

CHROMATOGRAPHY
PRODUCT GUIDE
2020/21



Архангельск (8182)63-90-72
Астана (7172)727-132
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89

Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Липецк (4742)52-20-81

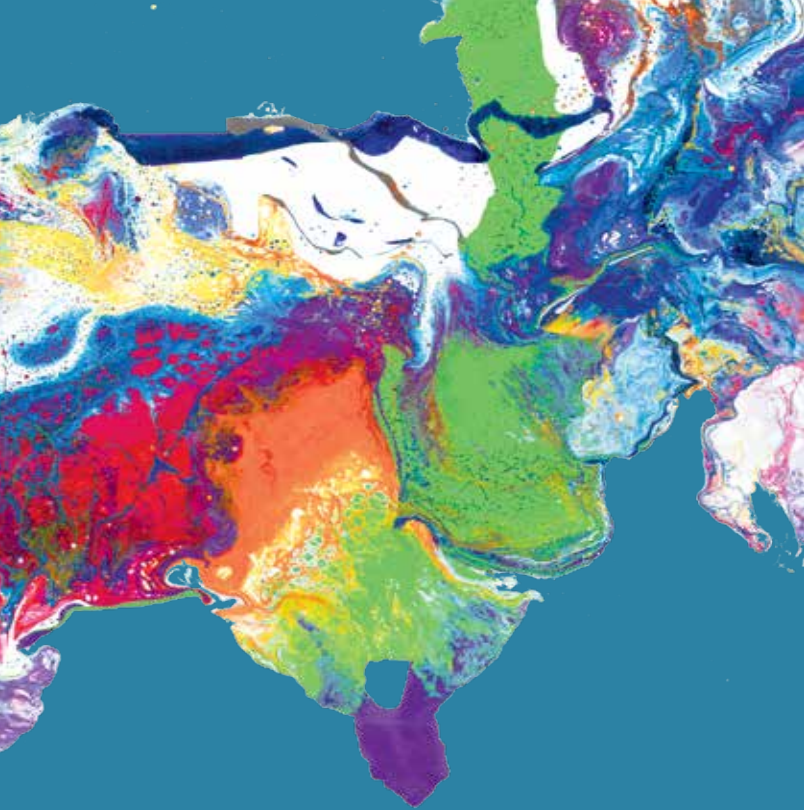
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16

Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
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Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
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Сургут (3462)77-98-35
Тверь (4822)63-31-35
Томск (3822)98-41-53
Тула (4872)74-02-29
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Ярославль (4852)69-52-93

Киргизия (996)312-96-26-47 Казахстан (772)734-952-31 Таджикистан (992)427-82-92-69

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Our Mission

The very existence of Phenomenex depends directly on the complete satisfaction of our customers. Therefore, it is our duty to acknowledge the contributions made by our customers and our staff toward the progress of the company. Further, it is our responsibility and foremost mission to promote the growth, prosperity, and well-being of those we serve — our customers, our employees, and humanity.

Demaris G. Mills
President



Founding Beliefs and Principles



- ▶ The oneness of humankind
- ▶ The abolition of all forms of prejudice such as those based on race, gender, religion, nationality, or class
- ▶ Upholding equal opportunity, rights and privileges for men and women
- ▶ The essential harmony of scientific and spiritual truths, which could constitute the ultimate basis for a peaceful, ordered, and progressive society
- ▶ Universal compulsory education for all children
- ▶ Economic justice
- ▶ Protection of human rights
- ▶ Protection of endangered species
- ▶ Protection of the environment



Chromatography

[krō'mə-tōg'rā-fē] *noun.*

To write with colors - literally translated from its Greek roots, *chroma* (*Khroma*) and “color” or “chromatin” and *graphein*.

Chromatography was first developed by the Russian botanist Mikhail Tswett in 1903 as he produced a colorful separation of plant pigments through a column of calcium carbonate. The key here is separation.

The technique of separating and analyzing of complex mixtures that rely on the different affinities of substances for a gas or liquid medium and for a stationary absorbing medium through which they pass. For example; a column of silica (liquid chromatography), or gas (gas chromatography) or gel (gel chromatography). Separation science.

Philanthropic Efforts and Passionate Commitment

2018/2019 has been an incredibly fulfilling year for our global Phenomenex family. From aiding those affected by natural disasters to granting the wish of a young boy with Leukemia, Phenomenex associates are passionate about helping those in need and will always be there when called upon.

Here are a few of our happiest 2019 moments.

Make-A-Wish for Charley

Phenomenex USA

Phenomenex partnered with Make-A-Wish Greater Los Angeles to grant the wish for young Charley, who has been battling Leukemia for about 5 years. Charley wished to be a paleontologist for the day, so him and his family were able to visit Paleo Adventures in South Dakota to visit and dig at a real excavation site for real dinosaurs. Charley has since finished his chemotherapy treatment and is working towards leaving cancer behind.



Providence Hospice Family Adoption and TrinityCare Kids Hospice

Phenomenex USA

For the holiday season, Phenomenex adopted 4 families in hospice care to give them the best holiday as possible. We were also able to donate over \$4,000 worth of toys to children in hospice care to be given out all year long.



Pediatric Therapy Network Donation

Phenomenex USA

Raised \$3,000 to support a local program that provides the community with high quality therapy, research, and education in order to best assist children with special needs.



Susan G. Komen Breast Cancer Run

Phenomenex USA

Phenomenex associates raised donations for breast cancer research, all while staying healthy by participating in the Susan G. Komen 5K and 10K Cancer Run.



UK Rossendale House Building

Phenomenex UK



A team from the Phenomenex UK office spent 2 full days building homes for The Rossendale Trust, which provides supported living care to adults with learning and physical disabilities.





UNICEF Trivia Night

Phenomenex USA

In typical nerd-fashion, Phenomenex associates gathered at a local brewery to help raise money for UNICEF through a friendly Trivia Night competition.



Los Angeles Food Bank Days

Phenomenex USA

Phenomenex volunteers have sorted over 45,000 pounds of food, equaling roughly 41,000 meals for those in need in the Los Angeles community.



UK vs Hach WaterAid Charity Soccer Game

Phenomenex UK

In the UK, Phenomenex and fellow Danaher OpCo, Hach, played in a friendly yet competitive soccer/football game to help raise money for the non-profit WaterAid.



India Clothing/Food Drive

Phenomenex IN

The Phenomenex India office gathered food, clothes, blankets, and medicine for those affected by the disastrous flood in Kerala.



France and Spain Bake Sale

Phenomenex France and Spain

The France and Spain office both held their own bake sales to help raise money for those affected by the natural disaster in Mozambique.



Italy – Rise Against Hunger

Phenomenex IT

The Italian office was able to pack 12,000 meals in 2 hours, which equates to helping to feed 48 children at school for one year in Zimbabwe.



Do Good Bus

Phenomenex USA

34 Phenomenex volunteers came together to build a new working garden for students at an inner-city middle school with the Do Good Bus organization. The garden will help students learn how to sustain and build a successful ecosystem.



Reference Standards

Phenova™ Certified Reference Materials

7 - 8



Reference Standards

Phenova Certified Reference Materials..... 8

“ The Phenova standards are well packaged and easy to use. ”

Van Spohn
ARI Labs, Inc., USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Reference Standards



Currently offered by Phenomenex in USA and Canada only. Other regions coming soon.

Certified Reference Materials For Organic Environmental Analysis

Calibration, Internal, and Surrogate Standards

Formulated and manufactured with the following quality characteristics:

- ISO/IEC 17025 and ISO Guide 34 compliant
- Raw materials are chosen from sources of the highest purity
- Characterized using qualified methods
- Produced with the lowest possible uncertainty
- Manufactured in labs that are ISO-accredited under documented procedures

An Exclusive Quality Factor

Phenova CRMs are manufactured by Phenova, Inc., an experienced proficiency testing (PT) provider who manufactures extremely precise PT standards for global environmental laboratories. Using the same strict precision to produce Phenova CRMs, laboratories benefit from a higher caliber of quality and **A New Standards of Confidence** with their analysis.



Visit

www.phenomenex.com/standards
for a full listing of products and analyte composition.



or

Call us and we can make a customized standard!

Who Needs to Use Certified Reference Materials?

All environmental labs accredited to ISO/IEC 17025 must use CRMs. Even if your lab does not have this accreditation it still benefits from having a high standard, quality product.

Located in Golden, CO, Phenova, Inc. is a subsidiary of Phenomenex, Inc. and is accredited to:

ISO Guide 34:2009

General requirements for the competence of reference material producers.

A2LA Cert No. 2427.02

ISO/IEC 17025:2005

General requirements for the competence of testing and calibration laboratories.

A2LA Cert No. 2427.03

ISO/IEC 17043:2010

Conformity assessment – General requirements for proficiency testing.

A2LA Cert No. 2427.01

TNI EL-V3-2009

General requirement for environmental proficiency testing providers.

A2LA Cert No. 2427.01



Chemical Testing Laboratory
Certificate No. 2427.03



Reference Material Producer
Certificate No. 2427.02



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“ We have found your syringe filters to be **competitively priced** and well made compared with our usual brand. They don't seem to clog as quickly and there is no loss of performance for our sample prep, usually 2mL vials of Pharmaceutical active ingredients.

” **Wes Herridge**
Laleham Healthcare, UK

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Phenex LC/GC Approved Syringe Filters

For sample and solvent filtration prior to LC or GC analysis

Phenex Offers:

- Broad chemical compatibility
- Minimized extractables
- Excellent flow rate
- High total throughput
- Certified quality
- 100 % integrity tested
- Low hold-up volume
- Low protein adsorption
- Bi-directional use



- Particulate, PVC, and extractable-free filters
- Less system downtime
- More consistent, reproducible results
- Increased column lifetime

Syringe Filter Selection Guide

1. Choose filter diameter based on sample volume

≤ 2mL Sample Volume	2 - 10mL Sample Volume	10 - 100mL Sample Volume
4 mm Diameter	15 mm Diameter	25 - 28 mm Diameter

2. Choose a pore size based on your sample

Sample Description	Recommended Filter Pore Size
General aqueous or mixed organic samples prior to LC analysis with columns packed with > 3 μm particles. General clarification of GC, SFC, CE, and GPC samples. Viscous samples or samples containing high levels of particulate matter.	0.45 μm
General aqueous or mixed organic samples prior to LC analysis with columns packed with ≤ 3 μm particles. Removal of fine particulate matter prior to GC, SFC, CE, and GPC samples.	0.20 μm
Viscous samples such as serum, plasma or other biological matrices. Solutions with high particulate load such as some environmental, biofuels or food and beverage applications.	Glass Fiber Filter with 0.45 μm filter membrane

3. Suggested syringe filter membranes

Membrane Type	Recommended Uses
RC (Regenerated Cellulose)	For Aqueous and Mixed Organic Solutions A broad range of aqueous and mixed-organic solutions. Fast-flow and ultra-low protein and non-specific binding characteristics. Broadly recommended as an excellent general purpose/high-performance sample filter for most applications.
PTFE, Teflon® (Polytetrafluoroethylene)	For 100% Organic Solutions Well-suited for the clarification of non-aqueous samples. Hydrophobic membrane, excellent for filtration of organic-based, highly acidic or basic samples and solvents. A hydrophobic membrane, that can be made hydrophilic by wetting with alcohol and then flushing with deionized water.

Additional syringe filter membranes

Membrane Type	Recommended Uses
PES (Polyethersulfone)	Polyethersulfone membranes exhibit very fast-flow and ultra-low protein binding characteristics. Phenex-PES membranes are typically broadly recommended for filtering critical biological samples, tissue culture media, additives and buffers.
NY (Nylon)	Nylon has inherent hydrophilic characteristics and works well for filtration of many aqueous and mixed-organic samples. In combination with a glass pre-filter (Phenex-GF/NY), this membrane is excellent for the filtration of particle-laden samples, such as foods and beverages, environmental, biofuels, and dissolution samples.
CA (Cellulose Acetate)	Cellulose Acetate (CA) membranes exhibit ultra-low protein binding and are broadly used in the filtration of biological samples. In combination with a glass pre-filter (Phenex-GF/CA), this membrane is excellent for filtration of tissue culture media, general biological sample filtration and clarification.
GF (Glass Fiber)	Glass Fiber (GF) filters are made of inert borosilicate glass and have a nominal 1.2 μm pore size. They are commonly used with highly viscous samples or samples containing high concentrations of particulate matter (e.g., food analysis, biological samples, soil samples, fermentation broth samples, removal of yeasts, molds, etc.).
PVDF (Polyvinylidene Fluoride)	Hydrophilic PVDF membrane provides high flow rates and throughput, low extractables, and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes.

Filtration Syringe Filters

Phenex™ Syringe Filters (cont'd)



Ordering Information ¹ Phenex Syringe Filters		4 mm Diameter for ≤ 2 mL sample volumes		15 mm Diameter for 2 – 10 mL sample volumes		25 - 28 mm Diameter for 10 – 100 mL sample volumes	
Membrane Type/Size	Part No.	Unit	Part No.	Unit	Part No.	Unit	
RC (Regenerated Cellulose)	AF0-3203-12	100/pk	AF0-2203-12	100/pk	AF0-8203-12 ⁵	100/pk	
	AF0-3203-52	500/pk	AF0-2203-52	500/pk	AF0-8203-52 ⁵	500/pk	
PES ³ (Polyethersulfone)	—	—	—	—	AF0-8208-12 ⁷	100/pk	
	—	—	—	—	AF0-8208-52 ⁷	500/pk	
PTFE ⁶ (Polytetrafluoroethylene)	AF0-3202-12	100/pk	AF0-2202-12	100/pk	AF0-1202-12	100/pk	
	AF0-3202-52	500/pk	AF0-2202-52	500/pk	AF0-1202-52	500/pk	
NY (Nylon)	AF3-3207-12	100/pk	AF0-2207-12	100/pk	AF0-1207-12	100/pk	
	AF3-3207-52	500/pk	AF0-2207-52	500/pk	AF0-1207-52	500/pk	
0.20 µm GF/NY ² (Glass Fiber/Nylon)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a Nylon (NY) membrane. Excellent for filtration of particle-laden samples, such as foods and beverages, environmental, biofuels, and dissolution samples. Use less hand pressure to filter even the most difficult samples. Outlet connection is luer lock.				AF0-1A47-12 ⁷	100/pk	
					AF0-1A47-52 ⁷	500/pk	
PVDF (Polyvinylidene Fluoride)	—	—	AF6-5206-12 ⁸	100/pk	AF6-6206-12	100/pk	
	—	—	AF6-5206-52 ⁸	500/pk	AF6-6206-52	500/pk	
GF/PVDF (Glass Fiber/Polyvinylidene Fluoride)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a PVDF membrane. The hydrophilic PVDF membrane provides high flow rates and throughput, low extractables and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes.				AF6-6C06-12	100/pk	
					AF6-6C06-52	500/pk	
CA ⁴ (Cellulose Acetate)	—	—	—	—	AF0-8204-12 ⁷	100/pk	
	—	—	—	—	AF0-8204-52 ⁷	500/pk	
GF/CA ^{2,3,4} (Glass Fiber/Cellulose Acetate)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a CA membrane. Excellent for filtration of tissue culture media, general biological sample filtration and clarification. Outlet connection is luer lock.				AF0-8A09-12 ⁷	100/pk	
					AF0-8A09-52 ⁷	500/pk	
RC (Regenerated Cellulose)	AF0-3103-12	100/pk	AF0-2103-12	100/pk	AF0-8103-12 ⁵	100/pk	
	AF0-3103-52	500/pk	AF0-2103-52	500/pk	AF0-8103-52 ⁵	500/pk	
PES ³ (Polyethersulfone)	—	—	—	—	AF0-8108-12 ⁷	100/pk	
	—	—	—	—	AF0-8108-52 ⁷	500/pk	
PTFE ⁶ (Polytetrafluoroethylene)	AF0-3102-12	100/pk	AF0-2102-12	100/pk	AF0-1102-12	100/pk	
	AF0-3102-52	500/pk	AF0-2102-52	500/pk	AF0-1102-52	500/pk	
NY (Nylon)	AF3-3107-12	100/pk	AF0-2107-12	100/pk	AF0-1107-12	100/pk	
	AF3-3107-52	500/pk	AF0-2107-52	500/pk	AF0-1107-52	500/pk	
0.45 µm GF/NY ² (Glass Fiber/Nylon)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a Nylon (NY) membrane. Excellent for filtration of particle-laden samples, such as foods and beverages, environmental, biofuels, and dissolution samples. Use less hand pressure to filter even the most difficult samples. Outlet connection is luer lock.				AF0-1B47-12 ⁷	100/pk	
					AF0-1B47-52 ⁷	500/pk	
PVDF (Polyvinylidene Fluoride)	—	—	AF6-5106-128	100/pk	AF6-6106-12	100/pk	
	—	—	AF6-5106-528	500/pk	AF6-6106-52	500/pk	
GF/PVDF (Glass Fiber/Polyvinylidene Fluoride)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a PVDF membrane. The hydrophilic PVDF membrane provides high flow rates and throughput, low extractables and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes.				AF6-6D06-12	100/pk	
					AF6-6D06-52	500/pk	
GF/CA ^{2,3,4} (Glass Fiber/Cellulose Acetate)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a CA membrane. Excellent for filtration of tissue culture media, general biological sample filtration and clarification. Outlet connection is luer lock.				AF0-8B09-12 ⁷	100/pk	
					AF0-8B09-52 ⁷	500/pk	
1.20 µm GF ^{2,3} (Glass Fiber)	Prefiltration of heavily contaminated or highly viscous samples. When used in-series preceding a membrane filter, clogging of the membrane filter is prevented and sample clean up is optimized. Outlet connection is luer lock.				AF0-8515-12 ⁷	100/pk	
					AF0-8515-52 ⁷	500/pk	



- Larger quantity purchases at significant savings are available.
- Glass fiber filters are 28 mm diameter and made of borosilicate. They will remove 90 % of all particles >1.2 µm.
- Housing material is methacrylate butadiene styrene (MBS) polymerisate. Also known as Cyrolite®.

- Cellulose acetate is surfactant-free.
- 26 mm diameter.
- Hydrophobic membrane. Can be made hydrophilic by pre-wetting with IPA.

- 28 mm diameter.
- 17 mm diameter.
- Additional dimensions and membrane types are available. Please contact your local Phenomenex technical consultant or distributor for availability or assistance.



Above syringe filters are non-sterile. Housing is made of medical-grade polypropylene (PP), and offer luer lock inlet/slip outlet connections, unless otherwise indicated.

Filtration Syringe Filters and Disposable Syringes

Phenex™ Syringe Filters (cont'd)

Syringe Filter Applications and Recommended Membranes

Application / Sample	Recommended Filter	First Alternative	Second Alternative
LC and GC Sample Prep	RC	PTFE	PES
Aggressive or Pure Organic Solvents	PTFE	RC	NY
Protein Analysis / Biological Samples	PES	RC	GF/CA
High Particulate Loads	GF/NY	GF + RC	PTFE
Environmental Methods	GF/NY	RC	PTFE
Food and Beverage	GF/NY	RC	PTFE
Clinical Research / Toxicology	RC	PES	NY
Dissolution Testing	GF/NY	RC	PTFE
Ion Chromatography	RC	PES	PTFE
Trace Metals (ICP-MS, AAS)	RC	PES	NY
Capillary Electrophoresis (CE)	RC	PES	NY
Tissue Cultures, Media, Buffers	GF/CA	PES	RC



For high load and particulate-laden samples you may consider placing a Glass Fiber (GF) prefilter, either integrated with the membrane as one unit (Phenex-GF/NY or -GF/CA) or in series with the membrane syringe filter of your choice.

Syringe Filter Finder
3-step tool designed to help you find the appropriate syringe filter to help you successfully remove particulates from your sample matrix.

Sterile Syringe Filters

Sterile syringe filters from Phenomenex are ready-to-use, individually blister packaged units, offering high flow rates at low inlet pressures, for rapid sterile filtration.



Ordering Information

Sterile Syringe Filters

Part No.	Pore Size (µm)	Disc Diameter (mm)	Membrane Material	Unit
AF0-8455	0.2	28	CA Luer/Slip	50/pk
AF0-8456	0.45	28	CA Luer/Slip	50/pk
AF0-8457	0.2	28	PES Luer/Slip	50/pk
AF0-8458	0.45	28	PES Luer/Slip	50/pk
AF0-8459	0.2	25	RC Luer/Slip	50/pk
AF0-8461	0.2	25	PTFE Luer/Slip	50/pk

All-Plastic Disposable Syringes

- Use for all syringe filter applications*
- Luer-lock outlet makes connection easy
- Made of ultra-clean, high-purity plastics



Ordering Information

All-Plastic Disposable Syringes

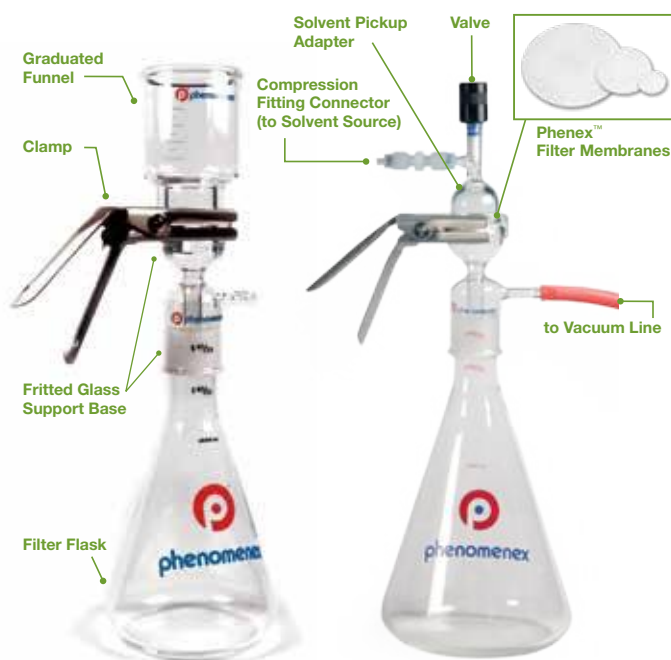
Part No.	Description	Capacity (mL)*	Unit
AS0-8408	Plastic Disposable Syringes, Luer-lock	3	100/pk
AS0-8409	Plastic Disposable Syringes, Luer-lock	5	100/pk
AS0-8410	Plastic Disposable Syringes, Luer-lock	10	100/pk
AS0-8411	Plastic Disposable Syringes, Luer-lock	20	100/pk

* Choose larger volume syringe to reduce force on syringe filter membrane. 10 mL syringe is recommended.

All-Glass Vacuum Mobile Phase Filtration System

FilterSys™

- Prevents pump and system component damage
- Rapid filtration of buffers, organics and corrosive liquids
- Removes damaging microparticulates and bacterial contaminants
- HPLC and GC solvent and sample filtration



WARNING: The apparatus should be used with a water aspiration line, not a true vacuum line, unless secured behind an appropriate safety shield.

Designed for rapid filtration of particulate matter from HPLC solvents, this unit is an excellent value. Protect your instrument and column from costly damage by clarifying all your HPLC solvents and buffer solutions before use. This vacuum filter assembly comes with a sample reservoir and receiving flask. A 47 mm diameter membrane filter is placed between the fritted-glass support base and the sample reservoir, secured in place by an aluminum clamp. The support base itself is connected to the receiving flask by a vacuum-tight ground-glass joint. Only low-extractable borosilicate glass and the membrane filter come into contact with the mobile phase. The vacuum hose connection is made above the filtration drip tip to prevent contamination from the vacuum line.

Recommended filter membranes: Nylon is a highly resistant material and can be used with almost all laboratory solvents. Since Nylon is hydrophilic, no prewetting of the filter is required. PTFE (Teflon®) membrane filters are excellent for organic or other aggressive solvent systems. Extremely low levels of extractables (plasticizers, contaminants, etc.) make this an excellent filter for trace analysis work. PTFE is hydrophobic, so it is not recommended for the filtration of aqueous solutions.

Ordering Information

Mobile Phase Filtration System

Part No.	Description	Unit
Complete Assembly		
AH0-1566	FilterSys, 47 mm, 300 mL funnel with 1 L vacuum flask	ea
AH0-3314	FilterSys, 47 mm, 500 mL funnel with 2 L vacuum flask	ea
AH0-3315	FilterSys, 47 mm, 1000 mL funnel with 4 L vacuum flask	ea
Component Parts		
AH0-1567	Fritted support base, 47 mm, 40/35 taper	ea
AH0-1568	Funnel, graduated, 300 mL, 47 mm	ea
AH0-3323	Funnel, graduated, 500 mL, 47 mm	ea
AH0-3324	Funnel, graduated, 1000 mL, 47 mm	ea
AH0-1569	1 liter filter flask, 40/35 taper	ea
AH0-3321	2 liter filter flask, 40/35 taper	ea
AH0-3322	4 liter filter flask, 40/35 taper	ea
AH0-1570	Aluminum clamp, 47 mm	ea
Filter Membranes		
AF0-0503	Nylon, 0.2 µm, 47 mm	100/pk
AF0-0504	Nylon, 0.45 µm, 47 mm	100/pk
AF0-0514	PTFE, 0.5 µm, 47 mm	100/pk



For compatible Solvent Pickup Adapter, see p. 14
For additional Filter Membranes, see p. 15



Verex™ Certified sample vials, inserts, caps, and seals are guaranteed to ensure problem-free, reproducible performance you can trust – all at competitive prices. See page 30

Solvent Reservoirs / Bottle Filter Cap

- Eliminates makeshift HPLC reservoir covers, such as aluminum foil, Parafilm®, etc.
- Neatly seals to prevent particulate contamination
- Minimizes solvent evaporation and gas absorption

A disposable filter (any size Luer lock Teflon® or nylon syringe filter) on the pressure equalization port minimizes the reabsorption of dissolved gases and prevents particle contamination. These assemblies fit the standard screw cap bottles with 38 mm cap size. The 1/8 in. OD Teflon feed line from the cap attaches directly to the HPLC pump. All cap parts are compatible with most common HPLC solvents.



Ordering Information

Filter Cap			
Part No.	Description	Cap Size	Unit
AH0-1565	Filter Reservoir Cap	38 mm	ea

Solvent Reservoir and Reagent Bottles

- Popular 1 and 2 liter sizes, equipped with 3-way valve cap
- Low-leaching (low alkali), borosilicate glass
- Chemically inert, internal PTFE seal

These wide-mouth GL45 mobile phase reservoirs come in 1- and 2-liter sizes. The reservoirs have easy-to-read volumetric markings to indicate the amount of solvent remaining. The versatile 3-way valve cap supplied with each reservoir provides a totally-inert PTFE (Teflon) seal against the solvents inside.



Ordering Information

Reservoir and Valve Cap Assembly*			
Part No.	Mfr. No.	Description	Unit
AH0-4142	3200	HPLC Reservoir, 1000 mL clear glass, GL45 wide-mouth, includes 3-way Valve Cap	ea
AH0-4143	3203	HPLC Reservoir, 2000 mL clear glass, GL45 wide-mouth, includes 3-way Valve Cap	ea

* Fittings not included. See p. 397 [AQ0-2950](#)

Increase Lab Safety with HPLC/UHPLC Solvent Protection SecurityCAP™

HPLC/UHPLC Solvent (Eluent) and Waste Protection

- **Safer Laboratory Work Environment**
Solvent vapors and gasses are restricted to the containers
- **Confidence During Quality and Safety Audits**
Eliminate aluminum foil or parafilm covering solvent bottles
- **Easy to Use**
No more twisting tubes during bottle exchange

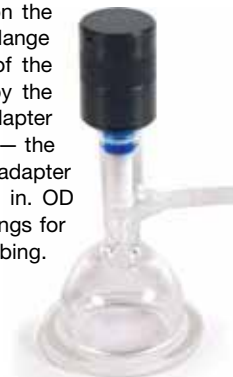


SecurityCAP Mobile Phase Safety Caps and Filters

SecurityCAP Waste Safety Caps and Filters

Solvent Pickup Adapter

This glass adapter enables direct pickup of mobile phase solvent for filtration using the Phenomenex FilterSys™ (see previous page). Safe in-line filtration with the pickup adapter replaces the tedious and dangerous pour-and-wait funnel filtration method. Eliminate the possibilities of spilling solvents and breathing toxic vapors. Replacing the funnel adapter on the FilterSys unit, the 47 mm pickup adapter with flange holds the membrane filter in place on top of the fritted support base, which in turn is held by the aluminum clamp (not included). The pickup adapter draws solvent directly from the reagent bottle — the safest way to transfer and filter solvents. The adapter includes a 4 mm PTFE (Teflon) valve with 1/4 in. OD outlet, PTFE 90° elbow with compression fittings for 1/4 in. OD tubing, and 3 feet of 1/4 in. OD PTFE tubing.



Ordering Information

Solvent Pickup Adapter		
Part No.	Description	Unit
AH0-2947	Mobile Phase Pickup Adapter, 47 mm	ea



For Ordering and Additional SecurityCAP Information, see pp. 391-392

Additional Filtration Products

Regular sample filtration means:

- Less system downtime
- Fewer troubleshooting problems
- Improved results

Removal of particulate matter to sub-micron levels is critical before any drug, tox, or dirty environmental sample is injected into an HPLC, GC or mass spectrometer. Also, products that remove matrix components, interferents, and chemical garbage will improve your results. Check out the following useful products:

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Filtration Products (General Laboratory)

- Syringe filters 10 - 12
- Membrane filters and filtration apparatus 13 - 15
- Solid Phase Extraction (SPE) devices
- Tubes and well plates 50 - 82
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Column Protection devices

- SecurityGuard
 - UHPLC (2.1 to 4.6 mm ID) 316
 - Analytical (2 to 8 mm ID) 311 - 315
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- Inlet filters
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Filter Membranes

Phenex™

- RC, Nylon, PTFE (Teflon®), and other membranes available
- Wide selection of membrane sizes

Phenex PTFE (Teflon®) and Regenerated Cellulose (RC) membrane filters offer excellent chemical resistance to almost all laboratory solvents and samples. They do not introduce unwanted plasticizers or extractables into the sample or mobile phase. Since Regenerated Cellulose (RC) is hydrophilic, filtering of aqueous solvents is simple. No prewetting is required. PTFE is hydrophobic and so is not recommended for the filtration of aqueous solutions.



Ordering Information

Filter Membranes				
Part No.	Pore Size (µm)	Disc Diameter (mm)	Membrane Material	Unit
Nylon				
AF0-0500	0.45	13	Nylon	100/pk
AF0-0501	0.2	25	Nylon	100/pk
AF0-0502	0.45	25	Nylon	100/pk
AF0-0503	0.2	47	Nylon	100/pk
AF0-0504	0.45	47	Nylon	100/pk
PTFE				
AF0-0512	0.45	25	PTFE	100/pk
AF0-0514	0.45	47	PTFE	100/pk
Cellulose Acetate (CA)				
AF0-8436	0.45	25	CA	100/pk
AF0-8437	0.2	25	CA	100/pk
AF0-8438	0.45	47	CA	100/pk
AF0-8439	0.2	47	CA	100/pk
Regenerated Cellulose (RC)				
AF0-8440	0.45	13	RC	100/pk
AF0-8441	0.2	13	RC	100/pk
AF0-8442	0.2	25	RC	100/pk
AF0-8443	0.45	47	RC	100/pk
AF0-8444	0.2	47	RC	100/pk
Polyethersulfone (PES)				
AF0-8445	0.2	25	PES	100/pk
AF0-8446	0.45	25	PES	100/pk
AF0-8447	0.2	47	PES	100/pk
AF0-8448	0.45	47	PES	100/pk
Cellulose Nitrate Ester (MCE)*				
AF0-8454	0.45	47	MCE	100/pk



*MCE = Mixed Cellulose Esters
Above filter membranes are non-sterile.
Phenex is a trademark of Phenomenex.



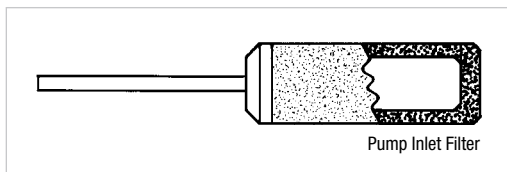
For a useful Membrane Selection Guide, see p. 10

Inlet Filters

Stainless Steel

- Protects pumps and check valves
- Easy to replace
- Low cost

HPLC solvent inlet filters are used at the low pressure inlet side of the pump to help protect the check valves, injector and column from damaging particulate contamination. Solvent filters are constructed of Hastelloy Steel and are available for 1/16 in. ID and 1/8 in. ID tubing. Due to the large surface area of the cylindrical frit, virtually no backpressure or cavitation is developed. The filter is easily cleaned by backflushing or sonicating.



Ordering Information

Solvent Inlet Filters - Stainless Steel

Part No.	Description	Unit
AF0-0356	Solvent Inlet Filter, 2 µm, for 1/16 in. ID tubing	ea
AF0-0359	Solvent Inlet Filter, 2 µm, for 1/8 in. ID tubing	ea
AT0-2955	Teflon Tubing, 5 ft. L x 1/8 in. OD x 1/16 in. (0.062 in.) ID	ea
AT0-2956	Teflon Tubing, 10 ft. L x 1/8 in. OD x 1/16 in. (0.062 in.) ID	ea
AT0-8609	Teflon Tubing, 5 ft. L x 1/4 in. OD x 1/8 in. (0.125 in.) ID	ea
AT0-8610	Teflon Tubing, 10 ft. L x 1/4 in. OD x 1/8 in. (0.125 in.) ID	ea



Important: Depending on the mobile phase, we recommend that you change your inlet filter every one to six months.



For disposable Syringe Filters offering convenient and economical sample and solvent filtration, see pp. 10 - 12

Metal-Free/Biocompatible

- Biocompatible
- Flat bottom design uses all available mobile phase
- High surface area for long filter life

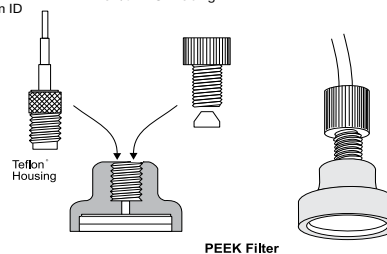
The Solvent Saver™ Inlet Filter Unit utilizes a flat filter element that sits parallel to the bottom of the HPLC reservoir. The design allows the filter to draw all but the last 2 % of the mobile phase from the reservoir without drawing air into the system.

The Solvent Saver Inlet Filter is manufactured by pressing a PEEK filter element into an inert Teflon® housing. The top of the housing has female 1/4 in.-28 threads to accept 1/8 or 1/16 in. OD tubing via PEEK flangeless fittings and Tefzel® ferrule (sold separately) or direct connect various size tubing using the Unifit adapter (sold separately). The Unifit adapter slip-fits onto 1.5, 2.2 or 3.0 mm ID tubing. This filter is excellent for sensitive biochromatography and ion chromatography applications where metal surfaces may corrode or interact with samples.



Unifit adapter (sold separately AQ0-8339) slip-fits onto 1.5, 2.2 or 3.0 mm ID tubing

1/4 in.-28 flangeless fitting (included) attaches to 1/8 in. OD tubing



Ordering Information

Solvent Saver Inlet Filter - Metal-Free

Part No.	Description	Unit
AH0-1562	Solvent Saver Inlet Filter with 10 µm PEEK filter with Flangeless fitting for 1/8 in. OD tubing	ea
AQ0-8339	Solvent Saver Unifit Adapter, Tri-Step Tubing Connector, PEEK	ea
AQ0-2949	Flangeless Nut and Ferrule for 1/8 in. OD tubing, 1/4 in.-28 threads, red Delrin	10/pk
AQ0-2950	Flangeless Nut and Ferrule for 1/8 in. OD tubing, 1/4 in.-28 threads, green Delrin	10/pk
AT0-2953	Teflon Tubing, 5 ft. L x 1/16 in. OD x 1/32 in. (0.031 in.) ID	ea
AT0-2955	Teflon Tubing, 5 ft. L x 1/8 in. OD x 1/16 in. (0.062 in.) ID	ea
AT0-2956	Teflon Tubing, 10 ft. L x 1/8 in. OD x 1/16 in. (0.062 in.) ID	ea
AT0-8610	Teflon Tubing, 10 ft. L x 1/4 in. OD x 1/8 in. (0.125 in.) ID	ea

In-Line Filters

Stainless Steel (Analytical)

- Removes particulates from flow path
- Minimizes sample peak dispersion

In-line Filters are available to protect expensive HPLC columns from damaging microparticulates. Using one of these filters between the injection valve and the column is recommended for all HPLC systems. The 3 mm diameter filter element is recommended for use with conventional 4.6 mm diameter columns. Column In-line Filters are supplied with two 6 cm L x 0.007 in. ID connecting tubes. Pressure rating is 5000 psi (345 bar).



Ordering Information

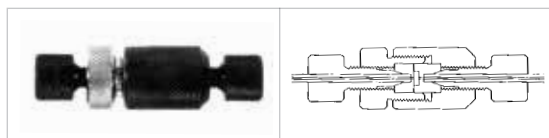
Stainless Steel In-Line Filters (Analytical)

Part No.	Description	Unit
AF0-0377	In-line Filter with 0.5 µm Porosity x 3 mm dia. filter	ea
AF0-0378	Replacement Filter Disks: 0.5 µm x 3 mm	5/pk

Metal-Free/Biocompatible (Analytical)

- Biocompatible
- Virtually no band broadening or peak distortion
- Easy fingertight connection


This in-line filter assembly removes fine particles from the solvent stream without adding band broadening or peak distortion to your separation. Microparticulates down to 0.5 µm are effectively removed before they have a chance to plug your column and degrade your separation. The Polyglas™ frit with fluoropolymer frit assembly design is fully biocompatible and easily installed using fingertight connections. Pressure-rated to 5000 psi (345 bar).




Ordering Information

Metal-Free/Biocompatible In-Line Filter (Analytical)

Part No.	Description	Unit
AF0-1736	In-line Filter, 0.5 µm Fit	ea

 For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 317-318

 For SecurityGuard™, the universal guard cartridge system, see p. 311

KrudKatcher™

- Universal fit to virtually all manufacturers' analytical columns
- Saves expensive columns and equipment from damaging microparticulates
- Convenient, disposable in-line filter

There are two types of KrudKatchers depending on system backpressure and dead volume demands: the KrudKatcher Classic and the KrudKatcher Ultra.

Whereas conventional in-line filters typically cost much more and often require replacement parts and tools, the KrudKatcher is a simple, low-cost unit that is easily replaced and discarded when the backpressure indicates clogging or excessive particle build up. The universal connection is compatible with all standard 1/16 in. 10-32 internal threaded end-fittings used in columns, guard columns, injector valves, and other LC equipment.

The KrudKatcher Classic:

- Pressure-rated to 5000 psi (345 bar)
- Hand-tightened connection



The PEEK filter body of the KrudKatcher Classic houses an integrated 316 stainless steel depth filter that efficiently removes microparticulates from the flow stream with minimal contributions to system dead volume (2 µL).

Ordering Information

KrudKatcher Classic Disposable In-Line Filter (Analytical)

Part No.	Description	Unit
AF0-5727	KrudKatcher Disposable Pre-Column Filter, 2.0 µm	10/pk

The KrudKatcher Ultra:

- Fits virtually all UHPLC / HPLC columns 1.0 to 4.6 mm ID
- Pressure rated to 20000 psi (1375 bar)
- Extremely low dead volume minimizes sample peak dispersion

The KrudKatcher Ultra filter body houses an integrated 2.0 µm 316 stainless steel depth filter that efficiently removes microparticulates from the flow stream without contributing to system backpressure or dead volume (<0.2 µL).



Ordering Information

KrudKatcher Ultra In-Line Filter (Analytical)

Part No.	Description	Unit
AF0-8497	HPLC KrudKatcher Ultra Column In-Line Filter, 2.0 µm Depth Filter x 0.004 in. ID	3/pk

KrudKatcher Ultra requires 9/16 in. wrench. Wrench not provided. See p. 401

In-Line Filters (cont'd)

Metal-Free/Biocompatible (SemiPrep)

- For columns 8 to 18 mm ID
- Effective pre-column filtration
- Replaceable filter element



Phenomenex's Biocompatible SemiPrep in-line filter holder with replaceable filter element (2 µm PEEK frit) will help protect your column investment by safely removing particulate matter and insoluble material from the mobile phase and sample matrix. The filter consists of a stainless steel body, two PEEK end-fittings, and a separate PEEK frit. When you need to replace the filter, simply unscrew the assembly, remove the frit and replace it. This filter unit can be placed in the flow path before or after the column with little or no effect on peak shape. Pressure rated to 6000 psi (414 bar).

Ordering Information

Metal-Free/Biocompatible In-Line Filter (SemiPrep)

Part No.	Description	Unit
AF0-8420	HPLC SemiPrep Column In-Line Filter 2.0 µm Porosity x 10 mm dia. filter, Biocompatible	ea
AF0-8428	Replacement In-Line Filter Disk, PEEK, 2.0 µm Porosity x 10 mm dia.	5/pk

Stainless Steel (PREP)

- Economical protection for preparative HPLC columns and injectors
- For columns 19 to 30 mm ID
- Replaceable filter element

Preparative columns and the HPLC systems on which they are used are costly and must be protected against fouling. Phenomenex's PREP In-line Filter holder with replaceable filter element (2 µm stainless steel frit) will help protect your investment by safely removing particulate matter and insoluble material from the mobile phase and sample matrix. The filter unit can be placed in the flow path before or after the column with little or no effect on peak shape. This versatile filter can also protect check valves, injectors and detectors. Pressure rated to 8000 psi (551 bar).



Ordering Information

Stainless Steel In-Line Filters (PREP)

Part No.	Description	Unit
AF0-7866	HPLC PREP Column In-line Filter, S.S., 2.0 µm Porosity x 21.2 mm dia.	ea
AF0-7867	Replacement In-Line Filter Disks, S.S., 2.0 µm Porosity x 21.2 mm dia.	5/pk
AQ0-7877	PREP Replacement O-Rings, 1 in. OD x 7/8 in. ID x 1/16 in. CS, Fluorocarbon	2/pk
AT0-0465	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 10 cm L	5/pk
AT0-0466	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 20 cm L	5/pk

Analytical Column Couplers

Sure-Lok™ Coupler

- Universal and reusable
- Solvent resistant material
- Low dead-volume connection
- Compatible with all 10-32 internal-threaded fittings

Applications:

- Filter to column
- Column to column
- Precolumn to column
- Column to detector



Sure-Lok Coupler (PEEK)

Sure-Lok Couplers contain two Sure-Lok male nuts at either end of a 5 cm long 1/16 in. tubing. The PEEK biocompatible coupler has all parts composed of PEEK, including the 0.010 in. ID tubing. Fingertight to 5000 psi (345 bar).

Ordering Information

Sure-Lok Couplers (Analytical to SemiPrep)

Part No.	Description	Unit
AQ0-1392	PEEK Sure-Lok Coupler	ea
AQ0-1393	PEEK Sure-Lok Coupler	10/pk

PREP Column Coupler



Ordering Information

PREP Column Coupler

Part No.	Description	Unit
AQ0-8376	PREP Coupler, Stainless Steel Tube, Nuts, and Ferrules 10-32 Threads, 1/16 in. OD x 0.030 in. ID	ea

Protect your column and equipment with Phenex™ Syringe Filters

Filtering your sample helps prevent column and frit blockage, undue wear on detectors, pumps, valves, injector seals, and abnormally high operating pressures. Non-filtered samples can also lead to non-reproducible results and significant instrument downtime.

For SecurityGuard™, the universal guard cartridge system, see p. 311



Syringes

GC Syringes.....	20
HPLC Syringes	25
General Use Syringes.....	27

“*Technical assistance is always very thorough.*”

Sherri Tapp
Symbiotic Research LLC

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

GC Syringes




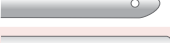

Technical Information

Needle Gauge Dimensions

Gauge	OD	ID
26	0.018 in. 0.46 mm	0.0102 in. 0.26 mm
26s	0.019 in. 0.47 mm	0.0050 in. 0.13 mm
25	0.021 in. 0.51 mm	0.0102 in. 0.26 mm
23s	0.025 in. 0.64 mm	0.0060 in. 0.15 mm
23	0.025 in. 0.64 mm	0.0132 in. 0.34 mm
22s	0.028 in. 0.72 mm	0.0060 in. 0.15 mm
22	0.028 in. 0.72 mm	0.0162 in. 0.41 mm



Needle Point Styles

Style	Description	Advantage
	AS/Cone	Exclusively for Agilent autosamplers
	2, BV (Beveled tip)	Optimal septum piercing for reduced septum coring
	3, LD (Blunt tip)	General sample pipetting and HPLC injectors
	5 (Conical with side hole)	Side hole for sample filling and dispensing, headspace
	H (Dome with side hole)	Side hole for sample filling and dispensing. Dome tip minimizes septum coring.

Needle / Needle Connection Styles

Style	Description	Manufacturer	Advantage
ASN	Autosampler Needle	Hamilton®	For use with autosamplers
ASRN	Autosampler Removable Needle	Hamilton	For use with autosamplers
RN	Removable Needle	Hamilton	Allows freedom to change needle style or replace broken needles
N	Cemented Needle	Hamilton	Low dead volume, for low-volume syringes
KH	Knurled Hub	Hamilton	Able to handle pressure up to 6000 psig
LTN	Luer Tip Cemented Needle	Hamilton	Fixed needle with Luer Tip, for mid-volume syringes
TLL	PTFE (Teflon®) Luer Lock	Hamilton	Luer Lock with locking hub for use with syringe filters
F	Fixed Needle	SGE®	Economical and more reproducible
R	Removable Needle	SGE	Allows freedom to change needle style or replace broken needles
FLL	Fixed Luer Lock	SGE	Allows use with syringe filters
LL	Luer Lock	SGE	Allows use with syringe filters



GC Autosampler Syringes

for Agilent® GC 7673, 7683, 7693, and 6850 Autosampler Systems

Ordering Information

Hamilton Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.	
Microliter Syringes										
5	ASN	23s	1.71 in.	Agilent	75	87987	9301-0892	20168	ea	ASO-4386
5	ASN	23s	1.71 in.	Agilent	75	87990	20170	6/pk	ASO-7641	
5	ASN	26s	1.71 in.	Agilent	75	87989	21230	6/pk	ASO-8683	
5	ASN	23s-26s	1.71 in.	Agilent	75	87993	24593	ea	ASO-8380	
10	ASRN	23s	1.71 in.	Agilent	701	80357	24795	ea	ASO-8836	
10	ASN	23s	1.71 in.	Agilent	701	80387	9301-0713	20167	ea	ASO-4387
10	ASN	23s	1.71 in.	Agilent	701	80390	9301-0725	20169	6/pk	ASO-4388
10	ASN	26s	1.71 in.	Agilent	701	80389	24599	6/pk	ASO-4389	
10	ASN	23s-26s	1.71 in.	Agilent	701	80393	24596	ea	ASO-8684	
10	ASN	23s-26s	1.71 in.	Agilent	701	80391	24600	6/pk	ASO-8685	
Teflon Tip Gastight® Syringes										
10	ASN	23s-26s	1.71 in.	Agilent	1701	80079	n/a	ea	ASO-8837	
10	ASN	23s	1.71 in.	Agilent	1701	80080	n/a	ea	ASO-9079	



*Similar to but not always an exact equivalent to the original manufacturer's product.

GC Syringes

GC Autosampler Syringes (cont'd)

for Agilent® GC 7673, 7683, 7693, and 6850 Autosampler Systems (cont'd)

SGE® Syringes										
Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.	
Microliter Syringes										
5	F	23	42 mm	Cone	SK-5F-HP-0.63	001814	24783	6/pk	ASO-8687	
5	F	26	42 mm	Cone	SK-5F-HP-0.47	001804	24782	6/pk	ASO-8688	
5	F	23s-26s	42 mm	Cone	SK-5F-HP-0.63/0.47	001822	21214	6/pk	ASO-8689	
5	F	23-26	42 mm	Cone	5F-HP-0.63*0.47	001821	5181-1273	21210	ea	ASO-5208
10	F	26	42 mm	Cone	SK-10F-HP-0.47	002804	24786	6/pk	ASO-7637	
10	R	23	42 mm	Cone	10RHP-0.63	002815	24795	ea	ASO-8690	
10	F	23	42 mm	Cone	10F-HP-0.63	002810	24785	ea	ASO-8691	
10	F	26	42 mm	Cone	SK-10F-HP-0.47	002804	24786	6/pk	ASO-7637	
10	F	23	42 mm	Cone	SK-10F-HP-0.63	002814	24787	6/pk	ASO-8692	
10	F	23s-26s	42 mm	Cone	10F-HP-0.63/0.47	002821	21212	ea	ASO-8693	
10	F	23s-26s	42 mm	Cone	SK-10F-HP-0.63/0.47	002822	21215	6/pk	ASO-8694	
Teflon® Tip Gastight® Syringes										
10	F	23	42 mm	Cone	HF-HP-GT-0.63	002812	24789	ea	ASO-8695	
10	F	23-26	42 mm	Cone	10F-HP-GT-0.63/0.47	002826	5181-1267	ea	ASO-5209	
10	F	23-26	42 mm	Cone	SK10F-HP-FT-0.63/0.47	002827	5181-3361	6/pk	ASO-5210	

for PerkinElmer® AutoSystem™ and Clarus® 500 GC Systems

Ordering Information

SGE Syringes									
Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
0.5	R	23	70 mm	Cone	0.5BR-PE-0.63	000478	24811	ea	ASO-8697
5	F	23	70 mm	Cone	5F-PE-0.63	001954	24813	ea	ASO-8698

for Varian® 8000 Series GC Systems

Ordering Information

SGE Syringes									
Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
10	R	25	53 mm	Side Hole	10R-VA8X-II	002924	24852	ea	ASO-8699
10	F	26	50 mm	Cone	10F-C/F-5/0.47C	002980	24922	ea	ASO-8700
10	F	26	50 mm	Bevel	10F-VA8400-5/0.47	002950	21202	ea	ASO-8701

for Shimadzu® AOC 9GC Systems

Ordering Information

Hamilton Syringes									
Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
5	RN	26s	2 in. /51 mm	2	75RN	87930	24617	ea	ASO-8702
5	N	26s	2 in. /51 mm	2	75N	87900	24938	ea	ASO-4390
10	RN	26s	2 in. /51 mm	2	701RN	80330	24530	ea	ASO-0100

Ordering Information

SGE Syringes									
Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
10	R	23	42 mm	Cone	10R-S-0.63	002898	24845	ea	ASO-8703



*Similar to but not always an exact equivalent to the original manufacturer's product.

GC Autosampler Syringes continued on next page.

GC Syringes

GC Autosampler Syringes (cont'd)

for Thermo Scientific® GC Systems

Ordering Information

SGE® Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
10	F	26	80 mm	Cone	10F-C/F-8/0.47C	002992	24924	ea	ASO-8704
10	R	26	80 mm	Cone	10R-C/F-8/0-0.47C	002993	24934	ea	ASO-8705

for CTC/LEAP GC Systems

Ordering Information

Hamilton® Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
1.2	N	26	2 in./51 mm	Cone	7701.2N	203185	22755	ea	ASO-8706

Ordering Information

SGE Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
10	F	23	50 mm	Cone	10F-C/F-5/0.63	002981	24923	ea	ASO-7638
10	R	23	50 mm	Cone	10R-C/F-5/0.63	002984	24932	ea	ASO-8709
10	F	26	50 mm	Cone	10F-C/F-5/0.47C	002980	24922	ea	ASO-8700
10	F	26	50 mm	Cone	SK10F-C/F-5/0.47C	002986	24925	6/pk	ASO-8711
10	R	26	50 mm	Cone	10R-C/F-5/0.47C	002982	24930	ea	ASO-8712



*Similar to but not always an exact equivalent to the original manufacturer's product.

GC Manual Syringes

Ordering Information

Hamilton Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microvolume Syringes									
5	N	26s	2 in./51 mm	2	75N	87900	24938	ea	ASO-4390
5	RN	26s	2 in./51 mm	2	75RN	87930	24617	ea	ASO-8702
10	N	26s	2 in./51 mm	2	701N	80300	20174	ea	ASO-0077
10	N	26s	2 in./51 mm	2	701N	80366	20175	6/pk	ASO-0016
10	RN	26s	2 in./51 mm	2	701RN	80330	24530	ea	ASO-0100
25	N	22s	2 in./51 mm	2	702N	80400	24531	ea	ASO-0078
10	N	26s	2 in./51 mm	5	701NPT5	80339	24967	ea	ASO-0094
Positive Displacement Syringes									
0.5	KH	25	2.75 in./70 mm	2	7000.5	86259	24545	ea	ASO-8715
1.0	KH	22	2.75 in./70 mm	2	7101	86211	24549	ea	ASO-8716
1.0	KH	25s	2.75 in./70 mm	2	7001	80135	24547	ea	ASO-1918
1.0	KH	25s	2.75 in./70 mm	3	7001	80100	24548	ea	ASO-8717
2.0	KH	25	2.75 in./70 mm	2	7002	88411	24551	ea	ASO-8718
5.0	KH	24	2.75 in./70 mm	2	7105	88011	24555	ea	ASO-8719
Teflon Tip Gastight Syringes									
10	N	26s	2 in./51 mm	2	1701	80000	24557	ea	ASO-4391
10	RN	26s	2 in./51 mm	2	1701	80030	24558	ea	ASO-1898
25	N	22s	2 in./51 mm	2	1702	80200	24559	ea	ASO-8720
25	RN	22s	2 in./51 mm	2	1702	80230	24560	ea	ASO-1899
50	N	22s	2 in./51 mm	2	1705	80900	24561	ea	ASO-0061
50	RN	22s	2 in./51 mm	2	1705	80930	24562	ea	ASO-1900
100	N	22s	2 in./51 mm	2	1710	81000	24563	ea	ASO-0062
100	RN	22s	2 in./51 mm	2	1710	81030	24564	ea	ASO-1901
250	N	22s	2 in./51 mm	2	1725	81100	24567	ea	ASO-0063

GC Syringes

GC Manual Syringes (cont'd)

Ordering Information

Hamilton® Syringes (continued)

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Teflon® Tip Gastight® Syringes (continued)									
250	RN	22s	2 in./51 mm	2	1725	81130	24568	ea	ASO-1902
500	LTN	22	2 in./51 mm	2	1750	81217	24571	ea	ASO-0064
500	RN	22	2 in./51 mm	2	1750	81230	24572	ea	ASO-1903
1 mL	LTN	22	2 in./51 mm	2	1001	81317	24575	ea	ASO-0065
1 mL	RN	22	2 in./51 mm	2	1001	81330	24576	ea	ASO-8721
1 mL	TLL	–	–	w/o slots	1001	81320	24578	ea	ASO-1907
2.5 mL	TLL	–	–	w/o slots	1002	81420	24584	ea	ASO-1908
2.5 mL	RN	22	2 in./51 mm	2	1002	81430	24582	ea	ASO-8722
2.5 mL	N	22	2 in./51 mm	2	1002	81417	24581	ea	ASO-8723
10 mL	TLL	–	–	w/o slots	1010	81620	20179	ea	ASO-1910

Ordering Information

SGE® Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microvolume Syringes									
5	F	26	50 mm	2	5F	001000	24700	ea	ASO-8725
5	R	26	50 mm	2	5R	001050	24701	ea	ASO-8726
10	F	26	50 mm	2	10F	002000	24702	ea	ASO-8727
10	F	26	50 mm	2	SK-10F	002030	24715	6/pk	ASO-8728
10	R	26	50 mm	2	10R	002050	24703	ea	ASO-8729
Positive Displacement Syringes									
1.0	R	23	70 mm	2	1BR-7BV	000506	24775	ea	ASO-8738
1.0	R	26	70 mm	Cone	1BR-7/0.47	000570	24776	ea	ASO-8739
Teflon Tip Gastight Syringes									
10	F	26	50 mm	2	10F-GT	002200	24725	ea	ASO-8741
25	F	25	50 mm	2	25F-GT	003200	24727	ea	ASO-8743
50	F	25	50 mm	2	50F-GT	004200	24729	ea	ASO-8744
50	R	25	50 mm	2	50R-GT	004250	24730	ea	ASO-8745
100	F	25	50 mm	2	100F-GT	005200	24734	ea	ASO-8746
100	R	25	50 mm	2	100R-GT	005250	24735	ea	ASO-8747
250	F	25	50 mm	2	250F-GT	006200	24738	ea	ASO-8748
250	R	25	50 mm	2	250R-GT	006250	24739	ea	ASO-8749
500	F	25	50 mm	2	500F-GT	007200	24742	ea	ASO-8750
1 mL	RN	23	50 mm	Bevel	1MDR-GT	008100	24750	ea	ASO-8845
1 mL	LL	–	–	–	1MDF-LL-GT	008025	24752	ea	ASO-0120
2.5 mL	R	23	50 mm	Bevel	MDR-GT	008500	–	ea	ASO-8752
5 mL	LL	–	–	–	5MDR-LL-GT	008760	24757	ea	ASO-0121
10 mL	LL	–	–	–	10MDR-LL-GT	008960	24759	ea	ASO-0122



*Similar to but not always an exact equivalent to the original manufacturer's product.

GC Syringes

VICI® Series A-2 Gas Syringes

- Push-button valve and smaller volumes
- Pressure-Lok® design offers gas-tight injections
- Inject without carrier backflushing to sharpen peaks and improve separations
- Leak-tight to 250 psi - liquids and gases
- No plunger "blow out" at elevated pressures

The A-2 features a push-button valve, which allows sample storage up to 250 psi in syringes as small as 25 µL. This is useful with small liquid samples containing low-boiling components that would be lost through evaporation using ordinary syringes.

The positive rear stop (in 100 µL and larger sizes) prevents plunger blowout at elevated pressures, protecting against sample loss or operator injury. Like the Series A gas syringe, the A-2 has all the standard Pressure-Lok features such as a PTFE plunger tip, PTFE-sealed needle and ultra-smooth bore. Replacement components are available for easy repair.



Ordering Information

VICI Precision Sampling Syringes

Part No.	Mfr. No.	Description	Capacity (µL)	Unit
ASO-4739	050023	Series A-2 Syringe	25	ea
ASO-4740	050024	Series A-2 Syringe	50	ea
ASO-4741	050025	Series A-2 Syringe	100	ea
ASO-4742	050031	Series A-2 Syringe	250	ea
ASO-4743	050032	Series A-2 Syringe	500	ea
ASO-4744	050033	Series A-2 Syringe	1000 (1 mL)	ea
ASO-4745	050034	Series A-2 Syringe	2000 (2 mL)	ea
ASO-4746	050035	Series A-2 Syringe	5000 (5 mL)	ea

Notes: (1) All other VICI Precision Sampling products not listed are available.
 (2) Removable needle: 0.028 in. x 0.005 in. x 2.00 in., bevel, open end on 25, 50 and 100 µL (p/n 943050, 3/pk); 0.029 in. x 0.012 in. x 2.00 in., bevel, open end on all others (p/n 943051, 3/pk).

Filtration Products from Phenomenex

"Filtration is the **easiest way** to improve your results, guard your system components from damage, and protect your column investment".



Phenex™ Syringe Filters

- Increase column lifetime and save money!
- Ensure more accurate, consistent results
- Eliminate damaging microparticulates

Particulates can damage expensive equipment, valves, columns and pumps. They can also lead to erratic analytical results. Pre-filtering samples prior to analysis is critical in preventing column and frit blockage, undue wear on valve seals, and abnormally high operating pressures.

Sample or Mobile Phase Volume (mL)	Filter Membrane (diameter, mm)	Format
≤ 2	4	Syringe filter
2 to 10	15	Syringe filter
10 to 100	25-28	Syringe filter
> 100	47	Membrane disk
> 1000	90	Membrane disk

Ordering Information¹

Part No.	Pore Size (µm)	Phenex Membrane
4 mm Diameter (500/pk)		
AF0-3103-52	0.45	RC
AF0-3102-52	0.45	PTFE ⁶
AF3-3107-52	0.45	NY
AF0-3203-52	0.20	RC
AF0-3202-52	0.20	PTFE ⁶
AF3-3207-52	0.20	NY
15 mm Diameter (500/pk)		
AF0-2103-52	0.45	RC
AF0-2102-52	0.45	PTFE ⁶
AF0-2107-52	0.45	NY
AF0-2203-52	0.20	RC
AF0-2202-52	0.20	PTFE ⁶
AF0-2207-52	0.20	NY
25–28 mm Diameter (500/pk)		
AF0-8103-525	0.45	RC
AF0-8108-527	0.45	PES ³
AF0-1102-52	0.45	PTFE ⁶
AF0-1107-52	0.45	NY
AF0-8B09-527	0.45	GF/CA ^{2,3,4}
AF0-8203-525	0.20	RC
AF0-8208-527	0.20	PES ³
AF0-1202-52	0.20	PTFE ⁶
AF0-1207-52	0.20	NY
AF0-8A09-527	0.20	GF/CA ^{2,3,4,7}
AF0-8515-527	1.20	GF ^{2,3}

Housing is made of medical-grade polypropylene (PP), unless otherwise indicated. Above syringe filters are non-sterile.

1. Additional membrane types available.
2. Glass fiber filters are 28 mm diameter and made of borosilicate. They will remove 90% of all particles >1.2µm.
3. Housing material is methacrylate butadiene styrene (MBS) polymerisate. Also known as Cyrolite®.
4. Cellulose acetate is surfactant-free.
5. 26 mm diameter.
6. Hydrophobic membrane. Can be made hydrophilic by pre-wetting with IPA.
7. 28 mm diameter.

Syringes continued on next page.



For additional Phenex Syringe Filters and a useful Membrane Selection Guide, see pp. 10-12

HPLC Syringes

for Rheodyne®, Altex and Valco® (VISF-2) Injectors



Ordering Information

Hamilton Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
5	RN	22s	2 in./51 mm	3	65	87943		ea	ASO-3353
10	N	22s	2 in./51 mm	3	701	80365	21250	ea	ASO-0022
25	N	22s	2 in./51 mm	3	702	80465	21251	ea	ASO-0023
50	N	22s	2 in./51 mm	3	705	80565	21252	ea	ASO-0024
100	N	22s	2 in./51 mm	3	710	80665	21253	ea	ASO-0025
250	N	22	2 in./51 mm	3	725	80765	21254	ea	ASO-0026
500	N	22	2 in./51 mm	3	750	80865		ea	ASO-0027

for Waters® U6K Injector, Removable Needle



Ordering Information

Hamilton Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	RN	25s	1.97 in./50 mm	3	801	84815	21255	ea	ASO-0028
25	RN	25s	1.97 in./50 mm	3	802	84816	21256	ea	ASO-0029
50	RN	25s	1.97 in./50 mm	3	805	84817	21257	ea	ASO-0030
100	RN	25s	1.97 in./50 mm	3	810	84818	21258	ea	ASO-0031

Hamilton® 10 mL Gastight® Priming Syringe, for Waters HPLC Pumps (Models 6000, 6000A, 501, 510, 610 and 610E)



Ordering Information

Hamilton Syringe

Volume (mL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	W	-	-	-	1010	81610	21265	ea	ASO-1906

Replacement Needles

Point Style #2 (Beveled Tip)



Ordering Information

Hamilton Replacement Needles

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
2.5-100	RN	26	2 in./51 mm	2	RN NDL	7758-04		6/pk	ASO-1904
25-100	RN	26	2 in./51 mm	2	RN NDL	7758-02	24939	6/pk	ASO-4392
25-100	RN	22s	2 in./51 mm	2	RN NDL	7758-03	24940	6/pk	ASO-4393
0.250-10 mL	RN	22s	2 in./51 mm	2	RN NDL	7779-03	24944	6/pk	ASO-4398

Point Style #3 (Blunt Tip)



Ordering Information

Hamilton Replacement Needles

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
2.5-100	RN	22s	2 in./51 mm	3	RN NDL	7770-01	24941	6/pk	ASO-4394
0.250-10 mL	RN	22	2 in./51 mm	3	RN NDL	7780-04	24945	6/pk	ASO-4397
0.250-10 mL	RN	22s	2 in./51 mm	3	RN NDL	7780-03		6/pk	ASO-4400



Needle point #2 (22 ° bevel) is used for GC and most applications that require the puncturing of a septum.



Needle point style #3 (90 °) is appropriate for HPLC applications.



*Similar to but not always an exact equivalent to the original manufacturer's product.



For Rheodyne HPLC Sample Injectors, see pp. 403-405

HPLC Syringes continued on next page.



Removable Needle (RN, R)



Cemented Needle (N, F)

HPLC Syringes

Replacement Needles (cont'd)

for Rheodyne®, Valco® HPLC Injectors, 2 in. Fixed Needles

Ordering Information

SGE® Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	F	22	2 in./51 mm	LD	10F-LC	002301	24860	ea	ASO-0142
25	F	22	2 in./51 mm	LD	25F-LC	003300	24861	ea	ASO-0143
50	F	22	2 in./51 mm	LD	50F-LC	004300	24862	ea	ASO-0144
100	F	22	2 in./51 mm	LD	100F-LC	005300	24863	ea	ASO-0145
250	F	22	2 in./51 mm	LD	250F-LC	006300	24864	ea	ASO-0146
500	F	22	2 in./51 mm	LD	500F-LC	007300	24865	ea	ASO-0147

for Rheodyne, Valco HPLC Injectors, 2 in. Removable Needles

Ordering Information

SGE Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	R	22	2 in./51 mm	LD	10R-GT-LC-SS	002313	24866	ea	ASO-4370
25	R	22	2 in./51 mm	LD	25R-GT-LC-SS	003312	24867	ea	ASO-4371
100	R	22	2 in./51 mm	LD	100R-GT-LC-SS	005312	24869	ea	ASO-4373
500	R	22	2 in./51 mm	LD	500R-GT-LC-SS	007312	24871	ea	ASO-4375

for PerkinElmer®, Fixed Needles

Ordering Information

SGE Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Unit	Part No.
5	F	23	2.76 in./70 mm	Cone	-	001957	ea	ASO-7636

for CTC/LEAP, Fixed Needles

Ordering Information

SGE Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Unit	Part No.
10	F	23	1.97 in./50 mm	Cone	-	002981	ea	ASO-7638



Removable Needle (RN, R)



Cemented Needle (N, F)



*Similar to but not always an exact equivalent to the original manufacturer's product.



For Rheodyne HPLC Sample Injectors, see pp. 403-405

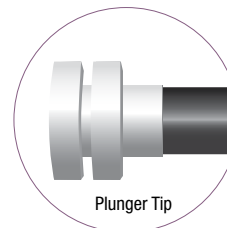
General Use Syringes

General Use Syringes for:

- Pipetting
- Diluting
- Delivering



Gastight syringes have a polymer tipped plunger, often PTFE, which essentially wipes the interior of the syringe barrels. This reduces the risk of deposition on the barrel which may cause cross-contamination or plunger seizing.



Hamilton® 1700 Series Gastight® Syringes, Needle Point Style 2 (Beveled)

Ordering Information

Hamilton Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	RN	26s	2 in./51 mm	2	1701	80030	24558	ea	ASO-1898
25	RN	22s	2 in./51 mm	2	1702	80230	24560	ea	ASO-1899
50	RN	22s	2 in./51 mm	2	1705	80930	24562	ea	ASO-1900
100	RN	22s	2 in./51 mm	2	1710	81030	24564	ea	ASO-1901
250	RN	22s	2 in./51 mm	2	1725	81130		ea	ASO-1902
500	RN	22s	2 in./51 mm	2	1750	81230		ea	ASO-1903



Hamilton 1700 Series Gastight Syringes, Needle Point Style 3 (Blunt)

Ordering Information

Hamilton Syringe

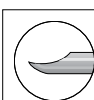
Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	RN	22s	2 in./51 mm	3	1701	80065		ea	ASO-4380
25	RN	22s	2 in./51 mm	3	1702	80265	24560	ea	ASO-4381
50	RN	22s	2 in./51 mm	3	1705	80965	24562	ea	ASO-4382
100	RN	22s	2 in./51 mm	3	1710	81065	24564	ea	ASO-4383
250	RN	22s	2 in./51 mm	3	1725	81165	24568	ea	ASO-4384
500	RN	22s	2 in./51 mm	3	1750	81265	24572	ea	ASO-4385

Hamilton 1000 Series Gastight Syringes

Ordering Information

Hamilton Syringe

Volume (mL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
1	TLL	-	-	w/o slots	1001	81320	24578	ea	ASO-1907
2.5	TLL	-	-	w/o slots	1002	81420	24584	ea	ASO-1908
5	TLL	-	-	w/o slots	1005	81520	20178	ea	ASO-1909
10	TLL	-	-	w/o slots	1010	81620	20179	ea	ASO-1910
-	TLL	22	2 in./51 mm	2	KF722	90122		6/pk	ASO-1915
-	TLL	16	2 in./51 mm	2	KF716	90116		6/pk	ASO-1916



Needle point #2 (22° bevel) is used for GC and most applications that require the puncturing of a septum.



Needle point style #3 (90°) is appropriate for HPLC applications.



*Similar to but not always an exact equivalent to the original manufacturer's product.

General Use Syringes continued on next page.

General Use Syringes

SGE® Syringes, Gas Tight Luer Lock

Ordering Information

SGE Syringe

Volume (mL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Unit	Part No.
1	F	-	-	-	1 mL GT	008025	ea	ASO-0120
5	R	-	-	-	5 mL GT	008760	ea	ASO-0121
10	R	-	-	-	10 mL GT	008960	ea	ASO-0122

SGE Replacement Needles, Removable, for Gas Tight Luer Lock Syringes

Ordering Information

SGE Replacement Needles

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
-	R	23	1.97 in./50mm	BV	NLL-5/23	039802	24763	5/pk	ASO-2016
-	R	23	1.97 in./50mm	H	NLL-5/23H	039803		2/pk	ASO-2017



*Similar to but not always an exact equivalent to the original manufacturer's product.

Phenex™ Syringe Filters

- Increase column lifetime and save money!
- Ensure more accurate, consistent results
- Eliminate damaging microparticulates

Ordering Information¹

Part No.	Pore Size (µm)	Phenex Membrane
4 mm Diameter (500/pk)		
AF0-3103-52	0.45	RC
AF0-3102-52	0.45	PTFE ⁶
AF3-3107-52	0.45	NY
AF0-3203-52	0.20	RC
AF0-3202-52	0.20	PTFE ⁶
AF3-3207-52	0.20	NY
15 mm Diameter (500/pk)		
AF0-2103-52	0.45	RC
AF0-2102-52	0.45	PTFE ⁶
AF0-2107-52	0.45	NY
AF0-2203-52	0.20	RC
AF0-2202-52	0.20	PTFE ⁶
AF0-2207-52	0.20	NY
25–28 mm Diameter (500/pk)		
AF0-8103-525	0.45	RC
AF0-8108-527	0.45	PES ³
AF0-1102-52	0.45	PTFE ⁶
AF0-1107-52	0.45	NY
AF0-8B09-527	0.45	GF/CA ^{2,3,4}
AF0-8203-525	0.20	RC
AF0-8208-527	0.20	PES ³
AF0-1202-52	0.20	PTFE ⁶
AF0-1207-52	0.20	NY
AF0-8A09-527	0.20	GF/CA ^{2,3,4,7}
AF0-8515-527	1.20	GF ^{2,3}

Housing is made of medical-grade polypropylene (PP), unless otherwise indicated. Above syringe filters are non-sterile.

1. Additional membrane types available.
2. Glass fiber filters are 28 mm diameter and made of borosilicate. They will remove 90% of all particles >1.2µm.
3. Housing material is methacrylate butadiene styrene (MBS) polymerisate. Also known as Cyrolite®.
4. Cellulose acetate is surfactant-free.
5. 26 mm diameter.
6. Hydrophobic membrane. Can be made hydrophilic by pre-wetting with IPA.
7. 28 mm diameter.



For additional Phenex Syringe Filters and a useful Membrane Selection Guide, see pp. 10-12

All-Plastic Disposable Syringes

- Use for all syringe filter applications
- Luer-lock outlet makes connection easy
- Capacities ranging from 3 to 20 mL
- Made of ultra-clean, high-purity plastics

Ordering Information

All-Plastic Disposable Syringes

Part No.	Description	Capacity (mL)*	Unit
ASO-8408	Plastic Disposable Syringes, Luer-lock	3	100/pk
ASO-8409	Plastic Disposable Syringes, Luer-lock	5	100/pk
ASO-8410	Plastic Disposable Syringes, Luer-lock	10	100/pk
ASO-8411	Plastic Disposable Syringes, Luer-lock	20	100/pk

*Choose larger volume syringe to reduce force on syringe filter membrane. 10 mL syringe is recommended.



Recommended Plastic Syringes for use with Phenex Syringe Filters

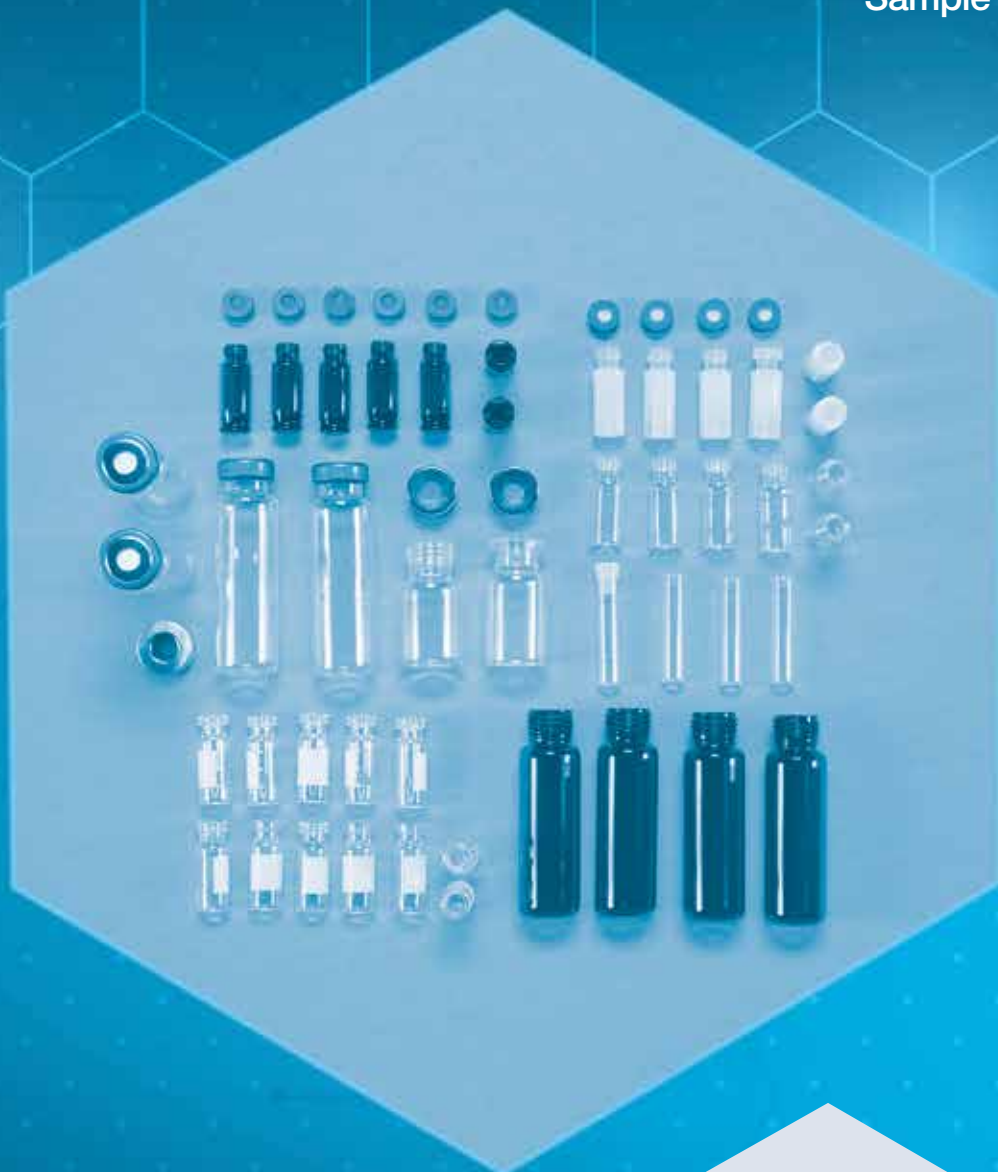
Part No. [ASO-8410](#):
10 mL Plastic Disposable Syringes, Luer-Lock 100/pk

Part No. [ASO-8411](#):
20 mL Plastic Disposable Syringes, Luer-Lock 100/pk



Pressure Forces Generated from Plastic Syringes:

- 20 mL can generate 2.0 bar
- 10 mL can generate 3.4 bar
- 5 mL can generate 5.2 bar
- 3 mL can generate 6.9 bar



Sample Vials

Autosampler Vials, Caps, Septa, and Inserts

Verex Vials Quality and Certification.....	30-31
8 mm	39
9 mm	32, 36-38
10 mm	32, 40
11 mm	32-35
13 mm	41
Limited Volume Specialty, 12 x 32mm.....	32
Shell Vials	41
Headspace Vials	42
VOA / ASE Vial Kits	43
Storage Vial Kits	43
Verex-EU Vials and Caps	44-46
Verex-IN Vials and Caps	47
Verex Vial Resources	48

“ I am **very pleased** to do business with Phenomenex. . . . for me you are a kind of benchmark for other companies. ”

Jos Mecklenfeld
QPS, Netherlands

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Vials for UHPLC/HPLC/GC/SFC and MS Analysis

Leading in Quality, Delivery, and Support

The most critical point of your analysis is when you put your sample in the vial. Verex certified sample vials, inserts, caps and seals are guaranteed to ensure problem-free, reproducible performance with consistent results you can trust.

All Vials, Caps, and Kits

- **Advanced manufacturing**
- **Multi-step QA/QC**
- **Cleanroom packaged**
- **Certified**

With the demand for better product reproducibility and performance in glass, septa and caps, we developed Verex HPLC / GC vial products with high quality materials to exceed industry specifications and tolerances. Verex innovative precision products provide air-tight, leak-free seals to safely transfer and store your most important samples. Through extensive testing, we've created guaranteed-fit vial products that offer compatibility with virtually any autosampler for trouble-free operation.

With tightly controlled 100% traceable manufacturing processes, we re-defined the standards for lot traceability and certification of every Verex product to ensure a uniform product with optimum performance for any application. For those with the most sensitive applications, choose Verex-Certified PLUS or Certified MSQ products for excellent ultra-grade cleanliness. Bottom line, Verex is your sample transfer and storage solution.

Vials and inserts are made of inert, high-purity, chemically-stable borosilicate glass to exacting specifications, individually heat-treated to burn off any impurities, then packaged in a cleanroom environment. Choose from crimp, snap, and screw types or mix and match vials and caps to your application. Most vials are offered with or without a write-on marking spot or "patch". For easy selection, purchase convenience, or assembled vial kits ready to go!

Verex caps / seals / closures are made to exacting specifications, giving a tight seal each and every time. The aluminum crimp seals, plastic screw and snap caps come with highly pure septa material and are available in pre-slit and non-slit formats. Economical press-fit and specially formulated bonded-in septa styles are both available. And our mass spec certified (MSQ) screw caps provide you with a state-of-the art solution for your most challenging, sensitive applications.

A variety of complete vial kits are available to meet the most demanding needs of chromatographers, from routine analytical to high-sensitivity work:

- **33 Expansion clear glass (USP Type 1 borosilicate, Class A), 51A amber glass**
- **Limited volume (high sample recovery) vials**
- **Silanized (deactivated) glass**
- **Polypropylene for biocompatibility**
- **Certified and special MS-certified (caps and vials)**

AUTOSAMPLER VIALS | VIALS - SAMPLE HANDLING

Three Levels of Certification

	LEVEL 1 Certified	LEVEL 2 Certified PLUS (Cert+)	LEVEL 3 Certified MSQ (Cert + MSQ) (Mass Spec Quality)
Ultra Clean Specially designed and treated for mass spectrometry (MS) applications.			✓
Low Bleed Special cap / closure processing, treating, and testing for low bleed of residual organics. For high sensitivity GC-MS and LC-MS applications.		✓	✓
Dimensionally Verified Machine vision cameras and gauges inspect critical dimensions and tolerances to produce uniform, defect-free products.	✓	✓	✓
Lot Traceable Vial and cap packs are 100% traceable through the manufacturing process. Certificate of Conformance available by lot number upon request.	✓	✓	✓
Clean Room Packaged Ensures particulate- and contaminate-free products for clean chromatography.	✓	✓	✓
Part Number Extension	No Extension	Certificate of Conformance Included; Extension -C	Certificate of Conformance Included; Extension -M
Part Number Example	ARO-8952-13	ARO-8952-13-C	ARO-8952-13-M



Vials for UHPLC/HPLC/GC/SFC and MS Analysis (cont'd)

All Verex products are fully lot-tested and certified. The "Certified PLUS" rating signifies the highest quality available from Phenomenex. A Certificate of Conformance is included. Depending on the product, Certified PLUS may indicate, for example, special processing or treating and/or testing for low bleed or residual organics. Certified products offer excellent performance, especially for high sensitivity, mass spectrometry applications.



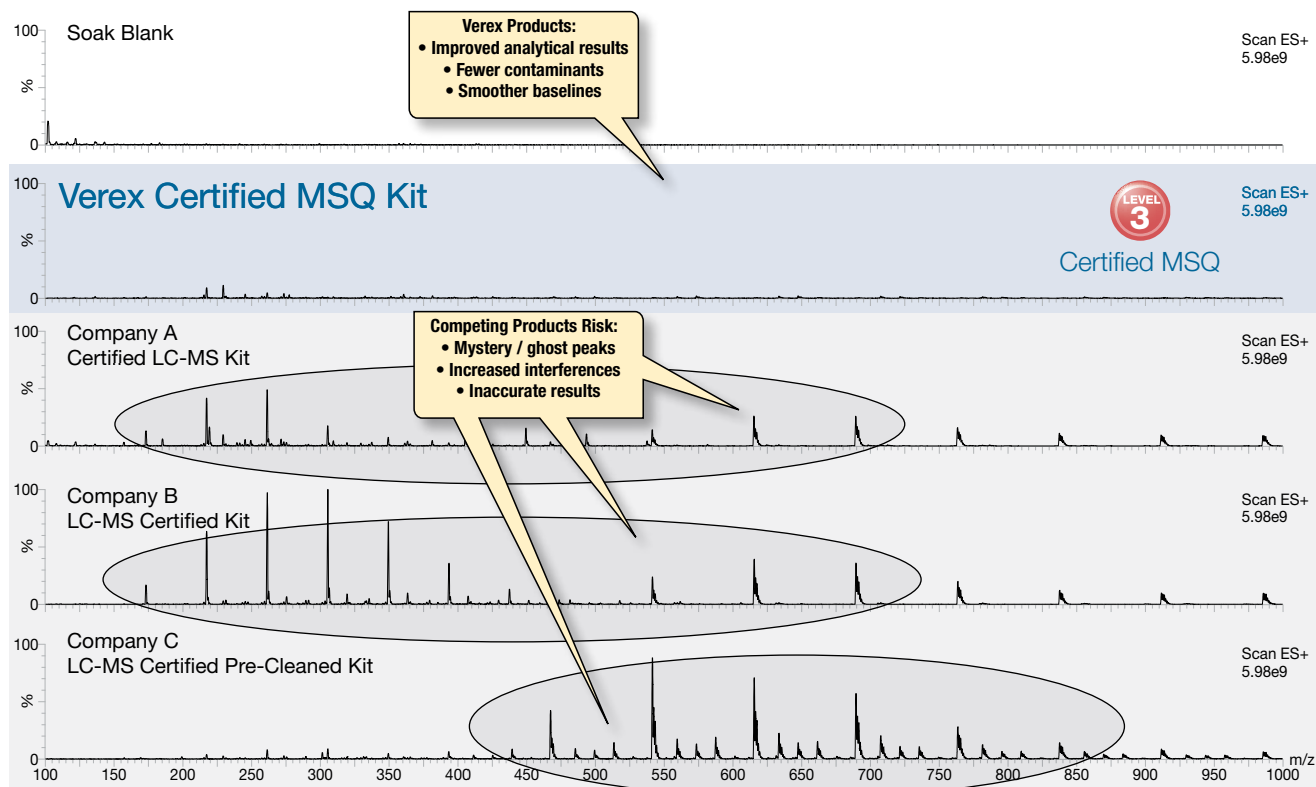
From the manufacturing of our products to their timely delivery and superior customer support, we are dedicated to continually improving our processes to consistently meet or exceed your expectations.



Vials, The Most Critical Part of Your Analysis!


Though they may look alike, not all vials offer equivalent performance. Variations in product quality can adversely affect your chromatography, leading to mystery peaks, loss of analytes, and

irreproducible results. Begin every analysis with high quality Verex products to minimize troubleshooting delays, and costly, unnecessary rework.



Comparative separations may not be representative of all applications.

12 x 32mm Limited Volume Specialty Vials and Kits

	Type and Description	Finish	Material	Total Volume	Residual Volume	Available as	Page Number	Part Numbers
	High-Recovery CD Vial Center-draining	9 mm Screw Thread	Glass	1.5 mL	< 20 µL	Convenience Kits (certified and regular)	37 37 36 36	ARO-9981-13 ARO-9982-13 ARO-9985-13-C ARO-9986-13-C
	Max-Recovery CD Vial Center-draining	11 mm Snap or 9 mm Screw Thread	Glass	1.5 mL	< 2 µL	Vials (regular) Convenience Kits (certified)	34 36 36	ARO-3680-12 ARO-9987-13-C ARO-9988-13-C
	Insert Vial µVial i2V	11 mm Snap	Glass	500 µL	< 2 µL	Vials (regular)	34 34	ARO-3630-13 ARO-3631-13
	Insert Vial µVial i3 (Qsert)	11 mm Snap or 9 mm Screw Thread	Glass	300 µL	< 4 µL	Convenience Kits (certified and regular)	34 34 37 37 36	ARO-9671-13 ARO-9672-13 ARO-9973-13 ARO-9974-13 ARO-9974-13-C
	Insert Vial µVial i3 (Qsert)	11 mm Crimp or 11 mm Snap or 9 mm Screw Thread	Glass	475 µL	< 4 µL	Vials (regular)	34 33 33 37 37	ARO-3625-13 ARO-3725-13 ARO-3726-13 ARO-3920-13 ARO-3921-13
	Insert Vial µVial i3 (Qsert)	10 mm Screw Thread	Glass	450 µL	< 2 µL	Vials (regular)	40 40	ARO-3020-13 ARO-3021-13
	Plastic Vial	9 mm Screw Thread	Polypropylene	700 µL	< 5 µL	Convenience Kits (certified)	36 36	ARO-9993-13-C ARO-9994-13-C
	Plastic Vial	11 mm Snap or 9 mm Screw Thread	Polypropylene	300 µL	< 2 µL	Convenience Kits (certified and regular) Vials (certified and regular)	34 34 37 37 36 34 37	ARO-9691-13-C ARO-9692-13-C ARO-9991-13 ARO-9992-13 ARO-9995-13-C ARO-36S0-13-C ARO-39S0-13-C
	Micro Vial with Tapered Base v-Vial	11 mm Crimp or 11 mm Snap or 9 mm Screw Thread or 10 mm Screw Thread	Glass	1.5 mL	< 4 µL	Vials (regular)	40 34 34 33 33 37 37	ARO-3040-13 ARO-3640-13 ARO-3641-12 ARO-3740-13 ARO-3741-13 ARO-3940-13 ARO-3941-13

AUTOSAMPLER VIALS | VIALS - SAMPLE HANDLING



9-425 neck finish represents a vial with a diameter of 9 mm across the outside of the threads and a thread style of 425.

12 x 32mm, 11 mm Crimp-Top Vial Products

Crimp-Top Vials, 2.0mL

- Cleaner vials eliminate ghost peaks and contaminants
- Used with most autosamplers, including Agilent®, Thermo Scientific®, Waters®
- Larger-opening “wide-mouth” style prevents broken needles and system downtime
- Precision neck improves crimping

Ordering Information

Description	1000/pk
Standard Opening	
Vial, Crimp, 2 mL Clear, No Patch	ARO-3700-13
Vial, Crimp, 2 mL Clear, w/ Patch	ARO-3710-13
Vial, Crimp, 2 mL Amber, w/ Patch	ARO-3711-13
Wide Mouth Opening	
Vial, Crimp, 2 mL Wide Mouth, Clear, No Patch	ARO-37K0-13
Vial, Crimp, 2 mL Wide Mouth, Clear, w/ Patch	ARO-37L0-13
Vial, Crimp, 2 mL Wide Mouth, Amber, No Patch	ARO-37K1-13
Vial, Crimp, 2 mL Wide Mouth, Amber, w/ Patch	ARO-37L1-13



Limited Volume Specialty Crimp-Top Vials

- Microsampling (center-draining and fused-insert vials)

Ordering Information

Description	100/pk	1000/pk
Vial, Crimp, v-Vial Clear, No Patch*	ARO-3740-12	ARO-3740-13
Vial, Crimp, v-Vial Amber, No Patch*	—	ARO-3741-13
Vial, Crimp, µVial i3 (Qsert), Clear, w/ Patch	ARO-3725-12	ARO-3725-13
Vial, Crimp, µVial i3 (Qsert), Amber, w/ Patch	ARO-3726-12	ARO-3726-13

*51-Expansion glass.



Seals / Closures for Crimp-Top Vials

- Excellent for volatile samples
- Extra clean to eliminate contamination
- Colored aluminum

Ordering Information

Description	1000/pk
Seal, 11 mm Diameter, Crimp, PTFE/Silicone, silver	ARO-5780-13
Seal, 11 mm Diameter, Crimp, PTFE/Silicone/PTFE, silver	ARO-5760-13
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, silver	ARO-5740-13
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, blue	ARO-5742-13
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, red	ARO-5741-13
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, green	ARO-5743-13
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, gold	ARO-5746-13
Seal, 11 mm Diameter, Crimp, PTFE, silver	ARO-5710-13



For Vial Inserts for Standard Opening Crimp-Top Vials, use 5 mm Diameter Inserts, see p. 39
 For Vial Inserts for Wide Mouth Crimp-Top Vials, use 6 mm Diameter Inserts, see p. 38

12 x 32 mm, 11 mm Snap-Top Vials and Kits

Convenience Kits – Snap-Top Vials and Seals / Closures

- Precision formed for autosampler fit
- Larger-opening “wide-mouth” style prevents broken needles and system downtime
- Rigorous quality testing for consistent performance
- Precise vial depth provides consistent sample recoveries



Ordering Information†

Description	1000/pk
Vial Kit, Snap Cap, 2 mL Clear, w/ Patch + PTFE/Silicone	ARO-9721-13
Vial Kit, Snap Cap, 2 mL Clear + PTFE/Silicone, preSlit	ARO-9727-13
Cert+ Vial Kit, Snap Cap, PP, 300 µL + PTFE/Silicone **	ARO-9691-13-C
Cert+ Vial Kit, Snap Cap, PP, 300 µL + PTFE/Silicone, preSlit**	ARO-9692-13-C

†No write-on patch unless otherwise indicated **Vial made of Polypropylene. ***Certified PLUS (Cert+) Level 2 Certification

Convenience Kits – Limited Volume Specialty Snap-Top Vials and Seals / Closures

- Microsampling (fused-insert vials)
- Cleaner vials eliminate ghost peaks and contaminants



Ordering Information

Description	100/pk	1000/pk
Vial Kit, Snap, µVial i3 (Qsert), Clear w/ Patch + PTFE/Silicone	ARO-9671-12	ARO-9671-13
Vial Kit, Snap, µVial i3 (Qsert), Clear w/ Patch + PTFE/Silicone, preSlit	ARO-9672-12	ARO-9672-13

Snap-Top Vials*, 2.0 mL

- Great for less volatile samples or high-throughput labs
- Save time, without crimping or twisting



Ordering Information

Description	1000/pk
Vial, Snap, 2 mL Clear, No Patch	ARO-3600-13
Vial, Snap, 2 mL Clear, w/ Patch	ARO-3610-13
Vial, Snap, 2 mL Amber, w/ Patch	ARO-3611-13
Vial, Snap, 2 mL Clear, w/ Patch, Silanized	ARO-3613-13
Vial, Snap, 2 mL Amber, w/ Patch, Silanized	ARO-3614-13

*Vials can accept either snap or crimp-tops to effectively seal the vial.

Limited Volume Specialty Snap-Top Vials

- For small volume microsamples (center-draining and fused-insert vials)
- One piece vial with fused-insert



Ordering Information

Description	100/pk	1000/pk
Vial, Snap, v-Vial i2V Clear, No Patch*	ARO-3640-12	ARO-3640-13
Vial, Snap, v-Vial i2V Amber, No Patch*	ARO-3641-12	—
Vial, Snap, µVial i2V Clear, No Patch	ARO-3630-12	ARO-3630-13
Vial, Snap, µVial i2V Amber, No Patch	ARO-3631-12	ARO-3631-13
Vial, Snap, µVial i3 (Qsert), Clear, w/ Patch	ARO-3625-12	ARO-3625-13
Vial, Snap, Maximum Recovery (CD), Clear, No Patch	ARO-3680-12	ARO-3680-13
Cert+ Vial, Snap, PP, 300 µL, Clear, No Patch***	ARO-36S0-12-C	ARO-36S0-13-C

*51-Expansion glass. **Vial made of Polypropylene. ***Certified PLUS (Cert+) Level 2 Certification



For Vial Inserts for Snap-Top Vials, use 6 mm Diameter Inserts, see p. 38

12 x 32 mm, 11 mm Snap-Top Vials and Kits (cont'd)

Seals / Closures for Snap-Top Vials

- Specially designed for secure fit
- Easily snap cap onto vial and pull cap off

Ordering Information

Description	1000/pk
No-Slit	
Seal, 11 mm Diameter, Snap, PTFE/Silicone, blue	ARO-5652-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone, Cert+, blue	ARO-5652-13-C
Seal, 11 mm Diameter, Snap, PTFE/Silicone, natural	ARO-5656-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone, red	ARO-5651-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone, green	ARO-5653-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone, yellow	ARO-5654-13
Seal, 11 mm Diameter, Snap, PTFE/Rubber, natural	ARO-5646-13
Seal, 11 mm Diameter, Snap, PTFE, blue	ARO-5612-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone/PTFE, blue	ARO-5661-13
preSlit	
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, blue	ARO-5672-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, natural	ARO-5676-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, red	ARO-5671-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, green	ARO-5673-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, yellow	ARO-5674-13



Simply choose the vial closure convenience kit for your application and you'll also receive a free dispenser box!



Make the Switch from your Current Vials and Caps to Verex!

2 Easy Steps:

- 1 Enter your current vial or cap part number
- 2 Order the recommended Verex part number

Finding the Verex replacement to your current vials and caps is EASY.

Use our online web tool to find the guaranteed Verex product match.

12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Kits Convenience Kits – Certified PLUS (Cert+) Mass Spec Quality (MSQ) 9mm Screw-Top Vials and Caps with Locked-Fit Septa

- For your most demanding analysis; high sensitive detectors
- HPLC and LC-MS tested and certified
- State-of-the-art design and manufacture



Ordering Information

Description	1000/pk
Cert+ MSQ Vial Kit, 9mm, 2 mL Clear w/ Patch + MSQ PTFE/Silicone	ARO-992A-13-M
Cert+ MSQ Vial Kit, 9mm, 2 mL Amber w/ Patch + MSQ PTFE/Silicone	ARO-992B-13-M

Convenience Kits – Certified PLUS (Cert+) 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- Certified for cleanliness and enhanced quality
- Polyethylene-Starburst cap is an excellent choice for inertness



Ordering Information

Description	1000/pk
Cert+ Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Silicone cap	ARO-9921-13-C
Cert+ Vial Kit, 9mm, 2 mL Clear w/ Patch + PE-Starburst cap	ARO-9927-13-C
Cert+ Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit cap	ARO-9926-13-C

Convenience Kits – Certified PLUS (Cert+) Limited Volume Specialty 9mm Screw-Top Vials and Caps

- Kits for microsampling (center-draining and fused-insert vials)
- Lower trace contaminants for higher sensitivity work
- Inert polypropylene (PP) vials for biochromatography, or pH-sensitive applications



Ordering Information*

Description	100/pk	1000/pk
Cert+ Vial Kit, 9mm, Maximum Recovery (CD) Clear + PTFE/Silicone cap ^o	ARO-9987-12-C	ARO-9987-13-C
Cert+ Vial Kit, 9mm, Maximum Recovery (CD) Clear + PTFE/Silicone, preSlit cap ^o	ARO-9988-12-C	ARO-9988-13-C
Cert+ Vial Kit, 9mm, High Recovery (CD) Clear + PE-Starburst cap [□]	ARO-9985-12-C	ARO-9985-13-C
Cert+ Vial Kit, 9mm, High Recovery (CD) Amber + PE-Starburst cap [□]	ARO-9986-12-C	ARO-9986-13-C
Cert+ Vial Kit, 9mm, µVial i3(Qsert) Clear w/ Patch + PTFE/Silicone, preSlit cap ^o	ARO-9974-12-C	ARO-9974-13-C
Cert+ Vial Kit, 9mm, PP, 300 µL + PE-Starburst cap ^{□**}	ARO-9995-12-C	ARO-9995-13-C
Cert+ Vial Kit, 9mm, PP, 700 µL + PTFE/Silicone cap ^{o**}	ARO-9993-12-C	ARO-9993-13-C
Cert+ Vial Kit, 9mm, PP, 700 µL + PTFE/Silicone, preSlit cap ^{o**}	ARO-9994-12-C	ARO-9994-13-C

*No write-on patch unless otherwise indicated **Vial made of Polypropylene.
^o-B = Bonded-In Septa. [□] Cap is one piece, constructed of ultra-pure, medical-grade polyethylene.

Convenience Kits – 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- Sample volume range from 0.2 to 1.5 mL



Ordering Information

Description	1000/pk
Vial Kit, 9mm, 2 mL Clear + PTFE/Silicone	ARO-9901-13
Vial Kit, 9mm, 2 mL Clear + PTFE/Silicone, preSlit	ARO-9903-13
Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Silicone	ARO-9921-13
Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Silicone, Silanized	ARO-9921-13-D
Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Silicone, preSlit	ARO-9925-13
Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Silicone, preSlit, Silanized	ARO-9925-13-D
Vial Kit, 9mm, 2 mL Clear + PTFE/Silicone/PTFE	ARO-9905-13
Vial Kit, 9mm, 2 mL Clear + PTFE/Rubber	ARO-9907-13
Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Rubber, preSlit	ARO-9914-13
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone	ARO-9922-13
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone, Silanized	ARO-9922-13-D
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit	ARO-9926-13
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit, Silanized	ARO-9926-13-D
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone/PTFE	ARO-9923-13
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Rubber	ARO-9912-13



12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Kits (cont'd)

Convenience Kits – Limited Volume Specialty 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- Kits for microsampling (center-draining and fused-insert vials)
- CD and Qsert vials offer superior performance over vials with loose inserts
- Polypropylene (PP) vial kits for bio- or ion-chromatography, or pH-sensitive samples

Ordering Information*

Description	100/pk	1000/pk
Vial Kit, 9 mm, High Recovery (CD) Clear + PTFE/Silicone	ARO-9981-12	ARO-9981-13
Vial Kit, 9 mm, High Recovery (CD) Clear + PTFE/Silicone, preSlit	ARO-9982-12	ARO-9982-13
Vial Kit, 9 mm, µVial i3 (Qsert) Clear w/ Patch + PTFE/Silicone	ARO-9973-12	ARO-9973-13
Vial Kit, 9 mm, µVial i3 (Qsert) Clear w/ Patch + PTFE/Silicone, preSlit	ARO-9974-12	ARO-9974-13
Vial Kit, 9 mm, PP, 300 µL + PTFE/Silicone**	ARO-9991-12	ARO-9991-13
Vial Kit, 9 mm, PP, 300 µL + PTFE/Silicone, preSlit**	ARO-9992-12	ARO-9992-13

*No write-on patch unless otherwise indicated **Vial made of Polypropylene.



Convenience Kits – Assembled 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- Cap and septa attached to vials
- Ready to use
- Save time and labor

Ordering Information

Description	1000/pk
Vial Kit, 9 mm, 2 mL Clear w/ Patch + PTFE/Silicone, preSlit	ARO-9925-13-A
Vial Kit, 9 mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit	ARO-9926-13-A



9 mm Screw-Top Vials, 2.0 mL

- Used with most autosamplers, including Agilent®, Thermo Scientific®, Waters® and many others
- Performs as well as crimp or snap vials
- Offers improved cap convenience and accessibility (easy on, easy off)

Ordering Information

Description	1000/pk
Vial, 9 mm Screw, 2 mL Clear, No Patch	ARO-3900-13
Vial, 9 mm Screw, 2 mL Amber, No Patch	ARO-3901-13
Vial, 9 mm Screw, 2 mL Clear, w/ Patch	ARO-3910-13
Vial, 9 mm Screw, 2 mL Amber, w/ Patch	ARO-3911-13
Vial, 9 mm Screw, 2 mL Clear, w/ Patch, Silanized	ARO-3960-13



Limited Volume Specialty 9 mm Screw-Top Vials

- Microsampling Qsert and v-Vial center-draining vials
- Qsert fused-insert vials ensure proper seating of the cap
- Extremely low residual volume

Ordering Information

Description	100/pk	1000/pk
Vial, 9 mm Screw, µVial i3 (Qsert) Clear, No Patch	ARO-3920-12	ARO-3920-13
Vial, 9 mm Screw, µVial i3 (Qsert) Amber, No Patch	ARO-3921-12	ARO-3921-13
Vial, 9 mm Screw, v-Vial Clear, No Patch*	ARO-3940-12	ARO-3940-13
Vial, 9 mm Screw, v-Vial Amber, No Patch*	ARO-3941-12	ARO-3941-13
Cert+ Vial, 9 mm, Screw, PP, 300 µL Clear, No Patch**	ARO-39S0-12-C	ARO-39S0-13-C

* 51-Expansion glass. **Vial made of Polypropylene.



12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Kits (cont'd)

Certified PLUS (Cert+) Mass Spec Quality (MSQ) Caps for 9 mm Screw-Top Vials

- HPLC and LC-MS tested and certified
- For your most demanding analysis; high sensitive detectors
- Locked-fit provides a positive physical septa lock into the cap



MS Quality. Constructed of virgin polymers, free of siloxanes and trace contaminants, these caps are the cleanest available from Phenomenex.

Ordering Information

Description	1000/pk
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone septa, blue	ARO-8952-13-M
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone preSlit septa, blue	ARO-8972-13-M



Certified PLUS (Cert+) Caps for 9 mm Screw-Top Vials

- Certified ultra-clean
- High-grade, preconditioned raw materials
- Finished product inspected and LC-MS tested



Ordering Information

Description	1000/pk
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	ARO-8952-13-C
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	ARO-8972-13-C
Cert+ Cap (one-piece*), 9 mm PE w/ Starburst preSlit, natural*	ARO-89P6-13-C



*Cap is one piece, constructed of ultra-pure, medical-grade polyethylene

Bonded-In Caps for 9 mm Screw-Top Vials

- Bonded septa caps eliminate costly liner/septa fallout
- Prevents rework and wasted productivity with perfect-fit septa
- Saves instrument downtime



Ordering Information

Description	1000/pk
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, black	ARO-8957-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	ARO-8952-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, natural	ARO-8956-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, red	ARO-8951-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, green	ARO-8953-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, black	ARO-8977-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	ARO-8972-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, grey	ARO-8976-13-B



For a more economical alternative, Press-Fit Caps are available. Contact your Phenomenex technical consultant or distributor.



Description	100/pk
Poly/Steel Caps	
Poly/Steel Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	ARO-895P-12-B
Poly/Steel Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	ARO-897P-12-B



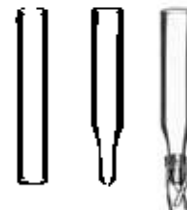
Inserts for 9 mm Screw-Top Vials

- For limited volume sampling in 2 mL sample vials
- Virtually no adsorption or pH effects
- Precisely centers and fits vial neck
- Offers maximum opening to sampling needle

Ordering Information^A

Description	500/pk	1000/pk
Insert, 6 mm Diameter, Flat Bottom, 450 µL	ARO-4610-52	—
Insert, 6 mm Diameter, Flat Bottom, 450 µL, Silanized	ARO-4615-52	—
Insert, 6 mm Diameter, Conical Bottom, 350 µL	—	ARO-4620-13
Insert, 6 mm Diameter, Conical Bottom, w/ bottom spring, 300 µL	—	ARO-4621-13
Insert, 6 mm Diameter, Conical Bottom, w/ bottom spring, 300 µL, Silanized	—	ARO-4623-13

^AApproximate useable volume indicated in µL



12 x 32 mm, 8 mm (8-425) Screw-Top Vials

8 mm Screw-Top Vials, 2.0 mL

- Standard-neck vials for Agilent® and Shimadzu® autosamplers
- 33-Expansion clear glass (USP Type 1 borosilicate, Class A), 51A amber glass

Ordering Information

Description	1000/pk
Vial, 8 mm Screw, 2 mL Clear, No Patch	ARO-3800-13
Vial, 8 mm Screw, 2 mL Clear, w/ Patch	ARO-3810-13
Vial, 8 mm Screw, 2 mL Amber, No Patch	ARO-3801-13
Vial, 8 mm Screw, 2 mL Amber, w/ Patch	ARO-3811-13



Caps / Closures for 8 mm Screw-Top Vials

- Prevent rework and wasted productivity with perfect fit bonded-in septa
- Fewer trace contaminants for higher sensitivity work

Ordering Information

Description	1000/pk
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone septa, black*	ARO-8857-13-B
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone preSlit septa, black*	ARO-8877-13-B
Cap (pre-assembled), 8-425, w/ PTFE/Silicone septa, black**	ARO-8857-13
Cap (pre-assembled), 8-425, w/ PTFE/Silicone preSlit septa, black**	ARO-8877-13
Cap (pre-assembled), 8-425, w/ PTFE/Silicone septa, w/ flange, yellow	ARO-8834-13
Cap (pre-assembled), 8-425, w/ PTFE/Silicone/PTFE septa, black**	ARO-8867-13
Cap (pre-assembled), 8-425, w/ Open-top cap (w/o septa), black	ARO-8897-13



*-B = Bonded-in Septa

**Press-Fit-Septa

Septa for 8 mm Screw Caps

- Preconditioned and tested
- For caps / closures without septa ([ARO-8897-13](#))

Ordering Information

Description	1000/pk
Septa, 8 mm Diameter, PTFE/Silicone 0.060 in	ARO-6853-13
Septa, 8 mm Diameter, PTFE/Silicone/PTFE 0.060 in	ARO-6863-13
Septa, 8 mm Diameter, PTFE 0.010 in	ARO-6817-13

Inserts for 8 mm Screw-Top Vials

- For limited volume sampling
- Precisely centers and fits vial neck
- Transforms full capacity vials to micro sample vials

Ordering Information^Δ

Description	500/pk	1000/pk
Insert, 5 mm Diameter, Flat Bottom, 200 μL	ARO-4510-52	ARO-4510-13
Insert, 5 mm Diameter, Conical Bottom, 100 μL	—	ARO-4520-13
Insert, 5 mm Diameter, Conical Bottom, w/ bottom spring, 175 μL	—	ARO-4521-13

^ΔApproximate useable volume indicated in μL



12 x 32 mm, 10 mm (10-425) Screw-Top Vials and Kits

Convenience Kits

10 mm Screw-Top Vials and Caps with Bonded-In Septa

- Available in assembled ready to use kits
- Offered with silanization

Ordering Information

Description	100/pk	1000/pk
Vial Kit, 10 mm, 2 mL Clear, No Patch + PTFE/Silicone, preSlit	—	ARO-9003-13
Vial Kit, 10 mm, 2 mL Clear, No Patch + PTFE/Silicone, Silanized	ARO-9005-12	—
Vial Kit, 10 mm, 2 mL Clear, No Patch, PTFE/Silicone + preSlit, Silanized	ARO-9006-12	—
Vial Kit, 10 mm, 2 mL Clear, w/ Patch + PTFE/Silicone*	—	ARO-9021-13-A
Vial Kit, 10 mm, 2 mL Amber, w/ Patch + PTFE/Silicone*	—	ARO-9022-13-A

*-A = Assembled



10 mm Screw-Top Vials, 2.0 mL

- Easy-to-fill wide-neck vials

Ordering Information

Description	1000/pk
Vial, 10 mm Screw, 2 mL Clear, No Patch	ARO-3000-13
Vial, 10 mm Screw, 2 mL Clear, w/ Patch	ARO-3010-13
Vial, 10 mm Screw, 2 mL Clear, No Patch, Silanized	ARO-3003-13
Vial, 10 mm Screw, 2 mL Amber, No Patch	ARO-3001-13
Vial, 10 mm Screw, 2 mL Amber, w/ Patch	ARO-3011-13



Limited Volume Specialty 10 mm Screw-Top Vials

- Microsampling Qsert and center-draining vial
- Extremely low residual volume

Ordering Information

Description	100/pk	1000/pk
Vial, 10 mm Screw, µVial i3 (Qsert) Clear, No Patch	ARO-3020-12	ARO-3020-13
Vial, 10 mm Screw, µVial i3 (Qsert) Amber, No Patch	ARO-3021-12	ARO-3021-13
Vial, 10 mm Screw, v-Vial, Clear, No Patch	ARO-3040-12	ARO-3040-13



Caps / Closures

for 10 mm Screw-Top Vials

- High quality preconditioned septa
- Bonded-in or press-fit
- Prevent rework and wasted productivity with perfect fit bonded-in septa

Ordering Information

Description	1000/pk
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone septa, black*	ARO-8057-13-B
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone preSlit septa, black*	ARO-8077-13-B
Cap (pre-assembled), 10-425, w/ PTFE/Silicone septa, black**	ARO-8057-13
Cap (pre-assembled), 10-425, w/ PTFE/Silicone preSlit septa, black**	ARO-8077-13

*-B = Bonded-in Septa
**Press-fit Septa



Inserts

for 10 mm Screw-Top Vials

- For limited volume sampling
- Precisely centers and fits vial neck

Ordering Information^Δ

Description	500/pk	1000/pk
Insert, 6 mm Diameter, Flat Bottom, 450 µL	ARO-4610-52	—
Insert, 6 mm Diameter, Flat Bottom, 450 µL, Silanized	ARO-4615-52	—
Insert, 6 mm Diameter, Conical Bottom, 350 µL	—	ARO-4620-13
Insert, 6 mm Diameter, Conical Bottom, w/ bottom spring, 300 µL	—	ARO-4621-13
Insert, 6 mm Diameter, Conical Bottom w/ bottom spring, 300 µL, Silanized	—	ARO-4623-13

^ΔApproximate useable volume indicated in µL



15 x 45 mm, 13 mm (13-425) Screw-Top Vials and Kits

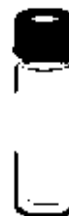
Convenience Kits – 13mm Screw-Top Vials and Caps

- Original Waters® 4 mL WISP™ autosampler vial
- General purpose sample / standard storage vial

Ordering Information

Description	1000/pk
Vial Kit, 4 mL Clear w/ Patch + screw caps 13-425, PTFE/Silicone* ^Δ	ARO-9321-13-A
Vial Kit, 4 mL Amber w/Patch + screw caps 13-425, PTFE/Silicone*	ARO-9422-13-A
Vial Kit, 4 mL Amber w/ Patch + screw caps 13-425, PTFE 0.01 in.*	ARO-9392-13-A

*-A = Assembled. ^Δ = Bonded-In Septa



13mm Screw-Top Vials, 4.0mL

Ordering Information

Description	1000/pk
Vial, 4 mL Screw Clear, No Patch	ARO-3300-13
Vial, 4 mL Screw Clear, w/ Patch	ARO-3310-13
Vial, 4 mL Screw Amber, No Patch	ARO-3301-13



Limited Volume Specialty 13mm Screw-Top Vials

- Center-draining bottom for low-volume samples

Ordering Information

Description	100/pk	1000/pk
Vial, 4 mL Screw High Recovery (CD) Clear, No Patch	ARO-3370-12	ARO-3370-13



Caps / Closures for 13mm Screw Top Vials

- High quality, pre-conditioned septa
- Available with bonded-in septa

Ordering Information

Description	1000/pk
Cap (pre-assembled), 13-425, w/ Bonded-in PTFE/Silicone septa, black*	ARO-8357-13-B
Cap (pre-assembled), 13-425, w/ PTFE/Silicone septa, black ^{ΔΔ}	ARO-8357-13

*-B = Bonded-in Septa. ^{ΔΔ} = Press-fit



Shell Vials

- Original 1 mL and 4 mL shell vials for Waters® 96- and 48-position autosampler trays
- Kits include high-quality borosilicate glass vials with convenient push-in polyethylene cap

Convenience Kits – Shell Vials, 1.0 and 4.0 mL

Ordering Information

Description	1000/pk
Shell Vial Kit, 8 x 40 mm, 1 mL Flat Bottom, Clear® + PE Cap	ARO-3110-13
Shell Vial Kit, 15 x 45 mm, 4 mL Flat Bottom, Clear® + PE Cap	ARO-3170-13

* 51-Expansion glass.



Convenience Kits – Certified PLUS (Cert+) Shell Vials, 1.0 mL

Ordering Information

Description	200/pk
Cert+ Shell Vial Kit, 8 x 40 mm, 1 mL Flat Bottom, Clear + PE Cap	ARO-3110-22-C
Cert+ Shell Vial Kit, 8 x 40 mm, 1 mL Flat Bottom, Amber + PE Cap	ARO-3111-22-C

Headspace Vials

Screw- and Crimp-Top Headspace Vials

- 10 and 20 mL screw- or crimp-top, with round or flat bottom
- Uniform glass thickness ensures even heating
- Lot traceable



Ordering Information

Description	1000/pk
Crimp-Top	
Headspace Vial, 22 x 38 mm, 6 mL Beveled Edge, Flat Bottom, Clear, No Patch	ARO-32F0-13
Headspace Vial, 22 x 38 mm, 6 mL Square Rim, Flat Bottom, Clear, No Patch	ARO-32D0-13
Headspace Vial, 22 x 38 mm, 6 mL Beveled Edge, Round Bottom, Clear, No Patch	ARO-32G0-13
Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Flat Bottom, Clear, No Patch	ARO-3220-13
Headspace Vial, 23 x 46 mm, 10 mL Square Rim, Flat Bottom, Clear, No Patch	ARO-32A0-13
Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Round Bottom, Clear, No Patch	ARO-3230-13
Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Flat Bottom, Clear, No Patch	ARO-3260-13
Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Flat Bottom., Clear, No Patch, Silanized	ARO-3263-13
Headspace Vial, 23 x 75 mm, 20 mL Square Rim, Flat Bottom, Clear, No Patch	ARO-3290-13
Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Round Bottom, Clear, No Patch	ARO-3270-13
Screw-Top	
Headspace Vial, 23 x 46 mm, 10 mL 18 mm Screw, Round Bottom, Clear, No Patch	ARO-32H0-13
Headspace Vial, 23 x 46 mm, 10 mL 18 mm Screw, Round Bottom, Amber, No Patch	ARO-32H1-13
Headspace Vial, 23 x 75 mm, 20 mL 18 mm Screw, Round Bottom, Clear, No Patch	ARO-3280-13
Headspace Vial, 23 x 75 mm, 20 mL 18 mm Screw, Round Bottom, Amber, No Patch	ARO-3281-13



Autosampler Compatibility

Flat Bottom: HP / Agilent, Carlo Erba, Shimadzu

Round Bottom: PerkinElmer, Tekmar, LEAP Technologies, Varian

Headspace Screw- and Crimp-Top Seals / Closures

- Variety of styles for any application
- Magnetic and pressure-release caps available

Ordering Information

Description	1000/pk
Crimp-Top	
Seal, 20 mm Diameter, PTFE/Gray Butyl Rubber, magnetic cap	ARO-52C5-13
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pharmafix Molded Septum, silver	ARO-52D0-13
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pressure Release, Pharmafix Molded Septum, silver	ARO-52B0-13
Seal, 20 mm Diameter, PTFE/Silicone magnetic cap	ARO-5255-13
Seal, 20 mm Diameter, PTFE/Silicone, silver	ARO-5250-13
Seal, 20 mm Diameter, PTFE/Silicone Pressure Release, silver	ARO-5220-13
Screw-Top	
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Butyl Rubber septa (red/grey)	ARO-814M-13
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Silicone septa (red/white)	ARO-815M-13
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Silicone septa (blue/white)	ARO-81AM-13
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Silicone septa (white/translucent blue)	ARO-81BM-13



VOA / ASE Assembled Vial Kits and Storage Vial Kits

- Convenience and assembled kits include vials with matching seals / closures
- Clear or amber, with open top or closed caps
- PTFE (Teflon®) faced 0.125 in. silicone septa or PTFE with foam urethane backing
- Lot numbered for traceability



Ordering Information

Description	100/pk	1000/pk
Storage Vial Kits		
Vial Kit, Storage, 20 mL Screw, Clear w/ Caps 24-400 white PTFE/Foam Urethane liner, closed top	ARO-9559-12	ARO-9559-13
Vial Kit, Storage, 20 mL Screw, Amber w/ Caps 24-400 white PTFE/Foam Urethane liner, closed top	ARO-9551-12	ARO-9551-13
Vial Kit, Storage, 40 mL Screw, Clear w/ Caps 24-400 white PTFE/Foam Urethane, closed top	ARO-9542-12	ARO-9542-13
Vial Kit, Storage, 40 mL Screw, Amber w/Caps 24-400 white PTFE/Foam Urethane, closed top	ARO-9543-12	ARO-9543-13
VOA/ASE Vial Kits		
Vial Kit, VOA/ASE, 40 mL Screw, Clear w/Caps 24-400 white PTFE/Silicone, open top	ARO-9540-12	ARO-9540-13
Vial Kit, VOA/ASE, 40 mL Screw, Clear w/Caps 24-400 white PTFE/Silicone, (assembled), open top	ARO-9540-12-A	ARO-9540-13-A
Vial Kit, VOA/ASE, 40 mL Screw, Amber w/ Caps 24-400 white PTFE/Silicone, open top	ARO-9541-12	—
Vial Kit, VOA/ASE, 20 mL Screw, Clear w/ Caps 24-400 white PTFE/Silicone (assembled)*, open top	ARO-9531-12-E	ARO-9531-13-E

* EPA certified Class 100 vials, caps, and septa are assembled, without processing.
ASE = Dionex Accelerated Solvent Extractor for pesticide analysis.

VOA / ASE Vials and Caps (Separate)

Ordering Information

Description	200/pk
Vials	
Vial, VOA/ASE, 40 mL Screw, Clear, 24-400 Threads (No Cap)	ARO-35V0-22
Vial, VOA/ASE, 40 mL Screw, Amber, 24-400 Threads (No Cap)	ARO-35V1-22
Description	
Caps	
Cap (pre-assembled), Screw (24-414), w/ Bonded-in PTFE/Silicone septa, white	ARO-8557-13-B

SAMPLE HANDLING - VIALS | AUTOSAMPLER VIALS

Protect your HPLC/UHPLC and GC columns and equipment with Phenex Syringe Filters

Filtering your sample helps prevent column and frit blockage, undue wear on detectors, pumps, valves, injector seals, and abnormally high operating pressures. Non-filtered samples can also lead to non-reproducible results and significant instrument downtime.



Verex™ -EU Vial Products

Offered by Phenomenex in Europe only.

Leading in Quality, Delivery, and Support

From start to finish, Verex-EU vial and cap products are manufactured to provide high quality, state-of-the-art solutions for your most challenging, sensitive applications.

Certified

The highest quality materials combine with tightly controlled manufacturing processes to produce uniform, trouble-free products you can rely on.

100 % Defect-Free

No product is placed in inventory without passing cleanliness and performance testing for consistent results.

Clear and Amber Glass

Verex-EU vials use 51A-Expansion glass (USP Type 1 borosilicate, Class B) for both clear and amber glass vials.

12 x 32 mm, 11 mm Crimp-Top Vials and Seals

Ordering Information

Description	100/pk
Verex-EU Vial, Crimp, 2 mL Clear, w/ Patch	AR1-3710-12
Verex-EU Vial, Crimp, 2 mL Amber, w/ Patch	AR1-3711-12



Seals / Closures for Crimp-Top Vials

Ordering Information

Description	100/pk
Seal, 11 mm Diameter, Crimp, PTFE/Silicone, silver	AR0-5780-12
Seal, 11 mm Diameter, Crimp, PTFE/Silicone/PTFE, silver	AR0-5760-12
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, silver	AR1-5740-12
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, blue	AR1-5742-12
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, red	AR1-5741-12
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, green	AR0-5743-12
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, gold	AR0-5746-12
Seal, 11 mm Diameter, Crimp, PTFE, silver	AR0-5710-12



12 x 32 mm, 11 mm Snap-Top Vials and Caps

Ordering Information

Description	100/pk
Verex-EU Vial, Snap, 2 mL Clear, w/ Patch	AR1-3610-12
Verex-EU Vial, Snap, 2 mL Amber, w/ Patch	AR1-3611-12



Seals / Closures for Snap-Top Vials

Ordering Information

Description	100/pk
Seal, 11 mm Diameter, Snap, PTFE/Silicone, blue	AR1-5652-12
Seal, 11 mm Diameter, Snap, PTFE/Silicone, natural	AR1-5656-12
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, blue	AR1-5672-12
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, natural	AR0-5676-12
Seal, 11 mm Diameter, Snap, PTFE/Rubber, natural	AR0-5646-12
Seal, 11 mm Diameter, Snap, PTFE, blue	AR0-5612-12



12 x 32 mm, 13 mm (13-425) Screw-Top Vials and Caps

Ordering Information

Description	100/pk
Verex-EU Vial, 4 mL Screw Clear, w/ Patch	AR1-3310-12

Caps / Closures for 13 mm Screw Top Vials

Ordering Information

Description	100/pk
Cap (pre-assembled), 13-425, w/ Bonded-in PTFE/Silicone septa, black [□]	AR0-8357-12-B
Cap (pre-assembled), 13-425, w/ PTFE/Silicone septa, black ^{□□}	AR0-8357-12

[□]-B = Bonded-in Septa. ^{□□} Press-Fit Septa



Verex™ -EU Vial Products

Offered by Phenomenex in Europe only.



MS Quality. Constructed of virgin polymers, free of siloxanes and trace contaminants, these caps are the cleanest available from Phenomenex.

12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Caps

Ordering Information

Description	100/pk
Verex-EU Vial, 9 mm Screw, 2 mL Clear, w/ Patch	AR1-3910-12
Verex-EU Vial, 9 mm Screw, 2 mL Amber, w/ Patch	AR1-3911-12



Caps for 9 mm Screw-Top Vials

Ordering Information

Description	100/pk
Certified PLUS (Cert+) Mass Spec Quality (MSQ) Caps for 9-425 Screw-Top Vials	
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone septa, blue	ARO-8952-12-M
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone preSlit septa, blue	ARO-8972-12-M
Certified PLUS (Cert+) Caps for 9-425 Screw-Top Vials	
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	ARO-8952-12-C
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	ARO-8972-12-C
Cert+ Cap (one-piece), 9 mm PE w/ Starburst preSlit, natural*	ARO-89P6-12-C
Bonded-In Caps for 9-425 Screw-Top Vials	
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, black	ARO-8957-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	AR1-8952-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, natural	AR1-8956-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, red	AR1-8951-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, black	ARO-8977-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	ARO-8972-12-B



* Cap is one piece, constructed of ultra-pure, medical-grade polyethylene

12 x 32 mm, 8 mm (8-425) Screw-Top Vials and Caps

Ordering Information

Description	100/pk
Verex-EU Vial, 8 mm Screw, 2 mL Clear, w/ Patch	AR1-3810-12
Verex-EU Vial, 8 mm Screw, 2 mL Amber, w/ Patch	AR1-3811-12



Caps / Closures for 8 mm Screw-Top Vials

Ordering Information

Description	100/pk
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone septa, black [□]	ARO-8857-12-B
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone preSlit septa, black [□]	ARO-8877-12-B
Cap (pre-assembled), 8-425, w/ PTFE/Silicone septa, black ^{□□}	ARO-8857-12
Cap (pre-assembled), 8-425, w/ PTFE/Silicone preSlit septa, black ^{□□}	ARO-8877-12
Cap (pre-assembled), 8-425, w/ PTFE/Silicone/PTFE septa, black ^{□□}	ARO-8867-12
Cap (pre-assembled), 8-425, w/ Open-top cap (w/o septa)	ARO-8897-12

[□]-B = Bonded-in Septa. ^{□□} Press-Fit Septa



Septa for 8 mm Screw Caps

Ordering Information

Description	100/pk
Septa, 8 mm Diameter, PTFE/Silicone 0.060 in.	ARO-6853-12
Septa, 8 mm Diameter, PTFE 0.010 in.	ARO-6817-12

SAMPLE HANDLING - VIALS | AUTOSAMPLER VIALS

Verex™ -EU Vial Products

Offered by Phenomenex in Europe only.

12 x 32 mm, 10 mm (10-425) Screw-Top Vials and Caps

Ordering Information

Description	100/pk
Verex-EU Vial, 10 mm Screw, 2 mL Clear, w/ Patch	AR1-3010-12
Verex-EU Vial, 10 mm Screw, 2 mL Amber, w/ Patch	AR1-3011-12



Caps/ Closures for 10 mm Screw-Top Vials

Ordering Information

Description	100/pk
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone septa, black [□]	AR0-8057-12-B
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone preSlit septa, black [□]	AR0-8077-12-B
Cap (pre-assembled), 10-425, w/ PTFE/Silicone septa, black ^{□□}	AR0-8057-12
Cap (pre-assembled), 10-425, w/ PTFE/Silicone preSlit septa, black ^{□□}	AR0-8077-12



[□]-B = Bonded-in Septa. ^{□□} Press-Fit Septa

Headspace Vials and Caps

Ordering Information

Description	100/pk
Verex-EU Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Flat Bottom, Clear, No Patch	AR1-3220-12
Verex-EU Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Round Bottom, Clear, No Patch	AR1-3230-12
Verex-EU Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Flat Bottom, Clear, No Patch	AR1-3260-12
Verex-EU Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Round Bottom, Clear, No Patch	AR1-3270-12



Headspace Crimp-Top Seals / Closures

Ordering Information

Description	100/pk
Seal, 20 mm Diameter, PTFE/Gray Butyl Rubber, magnetic cap	AR0-52C5-12
Seal, 20 mm Diameter, PTFE/Gray Butyl Rubber, Pressure Release, silver	AR0-52A0-12
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pharmafix Molded Septum, silver	AR0-52D0-12
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pressure Release, Pharmafix Molded Septum, silver	AR0-52B0-12
Seal, 20 mm Diameter, PTFE/Silicone magnetic cap	AR0-5255-12
Seal, 20 mm Diameter, PTFE/Silicone silver	AR1-5250-12
Seal, 20 mm Diameter, PTFE/Silicone Pressure Release, silver	AR0-5220-12



VOA Vials and Caps

Ordering Information

Description	100/pk
Verex-EU Vial 40 mL Clear 24-414 Screw 28 x 95 mm	AR1-35V0-12
Verex-EU Vial 60 mL Clear 24-414 Screw 28 x 140 mm	AR1-35A0-12
Verex-EU Vial 60 mL Amber 24-414 Screw 28 x 140 mm	AR1-35A1-12



VOA Vial Caps

Ordering Information

Description	100/pk
Verex Cap (pre-assembled), 24-414, w/ Bonded-in PTFE/Silicone septa, white	AR0-8557-12-B



For Vial Inserts for 8 mm Screw-Top Vials, see p. 39
 For Vial Inserts for 9 mm Screw-Top Vials, see p. 38
 For Vial Inserts for 10 mm Screw-Top Vials, see p. 40

Verex™ -IN Vial Products

Offered by Phenomenex in India only.

Leading in Quality, Delivery, and Support

Verex-IN products are engineered to exact specification because uniform, high-purity vials are essential to accurate, reproducible chromatographic results.

Certified

High quality materials combined with tightly controlled manufacturing processes produce uniform, trouble-free products you can rely on.

100% Defect-Free

Machine vision cameras and gauges inspect critical dimensions and tolerances to produce uniform, defect-free products.

12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Caps

Ordering Information

Description	100/pk
Verex-IN Vial, 9 mm Screw, 2 mL Clear, w/ Patch	AR4-3910-12



Caps for 9 mm Screw-Top Vials

Ordering Information

Description	100/pk
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, black	AR4-8957-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, black	AR4-8977-12-B



Need Additional Cap Colors?

Caps for 9 mm Screw-Top Vials

Ordering Information

Description	100/pk
Certified PLUS (Cert+) Mass Spec Quality (MSQ) Caps for 9-425 Screw-Top Vials	
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone septa, blue	AR0-8952-12-M
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone preSlit septa, blue	AR0-8972-12-M
Certified PLUS (Cert+) Caps for 9-425 Screw-Top Vials	
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	AR0-8952-12-C
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	AR0-8972-12-C
Cert+ Cap (one-piece), 9 mm PE w/ Starburst preSlit, natural*	AR0-89P6-12-C
Bonded-In Caps for 9-425 Screw-Top Vials	
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	AR1-8952-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, natural	AR1-8956-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, red	AR1-8951-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	AR0-8972-12-B



* Cap is one piece, constructed of ultra-pure, medical-grade polyethylene



For Vial Inserts for 9 mm Screw-Top Vials, see p. 38

Make the Switch to Verex!

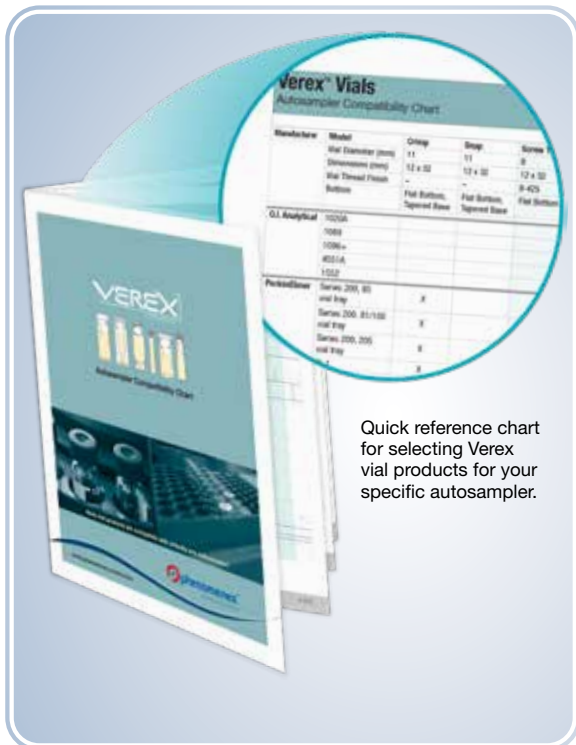


Easily Find Your Vial Online

2 Easy Steps:

- 1 Enter your current vial or cap part number
- 2 Order the recommended Verex part number

Download FREE Verex Autosampler Compatibility Chart



Download FREE Verex Vials and Caps Poster Guide



Sample Preparation



49 - 86

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“ Strata-X is an excellent all-around sorbent and we obtain high breakthrough volumes necessary to improve method quantitation limits. ”

Pedro A. Segura
Université de Montreal

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Sample Preparation

Choose Your Sample Preparation Solution

		Increase Column Lifetime	Remove Particulates	Remove Proteins	Remove Phospholipids	De-salt	Solvent Switching	Specifically Extract Target Analyte	Concentrate	
Filtration		•	•							PHENEX
Protein Precipitation		•	•	•						Impact™
β-Glucuronidase Removal		•	•	•	•					β-Gone™
Phospholipid Removal + Protein Precipitation		•	•	•	•					iPhree™
QuEChERS		•	•	•						roQ QuEChERS Kits
Supported Liquid Extraction (SLE)		•	•	•	•	•	•			strata DE novum
Solid Phase Extraction (SPE)		•	•	•	•	•	•	•	•	strata STRATA strata PRO

Product Recommendation

Available Formats

	96-Well Plates	Microelution Plates	1, 3, and 6mL Tubes	Giga™ Tubes (12 mL - 150 mL)	On-line Extraction Cartridge	Bulk Sorbent
Strata-X PRO SPE	X	X	X			
Strata-X Polymeric SPE	X	X	X	X	X	X
Strata Traditional SPE	X		X	X	X	X
Novum SLE	X		X			
Strata DE SLE	X			X		
Phree Phospholipid Removal Solutions	X		X			
Impact Protein Precipitation Plates	X					
β-Gone β-Glucuronidase Removal	X		X			

96-Well Plates

Microelution Plates

1, 3, and 6mL Tubes

Giga™ Tubes (12 mL - 150 mL)

On-line Extraction Columns and Cartridges

Bulk Sorbent



Don't see the format you want? Contact Phenomenex or your local Phenomenex distributor for custom packed SPE phases



For Septra™ Bulk Sorbent Material Characteristics and Ordering Information, see p. 369

Patent Pending

Faster, Easier, and More Reliable than Liquid-Liquid Extraction



- Avoid inferior results due to emulsions
- Eliminate interferences from your samples
- Increase throughput with automatable formats

A Simplified Liquid Extraction

Novum SLE will instantly increase your throughput by eliminating time consuming steps and reducing the risk of analyte loss. If further time savings are necessary, Novum SLE can be easily automated for rapid, hands free sample cleanup.

Slow and Laborious

Traditional Liquid-Liquid Extraction¹
Estimated Time Required = **25 minutes**

1. Dilute sample 1:1 with buffer or water and add extraction solvent
2. Mix for 10 minutes
3. Centrifuge for 10 minutes
4. Pour off or freeze supernatant

Fast and Easy

Novum Simplified Liquid Extraction (SLE)
Estimated Time Required = **<15 minutes**

1. Dilute sample 1:1 with buffer or water and load onto Novum SLE sorbent using 2–15 seconds of vacuum
2. Wait 5 minutes
3. Apply elution solvent and allow to elute via gravity. Complete elution with 10 seconds of vacuum.

- Rapid, automatable method for high-throughput cleanup
- Stop worrying about analyte loss due to emulsions

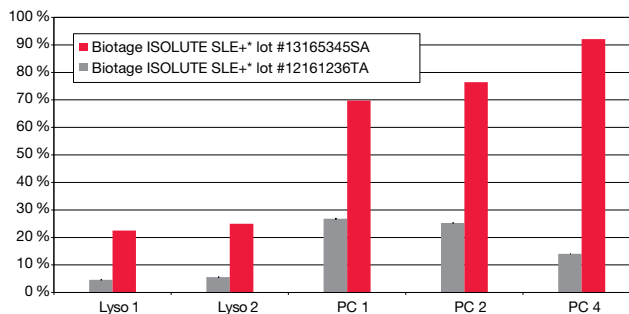
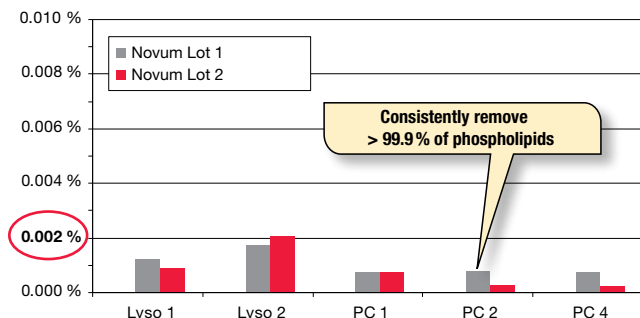
1. Russell Grant, Matthew Crawford, Brian Rappold, and Stacy Dee. Errors in Bioanalysis Due to Phospholipids – Definitive Measurement, Mechanism, and Management. ASMS 2011.

Patent Pending

Consistent Cleanup from Lot-to-Lot

As a unique, synthetic SLE sorbent you can expect Novum to provide reliable, more consistent cleanup from lot-to-lot as compared to traditional diatomaceous earth SLE.

Lot-to-Lot Phospholipid Breakthrough: Novum SLE vs. Biotage® ISOLUTE® SLE



- Lyso 1:** 1-Palmitoyl-2-OH-sn-glycero-phosphocholine (m/z 496-184)
- Lyso 2:** 1-Oleoyl-2-OH-sn-glycero-phosphocholine (m/z 522-184)
- PC 1:** 1-Palmitoyl-2-Oleoyl-sn-glycero-phosphocholine (m/z 761-184)
- PC 2:** 1-Stearoyl-2-Lindoleoyl-sn-glycero-phosphocholine (m/z 787-184)
- PC 4:** 1-Oleoyl-2-Lindoleoyl-sn-glycero-phosphocholine (m/z 784-184)

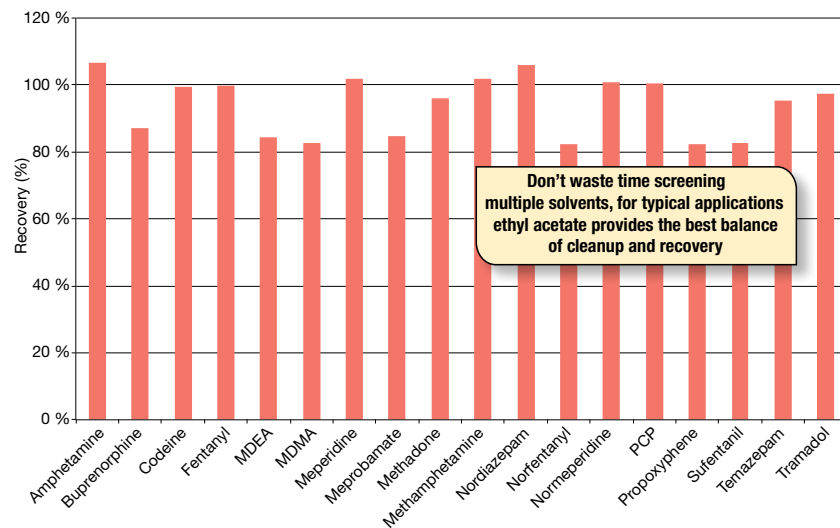
Plasma extractions were performed using 200 µL plates and ethyl acetate as an elution solvent. The recommended protocol provided with each product was followed. Comparative separations may not be representative of all applications.

*Phenomenex is in no way affiliated with Biotage.

Faster Method Development

For typical applications, Novum SLE provides excellent recovery and cleanup using ethyl acetate as an organic solvent which can help to reduce the amount of time required for method development.

Recovery of 18 Pain Management Drugs using a Single Extraction Method on Novum SLE



Extraction Method

A Simplified Procedure

1. Load diluted urine (diluted 1:1 with 0.5 M Ammonium hydroxide) onto Novum SLE MAX 96-well plate, apply vacuum for 2-15 seconds
2. Allow sample to soak into Novum SLE sorbent for 5 minutes
3. Elute with ethyl acetate

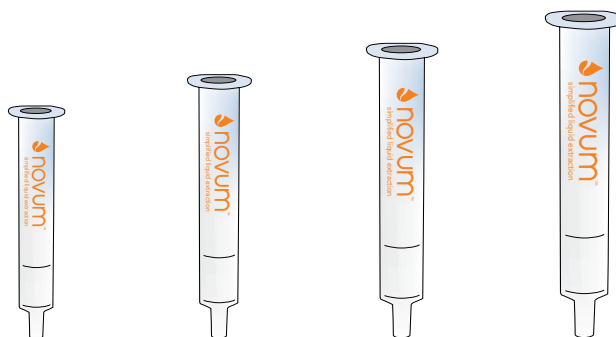
Novum™ Simplified Liquid Extraction (SLE)

Patent Pending

A Variety of Formats to Fit Your Sample and Throughput Requirements

Tubes

Process samples as small as 200 µL or as large as 2 mL using Novum SLE tubes. Ideal for all types of applications including Bioanalytical, Food Safety, and Environmental.

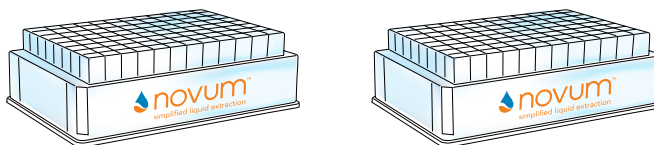


Ordering Information

Novum Simplified Liquid Extraction (SLE) Tubes				
Novum SLE Tubes	1 cc	3 cc	6 cc	12 cc
Maximum Sample Volume (after dilution)	200 µL	400 µL	1 mL	2 mL
Recommended Elution Volume	2x 600 µL	2x 900 µL	2x 2.5 mL	2x 5mL
Part No.	8B-S138-FAK	8B-S138-5BJ	8B-S138-JCH	8B-S138-KDG
Unit	100/pk	50/pk	30/pk	20/pk

96-Well Plates

Process 96 samples at once in an easily automatable 96-well plate. Perfect for high-throughput applications.



Ordering Information

Novum Simplified Liquid Extraction (SLE) 96-Well Plates		
Novum SLE 96-Well Plates	MINI	MAX
Maximum Sample Volume (after dilution)	300 µL	400 µL
Recommended Elution Volume	1x 1 mL	2x 900 µL
Part No.	8E-S138-FGA	8E-S138-5GA
Unit	1/pk	1/pk



For accessories that are compatible with Novum Simplified Liquid Extraction (SLE) Products, see pp. 79-82

A Cost Effective Supported Liquid Extraction (SLE) Solution

Quickly and easily improve your liquid-liquid extractions by following a short, automatable two step extraction process. Packed with Diatomaceous Earth, Strata DE is a great alternative to traditional SLE products such as Biotage[®] ISOLUTE[®] SLE+, Thermo HyperSep[™] SLE, and Agilent[®] Chem Elut[®] SLE.

SLE Protocol

Pre-treatment:	Combine 100 µL of spiked urine, 15 µL Campbell Beta-Glucuronidase (part number: DR2102), 35 µL 100 mM Ammonium Acetate (pH 4), and 150 µL of 100 mM Ammonium Bicarbonate (pH 10).
96-Well Plates:	Strata DE 400 µL Biotage ISOLUTE SLE+ 400 µL
Part No.:	8E-S325-5GB (Strata DE)
Load:	300 µL pre-treated urine sample onto plate (apply vacuum or positive pressure to pull/push sample into sorbent if necessary)
Wait:	6 minutes
Elute:	3x 600 µL Dichloromethane/IPA (95:5)
Apply:	Vacuum or apply positive pressure at 5-10" Hg for 10 seconds
Dry:	Sample under slow stream of Nitrogen at 30 °C
Reconstitute:	100 µL 0.1% Formic Acid/Methanol (4:1) with internal standard

Recovery Values and % CVs: Strata DE vs. Biotage ISOLUTE SLE+

Analyte	Strata DE		Biotage ISOLUTE SLE+	
	% Recovery	%CV (n=8)	% Recovery	%CV (n=8)
6-MAM	98	9	88	16
Alprazolam	104	10	98	11
Benzoylcegonine	88	6	98	11
Buprenorphine	93	7	102	15
Codeine	99	12	93	9
Diazepam	107	7	104	6
Fentanyl	85	5	94	8
Hydrocodone	104	11	93	11
Hydromorphone	95	9	93	11
Lorazepam	94	8	98	8
Methamphetamine	92	16	102	8
Morphine	98	12	94	12
Norbuprenorphine	101	11	92	11
Nordiazepam	100	9	92	8
Norfentanyl	113	7	110	11
Oxycodone	97	5	93	11
PCP	90	7	98	6

A Fast Extraction of 25-OH Vitamin D₂ / D₃ from Serum

Strata DE provides a simple extraction method with time and cost savings across all 3 QC levels.

SLE Protocol

Pre-treatment:	Dilute 200 µL of human serum* with 100 µL of 5% Ammonium hydroxide (w/v), add 25 µL of 25-OH Vitamin-D ₃ - ² H ₆ (1 µg/mL) and mix.
96-Well Plate:	Strata DE 400 µL
Part No.:	8E-S325-5GB
Load:	Pre-treated sample and wait for 5 minutes
Elute:	Sample with 600 µL MTBE by gravity, wait for 5 minutes
Repeat:	Elution step twice by gravity, and after the final elution, apply 5-10 Hg vacuum to finish elution
Dry:	40 °C under N ₂
Reconstitute:	200 µL 0.1% Formic acid in Water/0.1% Formic acid in Methanol (30:70)

Accuracy and precision

	QCL	QCM	QCH
Target Conc. (ng/mL)	6	50	80
	25-OH-D₂		
Mean Conc. Found	5.92	53.0	80.8
STDV	4.09	2.21	5.55
CV%	6.90	4.18	6.86
Accuracy (%)	98.7	106	101
n	6	6	6
	25-OH-D₃		
Mean Conc. Found (ng/mL)	6.59	52.7	87.2
STDV	0.50	1.74	5.50
CV%	7.62	3.30	6.31
Accuracy (%)	110	105	109
n	6	6	6

* Double Charcoal-stripped human serum was used to prepare all standards and QCs

Available for Large Volume Samples and High-throughput Cleanups

Tubes

Ideal for large volume cleanups such as Food and Environmental applications.



Ordering Information

Strata DE (Diatomaceous Earth SLE Tubes)		
Strata DE Tube	2 mL Capacity, 12 cc	20 mL Capacity, 60 cc
Maximum Sample Volume (after dilution)	2 mL	17 mL
Recommended Elution Volume	2x 5 mL	3x 20 mL
Part No.	8B-S325-KDG	8B-S325-VFF
Unit	20/pk	16/pk


96-Well Plates

Ideal for smaller volume, high-throughput cleanups such as Bioanalytical samples.



Ordering Information

Strata DE (Diatomaceous Earth SLE) 96-Well Plates		
Strata DE 96-Well Plates	200 µL	400 µL
Maximum Sample Volume (after dilution)	200 µL	300 µL
Recommended Elution Volume	2x 600 µL	3x 600 µL
Part No.	8E-S325-FGB	8E-S325-5GB
Unit	2/pk	2/pk

 For accessories that are compatible with Strata DE Supported Liquid Extraction (SLE) Products, see pp. 79-82

Recommended volumes are the expected loadability for most samples, however, it may be possible to load more than the stated capacity without breakthrough of the sample.

Comparative separations may not be representative of all applications.

Rapid Cleanup of Hydrolyzed Urine

β -Gone β -Glucuronidase Removal Products are designed to target and remove β -glucuronidase from hydrolyzed urine samples without requiring additional time or method development. In a single step and in less than 1 minute, your hydrolyzed samples are ready for analysis.

- Increase HPLC/UHPLC column lifetime
- Reduce mass spec maintenance
- Maintain the selectivity of your HPLC/UHPLC column
- Perform the pre-treatment step inside the 96-well plate with β -Gone Plus

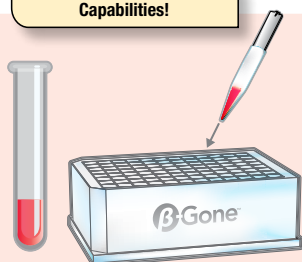
β -Gone Plus Steps

Now In-Well Hydrolysis Capabilities!

1

Load

Load urine and hydrolysis solution in β -Gone Plus 96-well plate, incubate

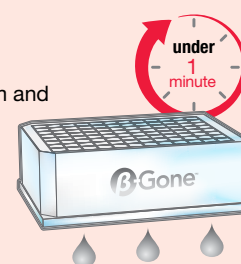


Skip the Transfer Step

2

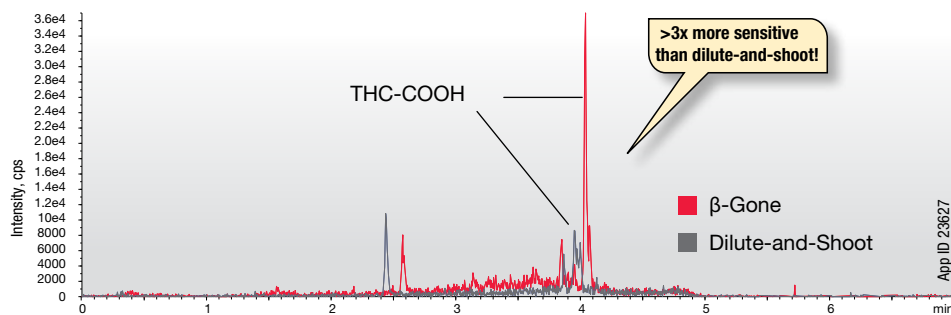
Collect

Initiate vacuum and collect eluate



Increase Your Sensitivity:

β -Gone vs. Dilute-and-Shoot



β -Gone Procedure: To 200 μ L spiked urine (spiked at 100 ng/mL), add 133 μ L 0.1% Formic acid in Methanol. Pass through β -Gone tube or 96-well plate and collect eluent. Dilute-and-Shoot Procedure: Dilute spiked urine (spiked at 100 ng/mL) 10-fold with 0.1% Formic acid in Water.

Column: Kinetex® 2.6 μ m Biphenyl
Dimensions: 50 x 2.1 mm
Part No.: [00B-4622-AN](#)
Mobile Phase: A: 0.1% Formic acid in Water
 B: 0.1% Formic acid in Acetonitrile
Gradient:

Time (min)	% B
0	5
3	95
4	95
4.1	5

Flow Rate: 500 μ L/min
Temperature: Ambient
Detection: MS/MS (SCIEX API 4000™)

Ordering Information

β -Gone β -Glucuronidase Removal Products

Part No.	Description	Unit
8B-S139-TAK	1 mL Tubes, Recombinant Enzyme	100/Box
8B-S322-DAK	1 mL Tubes, Non-Recombinant Enzyme	100/Box
8E-S139-TGA	96-Well Plate, Recombinant Enzyme	1/Box
8E-S322-DGA	96-Well Plate, Non-Recombinant Enzyme	1/Box
8E-S323-TGA	96-Well Plate Plus 30 mg/well, Recombinant/Non-Recombinant Enzyme	1/Box
8E-S323-UGA	96-Well Plate Plus 60 mg/well, Recombinant/Non-Recombinant Enzyme	1/Box
8N-S323-TUK	2 mL Centrifuge Tubes, Recombinant and Non-Recombinant Enzyme	100/Box

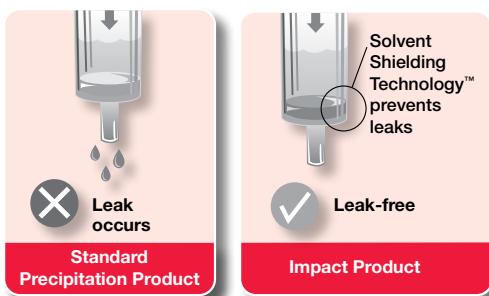


Watch the Webinar

Learn how to instantly improve your sensitivity without introducing extra steps into your workflow!

Rapid Protein Precipitation

- Quickly cleanup sample by passing biological samples through the Impact filter
- Increase sensitivity of your analysis by eliminating proteins which contribute to baseline noise
- Increase reproducibility with the leak-free membrane, preventing premature sample breakthrough and incomplete protein precipitation



Can retain acetonitrile with no leaks for up to 25 minutes

Compatible Solvents	Solvent : Sample Ratio
Acetonitrile	3:1 to 4:1
Methanol	4:1
Maximum Total Combined Liquid Volume (Organic Solvent plus Biological Sample)	
96-well plates	1.6 mL
Recommended Biological Sample Volumes	
96-well plates	25-400 µL
Leak Resistant Time	
96-well plates	Up to 25 minutes with no vacuum/pressure

Ordering Information

Impact Precipitation Products		
Part No.	Description	Unit
Impact Precipitation Products		
CE0-7565	Impact Protein Precipitation, Square Well, Filter Plate, 2 mL	2/pk
CE0-7566	Impact Protein Precipitation, Square Well, Long Drip, Filter Plate, 2 mL	2/pk
Impact Starter Kit for Protein Precipitation		
CE0-8201	Impact Protein Precipitation Plate (CE0-7565) (2 ea) Collection Plate 2 mL (2 ea) Sealing Mat, Santoprene™ (AH0-8199) (2 ea)	ea



For Accessories, see pp. 79-82

General Protocol



Dispense

Organic solvent into the wells of the Impact plate in a volume of 3 - 4x the volume of the intended plasma or tissue homogenate sample. Recommended solvents and maximum volume of sample and precipitation solvent are listed on this page.



Add†

Plasma or tissue homogenate directly and forcefully into the organic solvent, maintain a final ratio of 3:1 to 4:1 organic solvent:sample. Recommended sample volumes are listed on this page.



Vortex†

2 minutes at maximum possible speed, taking care not to allow solvent spillage. Sample can stand for up to 25 minutes.



Filter Centrifuge:

Place the Impact plate on top of a collection plate and centrifuge at 500 g for 5 minutes or until filtrate is collected.

Vacuum:

Place the Impact plate onto a suitable 96-well sample manifold or robot. Ensure that a 96-well collection plate is positioned inside the manifold or under the Impact plate. Vacuum at 2 - 7 inch Hg for up to 5 minutes or until filtrate is collected.

Positive Pressure:

Place the Impact plate on top of a collection plate and apply 2 - 5 psi using a positive pressure manifold.

* A 3:1 v/v ratio of organic solvent to biological sample will dilute your sample less. In contrast, a 4:1 v/v ratio of organic solvent to biological sample will ensure a more complete precipitation. A 4:1 v/v ratio is recommended when using methanol.

† When used with a liquid-handling instrument or automation, aspirate/dispense cycles may be used to promote in-tip mixing and precipitation. This will ensure complete precipitation and filtration. Vortexing is not necessary when in-tip precipitation is performed.

2013 R&D 100 Award Recipient



Eliminate Ion Suppression with Phree

- Consistently remove > 99% of phospholipids to increase LC-MS sensitivity
- Simultaneously remove interfering proteins
- No additional time required, the Phree method can be performed in the same amount of time as a protein precipitation procedure
- Skip the method development; one method for acids, bases, and neutrals

How it Works:

1

Remove Proteins

Solvent Shielding Technology™ prevents dripping of organic solvent, allowing for protein precipitation within the wells of the Phree Phospholipid Removal Product.

2

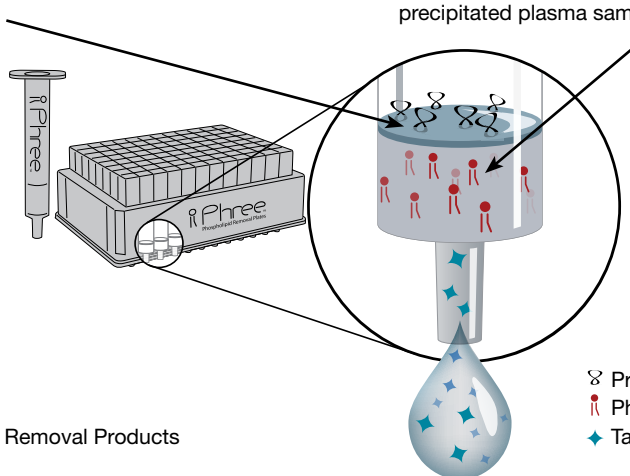
Eliminate Phospholipids

The Phree sorbent selectively removes phospholipids from precipitated plasma samples.

3

No Method Development

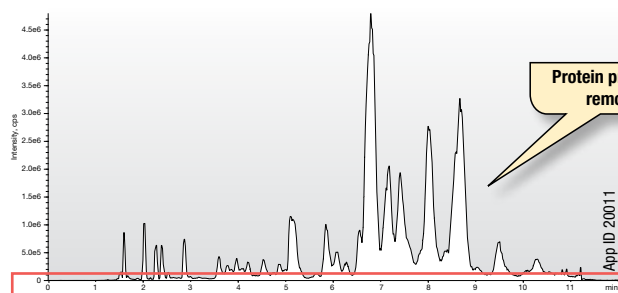
One method for acids, bases, and neutrals.



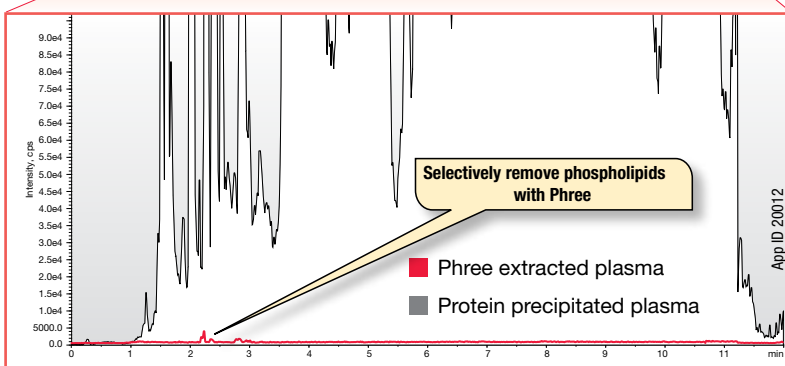
- ⌘ Proteins
- Phospholipids
- ★ Target Analyte

Total Phospholipid Profile

Protein Precipitation vs. Phree Phospholipid Removal Products



~ 50x Zoom



Phospholipid profile monitored using m/z 184-184

Plasma Cleanup: 100 μ L plasma plus 300 μ L Acetonitrile with 1% Formic acid
Column: Kinetex® 2.6 μ m C18 100Å
Dimensions: 50 x 2.1 mm
Part No.: [00B-4462-AN](#)
Mobile Phase: A: 0.1% Formic acid in Water
 B: 0.1% Formic acid in Methanol
Gradient:

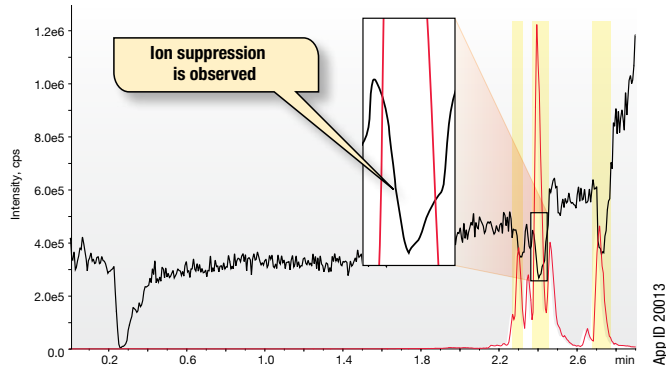
Time (min)	% B
0	60
0.5	95
15.5	95
15.51	60
19.5	60

Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS) @ 425 °C; 184 amu
Temperature: 22 °C

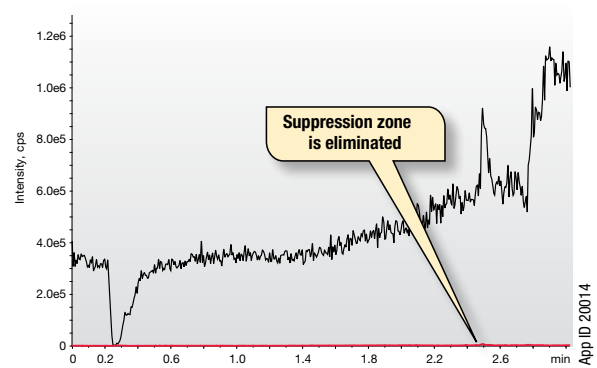
Reduce Ion Suppression

The presence of phospholipids in plasma samples produces zones of ion suppression that correlate exactly with the phospholipid elution profile when analyzed via mass spectrometer (MS).

Protein Precipitated Plasma



Phree Extracted Plasma



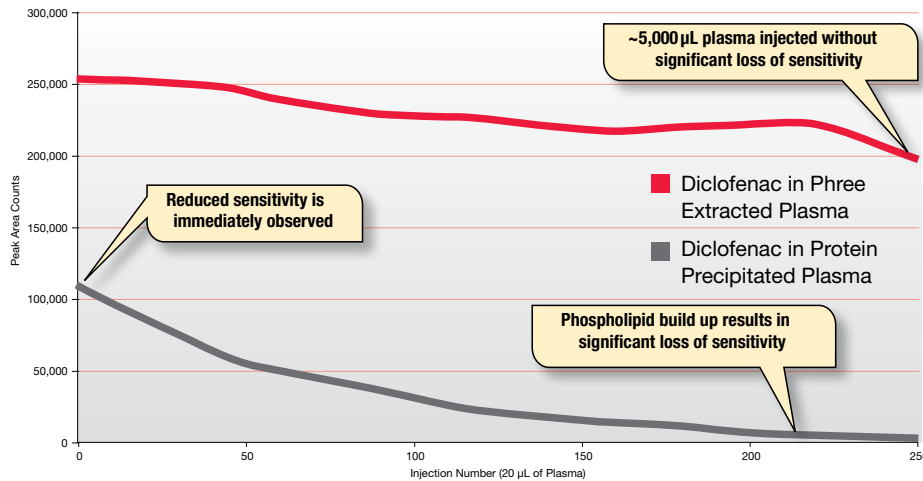
- Suppression Zone
- Phospholipids m/z 184-184
- Amoxapine m/z 314-271

Amoxapine was infused post-column to establish an ion suppression/enhancement profile with both protein precipitated plasma (left) and Phree extracted plasma (right), showing that Phree can successfully reduce ion suppression.

Maximize Sensitivity and Column Lifetime

Phospholipids reduce the sensitivity of the MS signal and shorten column lifetime when they build up over time.

Column Sensitivity after 250 Injections



To assess the effect of phospholipid build up, repetitive 20µL injections of diclofenac in protein precipitated plasma versus diclofenac in Phree extracted plasma were made.

Ordering Information

Phree Phospholipid Removal Products

Part No.	Description	Unit
8B-S133-TAK	Phree Phospholipid Removal Tabbed 1 mL Tubes	100/pk
8E-S133-TGB	Phree Phospholipid Removal 96-Well Plates	2/pk



For accessories that are compatible with Phree Phospholipid Removal Products, see pp. 79-82

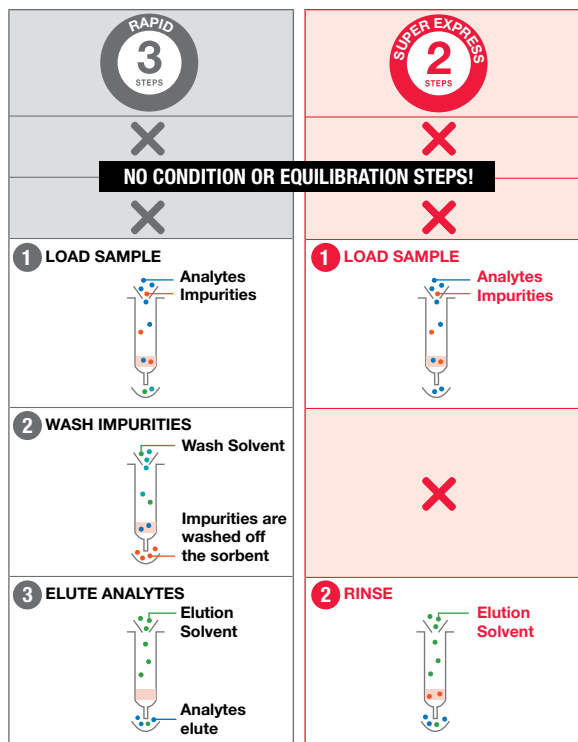
Polymeric Sorbent with Matrix Removal Technology

Strata-X PRO works to eliminate phospholipids and harmful particulates in the sample while targeting analytes. Strata-X PRO provides high recoveries, especially for polar analytes, and less matrix effects that could result in ion suppression or enhancement when compared to traditional polymeric SPE.

- Reversed phase polymeric sorbent designed to be water wettable
- Reduce protocol time by at least 40% with 3-Step and 2-Step SPE
- High recoveries without conditioning or equilibration

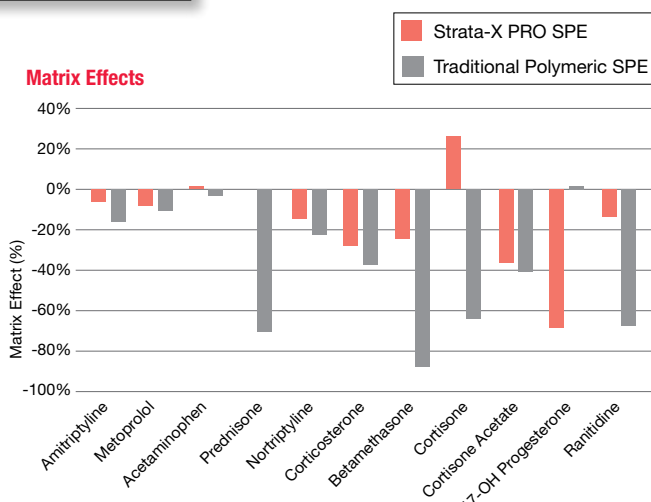
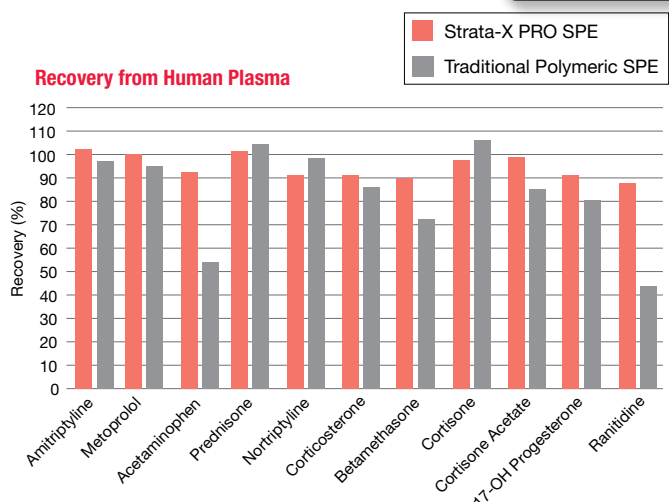
SPE Protocol

96-Well Plate: Strata-X PRO, 30 mg/well
Part No.: 8E-S536-TGA
Load: 400 µL Plasma/0.1 % Formic acid in Water (1:1)
Wash: 1 mL 5 % Methanol in Water
Dry: 1 minute at 5" Hg
Elute: 1 mL 0.1 % Formic acid in Acetonitrile/ Methanol (90/10)
Dry Down: 1 minute at 5" Hg
Reconstitute: 200 µL 5 % Methanol in Water



Consistently high recoveries, with less variation between samples and less matrix effects using Strata-X PRO.

STRATA-X PRO POLYMERIC SPE | SAMPLE PREPARATION



Strata-X PRO SPE

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	10 mg	8B-S536-AAK	1 mL (100/box)
	30 mg	8B-S536-TAK	1 mL (100/box)
	30 mg	8B-S536-TBJ	3 mL (50/box)
	60 mg	8B-S536-UBJ	3 mL (50/box)
	200 mg	8B-S536-FBJ	3 mL (50/box)
	100 mg	8B-S536-FCH	6 mL (30/box)
	200 mg	8B-S536-FCH	6 mL (30/box)
	500 mg	8B-S536-HCH	6 mL (30/box)

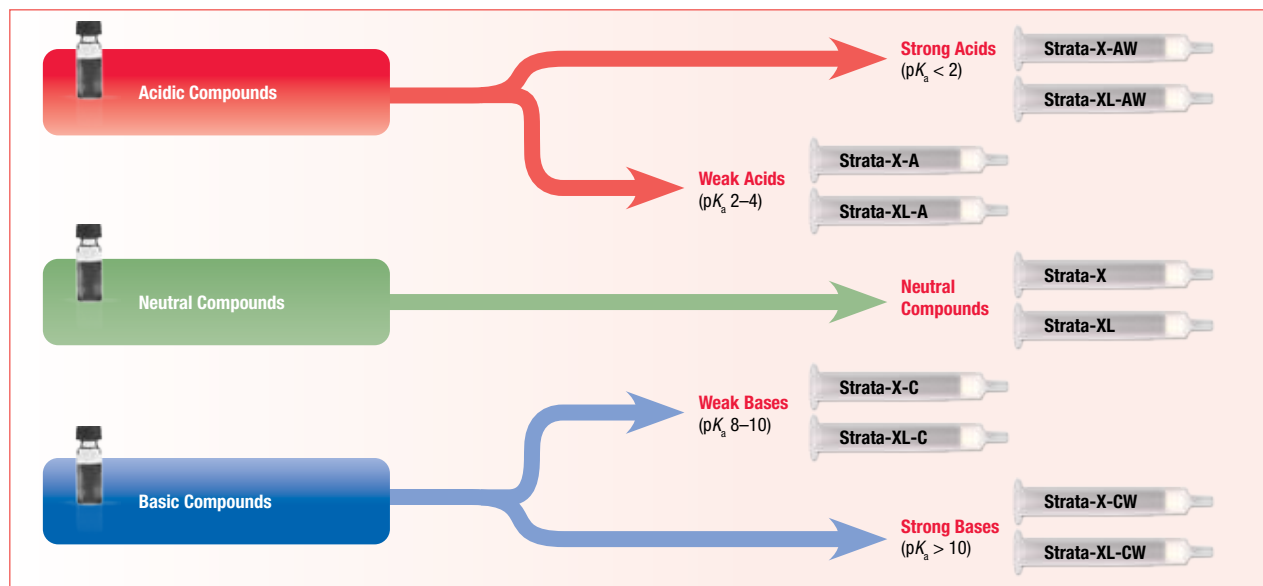
Format	Sorbent Mass	Part Number	Unit
96-Well Plate			
	10 mg/well	8E-S536-AGA	ea
	30 mg/well	8E-S536-TGA	ea
	60 mg/well	8E-S536-UGA	ea
96-Well Microelution Plate			
	2 mg/well	8M-S536-4GA	ea

U.S. Patent No. 7,119,145

Strata-X

Step 1. Select a Sorbent

Compound-Directed Phase Selection



Specialty Sorbents	Application	Phase Description
Strata-X-Drug B	Basic Drugs of Abuse	Proprietary strong cation-exchange sorbent that eliminates the need to condition / equilibrate the sorbent. *Now available with in-well hydrolysis capabilities
Strata-X-Drug N	Neutral Drugs of Abuse	Proprietary reversed phase sorbent that eliminates the need to condition / equilibrate the sorbent.

Step 2. Select a Sorbent Mass

Loading Capacity Chart

Strata-X Phase	Plasma /Serum	Urine	Filtered Tissue Homogenates	Water (particulate-free)	Water (particulate-laden)	Mass (mg in tube)
Strata-X, X-C, X-CW, X-A, X-AW	100 µL	250 µL	10 mg	N.A.	N.A.	10 mg
	250 µL	1 mL	50 mg	N.R.	N.R.	30 mg
	500 µL	2 mL	100 mg	N.R.	N.R.	60 mg
	1 mL	4 mL	150 mg	50 mL	25 mL	100 mg
	N.A.	8 mL	300 mg	100 mL	50 mL	200 mg
	N.A.	20 mL	500 mg	500 mL	100 mL	500 mg
Strata-XL, XL-C, XL-CW, XL-A, XL-AW	50 µL	125 µL	5 mg	N.A.	N.A.	10 mg
	125 µL	500 µL	25 mg	N.R.	N.R.	30 mg
	250 µL	1 mL	50 mg	N.R.	N.R.	60 mg
	500 µL	2 mL	75 mg	25 mL	13 mL	100 mg
	N.A.	4 mL	150 mg	50 mL	25 mL	200 mg
	N.A.	10 mL	250 mg	250 mL	50 mL	500 mg

N.A. = Not Applicable (not commonly used)
N.R. = Not Recommended (may not provide expected results)



See the following pages for specific phase details and general extraction protocols.

General Extraction Protocols

Bases

Strata-X-C / Strata-XL-C

Strong Cation-Exchange & Reversed Phase

for Bases with $pK_a \leq 10.5$



Condition

1 mL Methanol

Equilibrate

1 mL Acidified Water

Load

Diluted Acidified Sample

Wash

1 mL 0.1 N HCl in water (collect this fraction to analyze Polar Neutrals)

Wash

1 mL 0.1 N HCl in Methanol (collect this fraction to analyze Neutrals/Acids)

Elute Bases

2x 500 μ L 5 % NH_4OH in Methanol

Strata-X-CW / Strata-XL-CW

Weak Cation-Exchange & Reversed Phase

for Bases with $pK_a > 8$



Condition

1 mL Methanol

Equilibrate

1 mL Water, pH 6-7

Load

Diluted Sample, pH 6-7

Wash

1 mL Water, pH 6-7

Wash

1 mL Methanol (collect this fraction to analyze Neutrals/Acids)

Elute Any Base

2x 500 μ L 5 % Formic Acid in Methanol

Elute Weak Bases

2x 500 μ L 5 % NH_4OH in Methanol

STRATA-X POLYMERIC SPE | SAMPLE PREPARATION

Neutrals

Strata-X / Strata-XL

Reversed Phase

for Neutral Compounds



Condition

1 mL Methanol

Equilibrate

1 mL Water

Load

Diluted Sample

Wash

1 mL 5-60 % Methanol

Elute

2x 500 μ L 2 % Formic Acid in Methanol/Acetonitrile

Acids

Strata-X-A / Strata-XL-A

Strong Anion-Exchange & Reversed Phase

for Acids with $pK_a > 2$



Condition

1 mL Methanol

Equilibrate

1 mL Water, pH 6-7

Load

Diluted Sample, pH 6-7

Wash

1 mL 25 mM Ammonium Acetate Buffered, pH 6-7

Wash

1 mL Methanol (collect this fraction to analyze Neutral/Bases)

Elute Acids

2x 500 μ L 5 % Formic Acid in Methanol

Strata-X-AW / Strata-XL-AW

Weak Anion-Exchange & Reversed Phase

for Acids with $pK_a \leq 5$



Condition

1 mL Methanol

Equilibrate

1 mL Water, pH 6-7

Load

Diluted Sample, pH 6-7

Wash

1 mL 25 mM Ammonium Acetate Buffered, pH 6-7

Wash

1 mL Methanol

Elute Any Acid

2x 500 μ L 5 % NH_4OH in Methanol

Elute Weak Acids

2x 500 μ L 5 % Formic Acid in Methanol

*Based on 30 mg/1 mL sorbent mass.
The above is a convenient starting point for SPE method development.
Further optimization may be required to tailor the method to your specific needs.

Strata[®]-X Polymeric SPE

U.S. Patent No. 7,119,145

Microelution SPE

Successful bioanalytical sample preparation without the dry down

- Save 30 or more minutes per 96-well plate!
- At least 8x more sensitive than traditional 10 mg SPE
- Elution volumes as low as 25 μ L



For ordering information, go to pages 61-65

Strata-X Microelution Method Development and Peptide Screening

Test different SPE chemistries using a single 96-well plate

Ordering Information

Strata-X Microelution Peptide Screening 96-Well Plates

Part No.	Description	Unit
KS0-9528	Strata-X-CW 2 mg/well (6 rows) Strata-X-A 2 mg/well (6 rows)	ea

Strata-X Microelution Method Development 96-Well Plates

Part No.	Description	Unit
KS0-9529	Strata-X-C 2 mg/well (3 rows) Strata-X-AW 2 mg/well (3 rows) Strata-X-CW 2 mg/well (3 rows) Strata-X-A 2 mg/well (3 rows)	ea

A Faster SPE Solution

Save 30 or more minutes per 96-well plate by eliminating lengthy dry down and reconstitution steps.

Step 1		Condition
Step 2		Equilibrate
Step 3		Load Sample
Step 4		Wash
Step 5		Elute At least 8x more sensitive than traditional 10 mg SPE!
Step 6	NOT REQUIRED	Dry Down and Reconstitute Save 30 or more minutes per 96-well plate! Save on labor costs, do more in less time.
Total Processing Time		
30 Minutes		
No Dry Down!		
Throughput (in 8 hours)		
DOUBLE your throughput!*		
REDUCE Cost per Sample!*		

* When compared to traditional SPE methods

Strata[®]-X Polymeric SPE

U.S. Patent No. 7,119,145

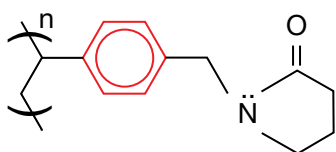
Strata-X and Strata-XL

A reversed phase functionalized polymeric sorbent that gives strong retention of neutral, acidic, or basic compounds under aggressive, high organic wash conditions.

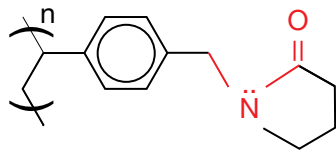
	Strata-X, 33 µm, 85 Å	Strata-XL, 100 µm, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

3 Mechanisms of Retention

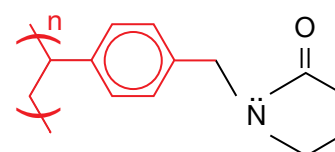
π-π Bonding



Hydrogen Bonding Dipole-Dipole Interactions



Hydrophobic Interaction



Strata-X

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S100-TAK**	1 mL (100/box)
	30 mg	8B-S100-TBJ	3 mL (50/box)
	60 mg	8B-S100-UBJ**	3 mL (50/box)
	100 mg	8B-S100-EBJ	3 mL (50/box)
	100 mg	8B-S100-ECH	6 mL (30/box)
	200 mg	8B-S100-FBJ	3 mL (50/box)
	200 mg	8B-S100-FCH	6 mL (30/box)
	500 mg	8B-S100-HBJ	3 mL (50/box)
	500 mg	8B-S100-HCH	6 mL (30/box)
Giga[™] Tube			
	500 mg	8B-S100-HDG	12 mL (20/box)
	1 g	8B-S100-JDG	12 mL (20/box)
	1 g	8B-S100-JEG	20 mL (20/box)
	2 g	8B-S100-KEG	20 mL (20/box)
	5 g	8B-S100-LFF	60 mL (16/box)
Teflon[®] Tube			
	200 mg	8B-S100-FBJ-T	3 mL (50/box)
	200 mg	8B-S100-FDJ-T	12 mL (20/box)
96-Well Plate			
	10 mg	8E-S100-AGB	2 Plates/Box
	30 mg	8E-S100-TGB	2 Plates/Box
	60 mg	8E-S100-UGB	2 Plates/Box
96-Well Microelution Plate			
	2 mg	8M-S100-4GA	ea

On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata-X on-line extraction cartridge, 20 x 2.0 mm	00M-S033-B0-CB	ea
Cartridge holder, 20 mm	CH0-5845	ea

**Tab-less tubes available. Contact Phenomenex for details.



For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

Strata-XL

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S043-TAK	1 mL (100/box)
	60 mg	8B-S043-UBJ	3 mL (50/box)
	100 mg	8B-S043-EBJ	3 mL (50/box)
	200 mg	8B-S043-FBJ	3 mL (50/box)
	200 mg	8B-S043-FCH	6 mL (30/box)
	500 mg	8B-S043-HCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S043-KDG	12 mL (20/box)
	2 g	8B-S043-KEG	20 mL (20/box)
	5 g	8B-S043-LEG	20 mL (20/box)
	5 g	8B-S043-LFF	60 mL (16/box)
	10 g	8B-S043-MFF	60 mL (16/box)
96-Well Plate			
	30 mg	8E-S043-TGB	2 Plates/Box

* To control flow rate with Strata-XL, use a stopcock ([AH0-6048](#)) when processing samples with a vacuum manifold.

Strata[®]-X Polymeric SPE

U.S. Patent No. 7,119,145

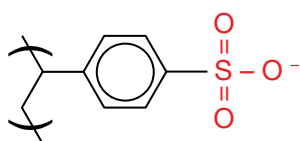
Strata-X-C and Strata-XL-C

A strong cation-exchange functionalized polymeric sorbent that allows for complete retention of basic compounds with a pK_a less than 10.5, making 100% organic wash conditions possible.

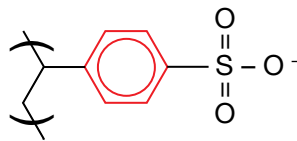
	Strata-X-C, 33 μ m, 85 Å	Strata-XL-C, 100 μ m, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

3 Mechanisms of Retention

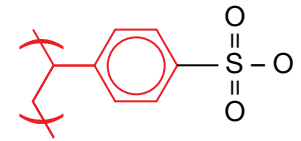
Strong Cation-Exchange



π - π Bonding



Hydrophobic Interaction



Strata-X-C

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S029-TAK**	1 mL (100/box)
	30 mg	8B-S029-TBJ	3 mL (50/box)
	60 mg	8B-S029-UBJ**	3 mL (50/box)
	100 mg	8B-S029-FBJ	3 mL (50/box)
	100 mg	8B-S029-ECH	6 mL (30/box)
	200 mg	8B-S029-FBJ	3 mL (50/box)
	200 mg	8B-S029-FCH	6 mL (30/box)
	500 mg	8B-S029-HBJ	3 mL (50/box)
	500 mg	8B-S029-HCH	6 mL (30/box)
Giga™ Tube			
	500 mg	8B-S029-HDG	12 mL (20/box)
	1 g	8B-S029-JDG	12 mL (20/box)
	1 g	8B-S029-JEG	20 mL (20/box)
	2 g	8B-S029-KEG	20 mL (20/box)
	5 g	8B-S029-LFF	60 mL (16/box)
96-Well Plate			
	10 mg	8E-S029-AGB	2 Plates/Box
	30 mg	8E-S029-TGB	2 Plates/Box
	60 mg	8E-S029-UGB	2 Plates/Box
96-Well Microelution Plate			
	2 mg	8M-S029-4GA	ea

On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata-X-C on-line extraction cartridge, 20 x 2.0 mm	00M-S048-BO-CB	ea
Cartridge holder, 20 mm	CHO-5845	ea

**Tab-less tubes available. Contact Phenomenex for details.



For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

Strata-XL-C

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S044-TAK	1 mL (100/box)
	60 mg	8B-S044-UBJ	3 mL (50/box)
	100 mg	8B-S044-EBJ	3 mL (50/box)
	100 mg	8B-S044-ECH	6 mL (30/box)
	200 mg	8B-S044-FBJ	3 mL (50/box)
	200 mg	8B-S044-FCH**	6 mL (30/box)
	500 mg	8B-S044-HCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S044-KEG	20 mL (20/box)
	5 g	8B-S044-LEG	20 mL (20/box)
	5 g	8B-S044-LFF	60 mL (16/box)
	10 g	8B-S044-MFF	60 mL (16/box)
96-Well Plate			
	30 mg	8E-S044-TGB	2 Plates/Box

Strata[®]-X Polymeric SPE

U.S. Patent No. 7,119,145

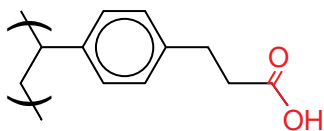
Strata-X-CW and Strata-XL-CW

A weak cation-exchange functionalized polymeric sorbent that allows for complete retention of basic compounds with a pK_a greater than 8, including quaternary amines, making 100% organic wash conditions possible.

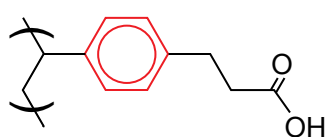
	Strata-X-CW, 33 μ m, 85 Å	Strata-XL-CW, 100 μ m, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

3 Mechanisms of Retention

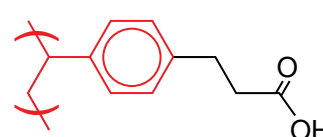
Weak Cation-Exchange



π - π Bonding



















Hydrophobic Interaction












Strata-X-CW

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S035-TAK**	1 mL (100/box)
	30 mg	8B-S035-TBJ	3 mL (50/box)
	60 mg	8B-S035-UBJ**	3 mL (50/box)
	100 mg	8B-S035-ECH	6 mL (30/box)
	200 mg	8B-S035-FBJ	3 mL (50/box)
	200 mg	8B-S035-FCH	6 mL (30/box)
	500 mg	8B-S035-HBJ	3 mL (50/box)
	500 mg	8B-S035-HCH	6 mL (30/box)
Giga™ Tube			
	1 g	8B-S035-JDG	12 mL (20/box)
	1 g	8B-S035-JEG	20 mL (20/box)
	2 g	8B-S035-KEG	20 mL (20/box)
	5 g	8B-S035-LFF	60 mL (16/box)
96-Well Plate			
	10 mg	8E-S035-AGB	2 Plates/Box
	30 mg	8E-S035-TGB	2 Plates/Box
	60 mg	8E-S035-UGB	2 Plates/Box
96-Well Microelution Plate			
	2 mg	8M-S035-4GA	ea

Strata-XL-CW

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S052-TAK	1 mL (100/box)
	60 mg	8B-S052-UBJ	3 mL (50/box)
	100 mg	8B-S052-EBJ	3 mL (50/box)
	100 mg	8B-S052-ECH	6 mL (30/box)
	200 mg	8B-S052-FBJ	3 mL (50/box)
	200 mg	8B-S052-FCH	6 mL (30/box)
	500 mg	8B-S052-HCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S052-KEG	20 mL (20/box)
96-Well Plate			
	30 mg	8E-S052-TGB	2 Plates/Box

On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata-X-CW on-line extraction cartridge, 20 x 2.0 mm	00M-S036-B0-CB	ea
Cartridge holder, 20 mm	CH0-5845	ea

**Tab-less tubes available. Contact Phenomenex for details.



For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

Strata[®]-X Polymeric SPE

U.S. Patent No. 7,119,145

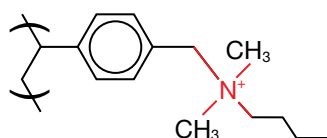
Strata-X-A and Strata-XL-A

A strong anion-exchange functionalized polymeric sorbent that allows for complete retention of weakly acidic compounds with pK_a greater than 2, making 100% organic wash conditions possible.

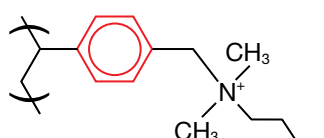
	Strata-X-A, 33 μ m, 85 Å	Strata-XL-A, 100 μ m, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

3 Mechanisms of Retention

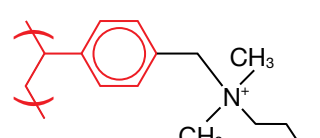
Strong Anion-Exchange



π - π Bonding



Hydrophobic Interaction



Strata-X-A

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S123-TAK**	1 mL (100/box)
	30 mg	8B-S123-TBJ	3 mL (50/box)
	60 mg	8B-S123-UBJ	3 mL (50/box)
	100 mg	8B-S123-FBJ	3 mL (50/box)
	100 mg	8B-S123-ECH	6 mL (30/box)
	200 mg	8B-S123-FBJ	3 mL (50/box)
	200 mg	8B-S123-FCH	6 mL (30/box)
	500 mg	8B-S123-HBJ	3 mL (50/box)
	500 mg	8B-S123-HCH	6 mL (30/box)
Giga[™] Tube			
	500 mg	8B-S123-HDG	12 mL (20/box)
	1 g	8B-S123-JDG	12 mL (20/box)
	1 g	8B-S123-JEG	20 mL (20/box)
	2 g	8B-S123-KEG	20 mL (20/box)
	5 g	8B-S123-LFF	60 mL (16/box)
96-Well Plate			
	10 mg	8E-S123-AGB	2 Plates/Box
	30 mg	8E-S123-TGB	2 Plates/Box
	60 mg	8E-S123-UGB	2 Plates/Box
96-Well Microelution Plate			
	2 mg	8M-S123-4GA	ea

Strata-XL-A

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S053-TAK	1 mL (100/box)
	60 mg	8B-S053-UBJ	3 mL (50/box)
	100 mg	8B-S053-EBJ	3 mL (50/box)
	100 mg	8B-S053-FCH	6 mL (30/box)
	200 mg	8B-S053-FBJ	3 mL (50/box)
	200 mg	8B-S053-FCH	6 mL (30/box)
	500 mg	8B-S053-HCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S053-KEG	20 mL (20/box)
	5 g	8B-S053-LFF	60 mL (16/box)
	10 g	8B-S053-MFF	60 mL (16/box)
96-Well Plate			
	30 mg	8E-S053-TGB	2 Plates/Box

**Tab-less tubes available. Contact Phenomenex for details.



For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

Strata[®]-X Polymeric SPE

U.S. Patent No. 7,119,145

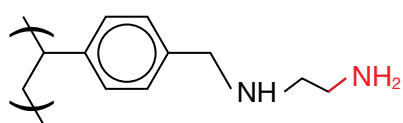
Strata-X-AW and Strata-XL-AW

A weak anion-exchange functionalized polymeric sorbent that allows for complete retention of acidic compounds with pK_a less than 5, making 100% organic wash conditions possible.

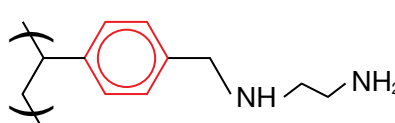
	Strata-X-AW, 33 μ m, 85 Å	Strata-XL-AW, 100 μ m, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

3 Mechanisms of Retention

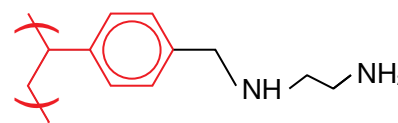
Weak Anion-Exchange



π - π Bonding




















Hydrophobic Interaction











Strata-X-AW

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S038-TAK**	1 mL (100/box)
	30 mg	8B-S038-TBJ	3 mL (50/box)
	60 mg	8B-S038-UBJ	3 mL (50/box)
	100 mg	8B-S038-EBJ	3 mL (50/box)
	100 mg	8B-S038-ECH	6 mL (30/box)
	200 mg	8B-S038-FBJ	3 mL (50/box)
	200 mg	8B-S038-FCH	6 mL (30/box)
	500 mg	8B-S038-HBJ	3 mL (50/box)
	500 mg	8B-S038-HCH	6 mL (30/box)
Giga[™] Tube			
	500 mg	8B-S038-HDG	12 mL (20/box)
	1 g	8B-S038-JDG	12 mL (20/box)
	1 g	8B-S038-JEG	20 mL (20/box)
	5 g	8B-S038-LFF	60 mL (16/box)
96-Well Plate			
	10 mg	8E-S038-AGB	2 Plates/Box
	30 mg	8E-S038-TGB	2 Plates/Box
	60 mg	8E-S038-UGB	2 Plates/Box
96-Well Microelution Plate			
	2 mg	8M-S038-4GA	ea

Strata-XL-AW

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S051-TAK	1 mL (100/box)
	60 mg	8B-S051-UBJ	3 mL (50/box)
	100 mg	8B-S051-EBJ	3 mL (50/box)
	100 mg	8B-S051-ECH	6 mL (30/box)
	200 mg	8B-S051-FBJ	3 mL (50/box)
	200 mg	8B-S051-FCH	6 mL (30/box)
	500 mg	8B-S051-HCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S051-KEG	20 mL (20/box)

**Tab-less tubes available. Contact Phenomenex for details.



For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

Strata[®]-X Polymeric SPE

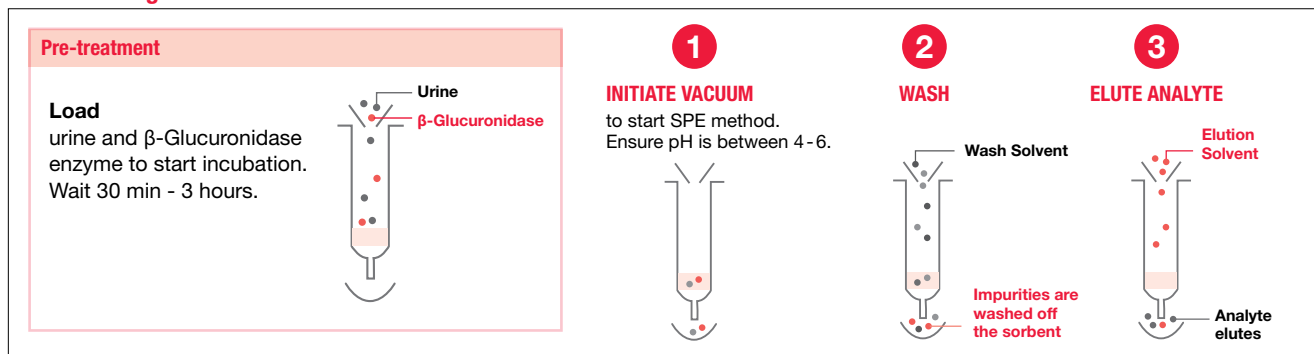
U.S. Patent No. 7,119,145

Strata-X-Drug B and Strata-X-Drug N

Proprietary sorbents that are designed and quality controlled for basic and neutral drugs of abuse analysis. These sorbents do not require a conditioning/equilibrating step.

Now In-Well Hydrolysis Capabilities!

Strata-X-Drug B Plus Protocol



Strata-X-Drug B Starting Methods

	1	2	3
Condition	Opiates, 6-MAM, PCP, Amphetamines, Methadone, Healthcare Opiates, and Propoxyphene*	Marijuana Metabolites	Cocaine Metabolites
Load	Pre-treated urine sample	Pre-treated urine sample	Pre-treated urine sample
Wash 1	600 μ L of 100 mM Sodium acetate buffer (pH 5.0)	600 μ L of 100 mM Sodium acetate buffer (pH 5.0)	600 μ L of 0.1 N Hydrochloric acid
Wash 2	600 μ L Methanol	600 μ L of Acetonitrile/100 mM Sodium acetate buffer (pH 5.0) (30:70)	600 μ L Methanol
Dry	10 minutes under full vacuum	15 minutes under full vacuum	10 minutes under full vacuum
Elute	2x 300 μ L of Ethyl acetate/ Isopropanol/ Ammonium hydroxide (70:20:10)	2x 300 μ L of Ethyl acetate/Isopropanol (85:15)	2x 300 μ L of Ethyl acetate/Isopropanol/ Ammonium hydroxide (70:20:10)

* Opiates, 6-MAM, PCP, Amphetamines, Methadone, Healthcare Opiates, and Propoxyphene can be extracted simultaneously or separately using the same SPE methodology.

Methods are written for 30 mg/well Strata-X-Drug B 96-well plate; however they can be scaled to accommodate smaller or larger sample sizes and sorbent masses.




Strata-X-Drug N Starting Methods

	1	2
Condition	Barbiturates	Benzodiazepines
Load	Pre-treated urine sample	Pre-treated urine sample
Wash 1	600 μ L of 0.1 N Hydrochloric acid (HCl)	600 μ L of Acetonitrile/Water (20:80)
Wash 2	2x 600 μ L of Methanol/ 0.1 N HCl (30:70)	—
Dry	10 minutes under full vacuum	10 minutes under full vacuum
Elute	2x 300 μ L of Ethyl acetate/ Isopropanol (85:15)	2x 300 μ L of Ethyl acetate/ Isopropanol (85:15)

Methods are written for 30 mg/well Strata-X-Drug N 96-well plate; however they can be scaled to accommodate smaller or larger sample sizes and sorbent masses.


Strata-X-Drug B

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	10 mg	8B-S128-AAK	1 mL (100/box)
	30 mg	8B-S128-TAK	1 mL (100/box)
	30 mg	8B-S128-TBJ	3 mL (50/box)
	60 mg	8B-S128-UBJ	3 mL (50/box)
	60 mg	8B-S128-UCH	6 mL (30/box)
	60 mg	8B-S128-UCL	6 mL (200/bag)
Giga[™] Tube			
	100 mg	8B-S128-EDG	12 mL (20/box)
96-Well Plate			
	10 mg	8E-S128-AGB	2 Plates/box
	30 mg	8E-S128-TGB	2 Plates/box
	60 mg	8E-S128-UGB	2 Plates/box



Strata-X-Drug B Plus

Ordering Information

Format	Sorbent Mass	Part Number	Unit
96-Well Plate			
	10 mg	8E-S128-AGB-P	2 Plates/box
	30 mg	8E-S128-TGB-P	2 Plates/box

Strata-X-Drug N

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S129-TAK	1 mL (100/box)
	30 mg	8B-S129-TBJ	3 mL (50/box)
	60 mg	8B-S129-UBJ	3 mL (50/box)
	60 mg	8B-S129-UCH	6 mL (30/box)
	60 mg	8B-S129-UCL	6 mL (200/bag)
	100 mg	8B-S129-ECH	6 mL (30/box)
96-Well Plate			
	10 mg	8E-S129-AGB	2 Plates/box
	30 mg	8E-S129-TGB	2 Plates/box

SAMPLE PREPARATION | STRATA-X POLYMERIC SPE

Strata Traditional Solid Phase Extraction (SPE) Sorbents


Material Characteristics

Phase	Particle Size (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load (%)	Bonding	End Capping	Ionic Capacity (meq/g)
Reversed Phase							
C18-E	55	70	500	18.0	trifunctional	Yes	—
C18-U	55	70	500	17.0	trifunctional	No	—
C18-T	55	140	300	15.0	trifunctional	Yes	—
C8	55	70	500	10.5	trifunctional	Yes	—
Phenyl	55	70	500	10.5	trifunctional	Yes	—
Normal Phase							
CN	55	70	500	10.0	trifunctional	No	—
NH ₂	50	60	490	6.5	trifunctional	No	1.3
Silica (Si-1)	60	70	490	0.0	—	—	—
Ion-Exchange							
SCX	60	70	500	6.0	trifunctional	No	0.2
WCX	55	70	500	8.0	trifunctional	No	0.8
SAX	55	70	500	6.5	trifunctional	No	0.9
Mixed-Mode							
Screen-C GF	200	70	500	proprietary	trifunctional	—	—
Screen-C	55	70	500	proprietary	trifunctional	—	—
Basic Screen Large Reservoir Cartridge (LRC)	50	60	600	proprietary	trifunctional	—	—
Screen-A	55	70	500	proprietary	trifunctional	—	—
ABW	55	70	500	7.0	—	—	—
Specialty							
FL-PR (Florisil®)	170	80	300	0.0	—	—	—
EPH (Extractable Petroleum Hydrocarbon)	120	30	proprietary	0.0	—	—	—
AL-N (Alumina-Neutral)	120	60	165	—	—	—	—
SDB-L	100	260	500	—	—	—	—
Eco-Screen	proprietary	proprietary	proprietary	—	—	—	—
Melamine	proprietary	proprietary	proprietary	proprietary	—	—	—
PAH	proprietary	proprietary	proprietary	proprietary	—	—	—
GCB (Graphitized Carbon Black)	proprietary	proprietary	70-100	proprietary	proprietary	proprietary	proprietary

Determine the Correct Sorbent Mass

Silica-Based Sorbents (Strata C18-E, C8, SCX, SAX, WCX, NH ₂ , etc.)	
Sample Matrix	Sorbent Mass
Blood, serum, plasma	50 mg sorbent per 250 µL
Urine	50 mg sorbent per 500 µL
Filtered tissue homogenates	100 mg sorbent per 100 mg tissue
Environmental Samples	Sorbent Mass
Water (particulate-free) drinking	500 mg/100 mL - 500 mL sample
Water (particulate-laden) rivers, runoff, etc.	1 g/100 mL - 500 mL sample
Soil Extracts	1 g/100 g of soil extract

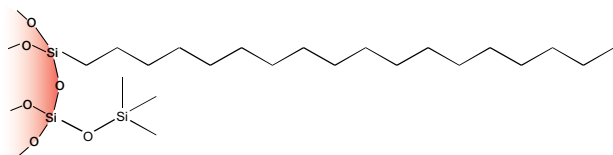
Determine the Correct Sorbent Wash and Elution Volumes

 Silica-Based Sorbent Mass	10 mg	50 mg	100 mg	150 mg	200 mg	500 mg	1 g	2 g	5 g	10 g
	Practical Minimum Wash and Elution Volume 4 bed volumes	60 µL	300 µL	600 µL	900 µL	1.2 mL	3 mL	6 mL	12 mL	30 mL
Recommended Wash and Elution Volume 8 bed volumes	120 µL	600 µL	1.2 mL	1.8 mL	2.4 mL	6 mL	12 mL	24 mL	60 mL	120 mL




Reversed Phase Sorbents

C18-E

End-capped C18 sorbent that offers strong hydrophobic retention with negligible secondary polar interactions from active silanol groups.



Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	50 mg	8B-S001-DAK	1 mL (100/box)
	100 mg	8B-S001-EAK**	1 mL (100/box)
	100 mg	8B-S001-EBJ	3 mL (50/box)
	200 mg	8B-S001-FBJ**	3 mL (50/box)
	200 mg	8B-S001-FCH	6 mL (30/box)
	500 mg	8B-S001-HBJ	3 mL (50/box)
	500 mg	8B-S001-HCH	6 mL (30/box)
	1 g	8B-S001-JEG	20 mL (20/box)
Giga™ Tube			
	500 mg	8B-S001-HDG	12 mL (20/box)
	2 g	8B-S001-KDG	12 mL (20/box)
	5 g	8B-S001-LEG	20 mL (20/box)
	10 g	8B-S001-MFF	60 mL (16/box)
	20 g	8B-S001-VFF	60 mL (16/box)
	50 g	8B-S001-YSN	150 mL (8/box)
	70 g	8B-S001-ZSN	150 mL (8/box)
96-Well Plate			
	25 mg	8E-S001-CGB	2 Plates/Box
	50 mg	8E-S001-DGB	2 Plates/Box
	100 mg	8E-S001-EGB	2 Plates/Box

On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata C18-E on-line extraction cartridge, 20 x 2.0 mm	00M-S039-B0-CB	ea
Cartridge holder, 20 mm	CH0-5845	ea

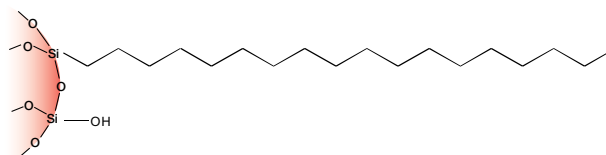
**Tab-less tubes available. Contact Phenomenex for details.





For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

C18-U

C18 sorbent with no end-capping, giving the phase moderate hydrophobic selectivity with slight polar selectivity due to the active silanol groups.

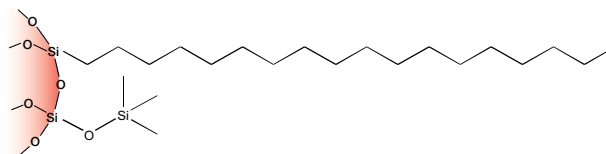


Ordering Information



Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S002-EAK	1 mL (100/box)
	200 mg	8B-S002-FBJ	3 mL (50/box)
	500 mg	8B-S002-HBJ	3 mL (50/box)
	500 mg	8B-S002-HCH	6 mL (30/box)
	1 g	8B-S002-JCH	6 mL (30/box)
96-Well Plate			
	50 mg	8E-S002-DGB	2 Plates/Box
	100 mg	8E-S002-EGB	2 Plates/Box

C18-T

A wide-pore C18 sorbent that offers strong hydrophobic selectivity and accommodates molecules up to 75 kD in size.



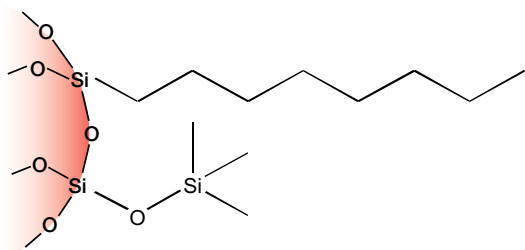
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S004-EAK	1 mL (100/box)
	200 mg	8B-S004-FBJ	3 mL (50/box)
	500 mg	8B-S004-HBJ	3 mL (50/box)
	500 mg	8B-S004-HCH	6 mL (30/box)
	1 g	8B-S004-JCH	6 mL (30/box)
96-Well Plate			
	50 mg	8E-S004-DGB	2 Plates/Box

Reversed Phase Sorbents

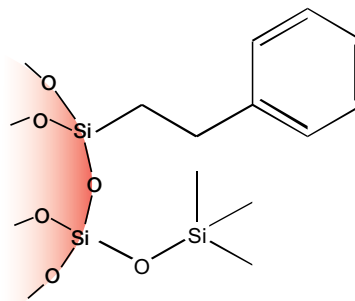
C8

An end-capped C8 sorbent that offers moderate hydrophobic retention with negligible secondary polar interactions from active silanol groups.












Phenyl

A short alkyl chain with a phenyl group provides moderate hydrophobic selectivity and aromatic selectivity through π - π interactions.










Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S005-EAK	1 mL (100/box)
	200 mg	8B-S005-FBJ	3 mL (50/box)
	500 mg	8B-S005-HBJ	3 mL (50/box)
	500 mg	8B-S005-HCH	6 mL (30/box)
	1 g	8B-S005-JCH	6 mL (30/box)
Giga™ Tube			
	2 g	8B-S005-KDG	12 mL (20/box)
	5 g	8B-S005-LEG	20 mL (20/box)
	10 g	8B-S005-MFF	60 mL (16/box)
96-Well Plate			
	25 mg	8E-S005-CGB	2 Plates/Box

On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata C8 on-line extraction cartridge, 20 x 2.0 mm	00M-S101-B0-CB	ea
Cartridge holder, 20 mm	CH0-5845	ea

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S006-EAK	1 mL (100/box)
	200 mg	8B-S006-FBJ	3 mL (50/box)
	500 mg	8B-S006-HBJ	3 mL (50/box)
	500 mg	8B-S006-HCH	6 mL (30/box)
	1 g	8B-S006-JCH	6 mL (30/box)
96-Well Plate			
	25 mg	8E-S006-CGB	2 Plates/Box
	100 mg	8E-S006-EGB	2 Plates/Box

RP (proprietary reversed phase on-line extraction column)

On-line Extraction Column

Description	Part Number	Unit/Box
50 x 1.0 mm	00B-S326-A0	ea
50 x 0.5 mm	00B-S326-AF	ea

On-line Extraction Cartridge

Description	Part Number	Unit/Box
20 x 2.1 mm	00M-S326-AN	ea
Cartridge holder, 20 mm	CH0-5845	ea



For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

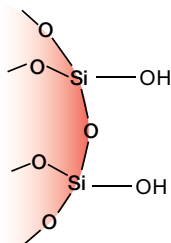


Don't see the size or format you want? Contact Phenomenex or your local distributor for other dimensions, Giga tubes, and bulk sorbent pricing, and part numbers.














Normal Phase Sorbents

Silica (Si-1)

Unbonded silica particle that offers strong polar selectivity.



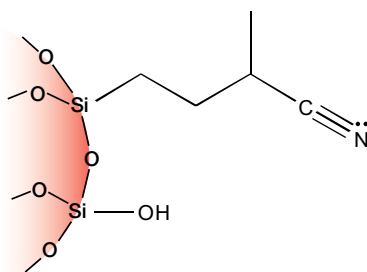
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S012-EAK**	1 mL (100/box)
	200 mg	8B-S012-FBJ	3 mL (50/box)
	500 mg	8B-S012-HBJ**	3 mL (50/box)
	500 mg	8B-S012-HCH	6 mL (30/box)
	1 g	8B-S012-JCH**	6 mL (30/box)
Giga™ Tube			
	500 mg	8B-S012-HDG	12 mL (20/box)
	1 g	8B-S012-JDG	12 mL (20/box)
	2 g	8B-S012-KDG	12 mL (20/box)
	5 g	8B-S012-LEG	20 mL (20/box)
	10 g	8B-S012-MFF	60 mL (16/box)
	20 g	8B-S012-VFF	60 mL (16/box)
96-Well Plate			
	50 mg	8E-S012-DGB	2 Plates/Box
	100 mg	8E-S012-EGB	2 Plates/Box

**Tab-less tubes available. Contact Phenomenex for details.

Cyano (CN)

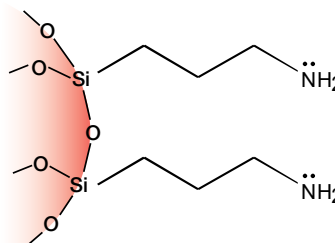
A polar phase with slight hydrophobic selectivity in reversed phase mode and moderate polar selectivity in normal phase mode.









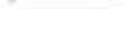






Phenomenex

NH₂/WAX








This amino phase offers strong polar selectivity and hydrogen bonding under normal phase conditions or can be used as a weak anion-exchange sorbent.



Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S009-EAK	1 mL (100/box)
	200 mg	8B-S009-FBJ	3 mL (50/box)
	500 mg	8B-S009-HBJ	3 mL (50/box)
	500 mg	8B-S009-HCH	6 mL (30/box)
	1 g	8B-S009-JCH	6 mL (30/box)
Giga Tube			
	500 mg	8B-S009-HDG	12 mL (20/box)
	2 g	8B-S009-KDG	12 mL (20/box)
	5 g	8B-S009-LEG	20 mL (20/box)
	10 g	8B-S009-MFF	60 mL (16/box)
	20 g	8B-S009-VFF	60 mL (16/box)
96-Well Plate			
	25 mg	8E-S009-CGB	2 Plates/Box
	50 mg	8E-S009-DGB	2 Plates/Box
	100 mg	8E-S009-EGB	2 Plates/Box

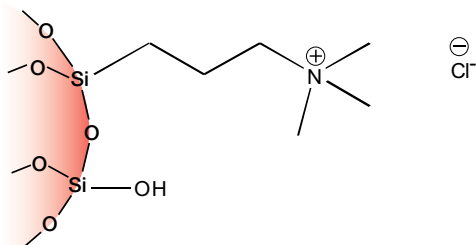
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S007-EAK	1 mL (100/box)
	200 mg	8B-S007-FBJ	3 mL (50/box)
	500 mg	8B-S007-HBJ	3 mL (50/box)
	500 mg	8B-S007-HCH	6 mL (30/box)
	1 g	8B-S007-JCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S007-KDG	12 mL (20/box)
96-Well Plate			
	50 mg	8E-S007-DGB	2 Plates/Box

Ion-Exchange Sorbents

SAX (strong anion-exchange)

The quaternary amine phase remains positively charged under all conditions, giving a strong anion-exchange mechanism of retention.

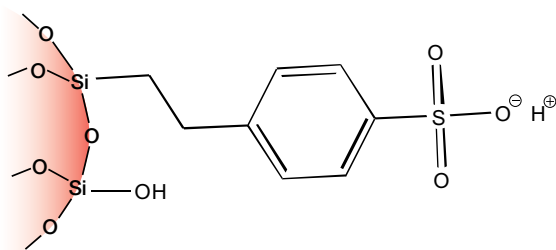


Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S008-EAK	1 mL (100/box)
	100 mg	8B-S008-EBJ	3 mL (50/box)
	200 mg	8B-S008-FBJ	3 mL (50/box)
	500 mg	8B-S008-HBJ	3 mL (50/box)
	500 mg	8B-S008-HCH	6 mL (30/box)
	1 g	8B-S008-JCH	6 mL (30/box)
Giga™ Tube			
	500 mg	8B-S008-HDG	12 mL (20/box)
	2 g	8B-S008-KDG	12 mL (20/box)
	5 g	8B-S008-LEG	20 mL (20/box)
	20 g	8B-S008-VFF	60 mL (16/box)
96-Well Plate			
	25 mg	8E-S008-CGB	2 Plates/Box
	50 mg	8E-S008-DGB	2 Plates/Box
	100 mg	8E-S008-EGB	2 Plates/Box

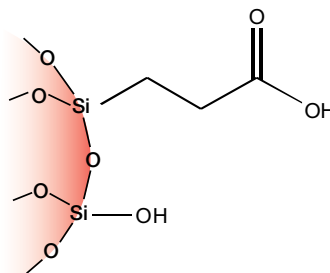
SCX (strong cation-exchange)

A benzene sulfonic acid group is bonded to the surface of the silica particle, giving strong cation-exchange selectivity.



WCX (weak cation-exchange)

A carboxylic acid group is bonded to the surface of the silica particle, giving a weak cation-exchange selectivity.



Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S027-EAK	1 mL (100/box)
	200 mg	8B-S027-FBJ	3 mL (50/box)
	500 mg	8B-S027-HBJ	3 mL (50/box)
	500 mg	8B-S027-HCH	6 mL (30/box)
	1 g	8B-S027-JCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S027-KDG	12 mL (20/box)
	5 g	8B-S027-LEG	20 mL (20/box)
96-Well Plate			
	25 mg	8E-S027-CGB	2 Plates/Box
	50 mg	8E-S027-DGB	2 Plates/Box

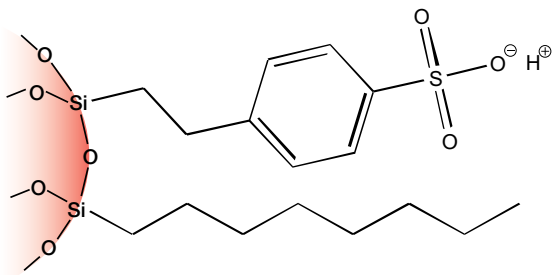
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S010-EAK	1 mL (100/box)
	100 mg	8B-S010-EBJ	3 mL (50/box)
	200 mg	8B-S010-FBJ	3 mL (50/box)
	500 mg	8B-S010-HBJ	3 mL (50/box)
	500 mg	8B-S010-HCH	6 mL (30/box)
	1 g	8B-S010-JCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S010-KDG	12 mL (20/box)
	5 g	8B-S010-LEG	20 mL (20/box)
	10 g	8B-S010-MFE	60 mL (16/box)
	20 g	8B-S010-VFF	60 mL (16/box)
96-Well Plate			
	25 mg	8E-S010-CGB	2 Plates/Box
	50 mg	8E-S010-DGB	2 Plates/Box
	100 mg	8E-S010-EGB	2 Plates/Box

Mixed-Mode Sorbents

Screen-C

Incorporates the hydrophobic selectivity of a C8 phase and strong cation-exchange for the extraction of basic drugs from biological matrices.



Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S016-EAK**	1 mL (100/box)
	100 mg	8B-S016-EBJ	3 mL (50/box)
	150 mg	8B-S016-SBJ	3 mL (50/box)
	150 mg	8B-S016-SCH	6 mL (30/box)
	200 mg	8B-S016-FBJ	3 mL (50/box)
	200 mg	8B-S016-FCH	6 mL (30/box)
	300 mg	8B-S016-RBJ	3 mL (50/box)
	300 mg	8B-S016-RCH	6 mL (30/box)
	500 mg	8B-S016-HCH	6 mL (30/box)

96-Well Plate

	50 mg	8E-S016-DGB	2 Plates/Box
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Screen-C GF

Offers the selectivity of Screen-C in a gravity flow particle size for viscous samples.

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	500 mg	8B-S026-HBJ	3 mL (50/box)

Basic Screen Large Reservoir Cartridge (LRC)

Improved recovery of basic drugs from biological samples in a funnel shaped tube ideal for large sample volumes with minimal extraction solvents.

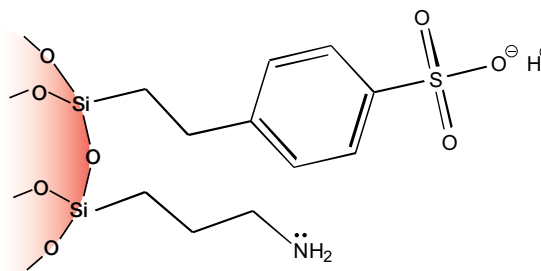
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
Large Reservoir Cartridge	200 mg	8B-S327-FTH	10 mL (30/box)

**Tab-less tubes available. Contact Phenomenex for details.

ABW

Offers a strong cation-exchange group and a weak anion-exchange group for the extraction or fractionation of complex mixtures.

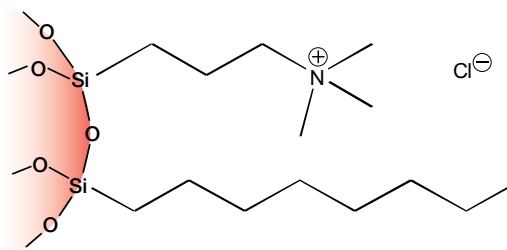


Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	200 mg	8B-S030-FBJ	3 mL (50/box)
	1 g	8B-S030-JCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S030-KDG	12 mL (20/box)
	5 g	8B-S030-LEG	20 mL (20/box)

Screen-A

Incorporates the hydrophobic selectivity of a C8 phase and strong anion-exchange for the extraction of acidic drugs from biological matrices.



Ordering Information




Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S019-EAK	1 mL (100/box)
	200 mg	8B-S019-FBJ	3 mL (50/box)
	200 mg	8B-S019-FCH	6 mL (30/box)
	500 mg	8B-S019-HCH	6 mL (30/box)

Specialty Sorbents

Alumina-N (AL-N)

A polar phase that allows for the extraction of polar compounds from food and environmental samples.


Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	500 mg	8B-S313-HBJ	3 mL (50/box)
	1 g	8B-S313-JCH	6 mL (30/box)
Giga™ Tube			
	2 g	8B-S313-KDG	12 mL (20/box)

Eco-Screen

This proprietary normal phase sorbent is topped with sodium sulfate to remove any excess water and used for the extraction of hydrocarbons from environmental samples, resulting in high recoveries of naphthalene.



Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	1 g	8B-S046-JBJ	3 mL (50/box)

GCB (graphitized carbon black)

This high quality non-porous graphitized carbon offers better retention of polar compounds compared to C8 or C18 silica products making it ideal for pesticide and PFAS extraction or pigment clean-up.








Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	250 mg	8B-S528-FCH	6 mL (30/box)
	500 mg	8B-S528-HCH	6 mL (30/box)

Florisil® (FL-PR, pesticide residue grade)

A modified silica sorbent that contains a magnesium ion, allowing for the retention of polar and halogenated compounds, like pesticides, from environmental samples.



Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	500 mg	8B-S013-HBJ	3 mL (50/box)
	500 mg	8B-S013-HCH	6 mL (30/box)
	1 g	8B-S013-JCH	6 mL (30/box)
	2.5 g	8B-S013-8CH	6 mL (30/box)
Giga Tube			
	2 g	8B-S013-KDG	12 mL (20/box)
	5 g	8B-S013-LEG	20 mL (20/box)
	10 g	8B-S013-MFF	60 mL (16/box)

Melamine

A proprietary phase that allows for the simultaneous extraction of melamine and cyanuric acid out of food and biological samples.

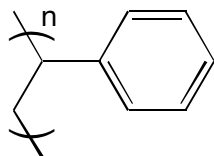
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S049-EBJ	3 mL (50/box)
	200 mg	8B-S049-FBJ	3 mL (50/box)









Specialty Sorbents

SDB-L (styrene-divinylbenzene)

A rugged polymer sorbent that is pH stable from 1-14 and offers hydrophobic and aromatic selectivity for reversed phase applications.





Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S014-EAK	1 mL (100/box)
	200 mg	8B-S014-FBJ	3 mL (50/box)
	200 mg	8B-S014-FCH	6 mL (30/box)
	500 mg	8B-S014-HBJ	3 mL (50/box)
	500 mg	8B-S014-HCH	6 mL (30/box)
	1 g	8B-S014-JCH	6 mL (30/box)
Giga™ Tube			
	10 g	8B-S014-MFF	60 mL (16/box)
96-Well Plate			
	50 mg	8E-S014-DGB	2 Plates/Box

PAH (Polycyclic Aromatic Hydrocarbons)

This proprietary sorbent was designed to provide high recoveries of polycyclic aromatic hydrocarbons from water (as specified in EPA Method 550.1) while simultaneously removing humic acids from the extract.

Ordering Information

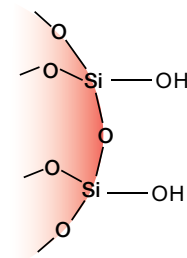
Format	Sorbent Mass	Part Number	Unit
Tube			
	750 mg	8B-S130-WCH	6 mL (30/box)
	1.5 g	8B-S130-7CH	6 mL (30/box)






Don't see the size or format you want? Contact Phenomenex or your local distributor for other dimensions, Giga tubes, and bulk sorbent pricing and part numbers.

EPH (Extractable Petroleum Hydrocarbons)

This specialty normal phase sorbent was developed for the fractionation of aliphatic and aromatic hydrocarbons from environmental samples.





Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	500 mg	8B-S031-HBJ	3 mL (50/box)
Giga Tube			
	5 g	8B-S031-LEG	20 mL (20/box)
Teflon® Giga Tube			
	5 g	8B-S031-LEG-T	20 mL (20/box)

Sodium Sulfate

A specialized sorbent that is used for the removal of aqueous residues from organic solutions in an effort to reduce blow-down time.

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	1 g	8B-S124-JCH	6 mL (30/box)
Giga Tube			
	5 g	8B-S124-LEG	20 mL (20/box)

COM bioZen MagBeads

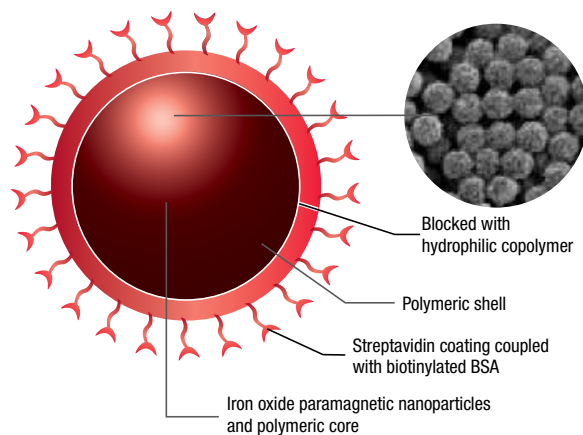
Streptavidin Coated

Uniform and efficient magnetic particles result in faster and reliable purification, clean-up, and isolation of proteins and peptide molecules.

- Excellent for binding biotinylated capture antibodies
- 1.0µm Streptavidin coated magnetic beads
- Available in 25 mg, 50 mg, and 500 mg formats

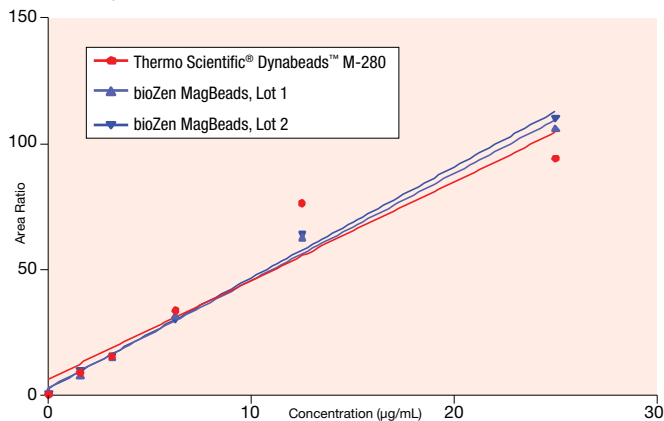
Material Characteristics

Bead Type	Bead Diameter	Outside Coating Type	Biotin Binding Capacity	Coating Specification	Concentration	Available Formats
Iron coated	1 µm	Streptavidin	> 200 pmol Biotin/mg	Tosyl-activated, blocked with hydrophilic copolymer	20 mg/mL	25 mg, 50 mg, 500 mg



Immunocapture Bead	Correlation Coefficient
M-280	0.9176
bioZen MagBeads, Lot 1	0.9914
bioZen MagBeads, Lot 2	0.9941

Area Ratio, Rituximab



Ordering Information

Product	Coating	Formats	Part No.	Concentration	Bead Size
bioZen MagBeads	Streptavidin	25 mg (1.25 mL)	KS0-9531	20 mg/mL	0.95-1.15 µm
		50 mg (2.5 mL)	KS0-9532		
		500 mg (25 mL)	KS0-9533		

N-Glycan Clean-Up

HILIC Solid Phase Extraction (SPE)

High recovery of labeled released N-glycans in a microelution format allowing for streamlined processing and clean-up of small sample volumes.



Ordering Information

bioZen Solid Phase Extraction	Format	Sorbent Mass	Part No.	Unit
bioZen N-Glycan Clean-Up	Microelution 96-Well Plate	5 mg/well	8M-S009-NGA	1/box

Presston 1000 Positive Pressure Manifold

Your Newest Solution to Increased Productivity

Presston 1000 is a positive pressure manifold designed to make sample preparation processing easy and consistent. It applies pressure from above to push liquid through sample preparation sorbents to provide uniform flow rates when processing samples. Presston 1000 is compatible with standard 96-well plates, including microelution plates, and can even be used with 1 mL tubes with the addition of a tabless tube holder (Part No.: [AH0-9055](#)).

- **Pneumatic Handling**
- **Consistent Flow Rates**
- **Safe and Easy-to-Use**

Do More with Presston 1000

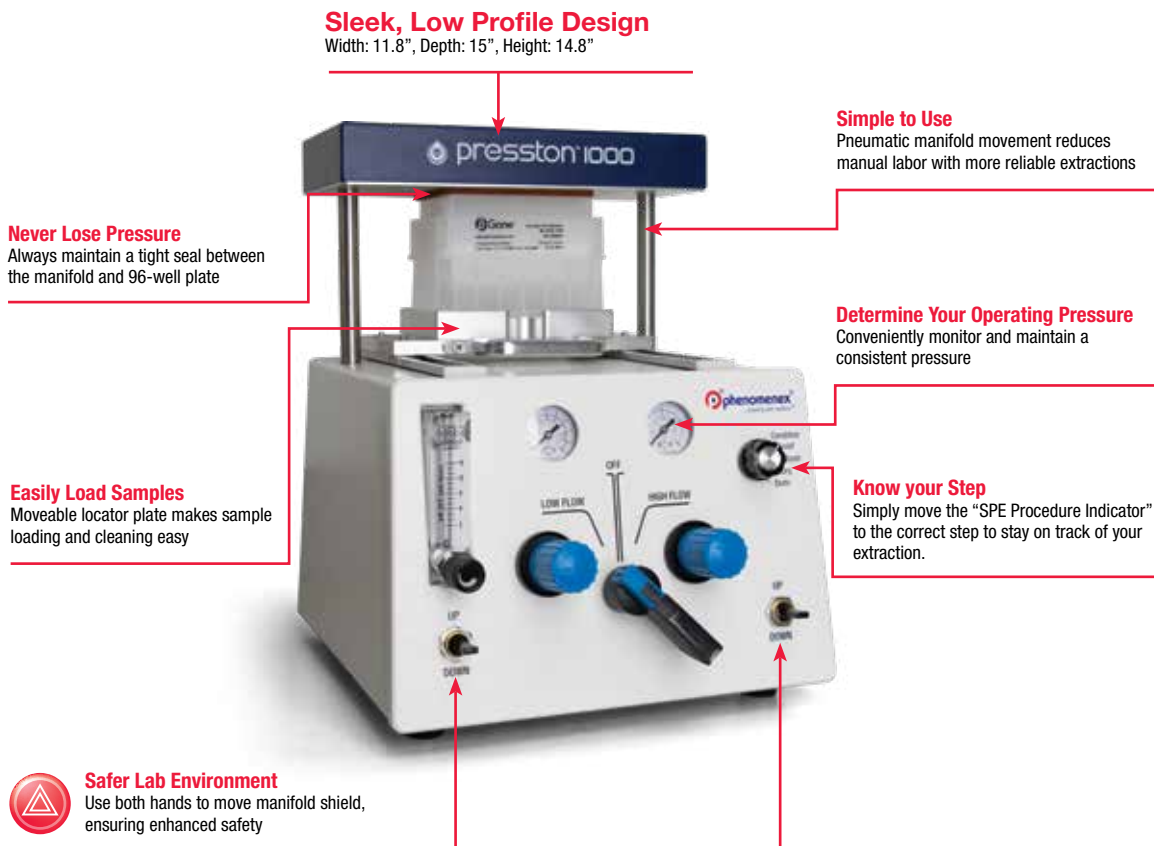
Streamline your 96-well plate processing for easier sample preparation with a pneumatic positive pressure manifold.

Compatible with:



Sleek, Low Profile Design

Width: 11.8", Depth: 15", Height: 14.8"



Never Lose Pressure
Always maintain a tight seal between the manifold and 96-well plate

Simple to Use
Pneumatic manifold movement reduces manual labor with more reliable extractions

Determine Your Operating Pressure
Conveniently monitor and maintain a consistent pressure

Easily Load Samples
Moveable locator plate makes sample loading and cleaning easy

Know your Step
Simply move the "SPE Procedure Indicator" to the correct step to stay on track of your extraction.

 **Safer Lab Environment**
Use both hands to move manifold shield, ensuring enhanced safety



Ensure Reliability

Phenomenex warrants the Presston 1000 Positive Pressure Manifold against defects in materials and workmanship under normal installation, use, and maintenance for a period of 12 months following delivery.

Ordering Information

Part No.	Description	Unit
Presston 1000 Positive Pressure Manifold		
AH1-7033	SPE Positive Pressure Manifold, 96-Well Plate, complete assembly	ea

Sample Preparation Accessories

Vacuum Manifolds

SPE Tube Vacuum Manifold

- Process up to 12 or 24 samples at one time
- Process up to 10 large volume samples at one time
- Female Luer inlets fit all male Luer tipped SPE tubes and cartridges

Ordering Information

Part No.	Description	Unit
24 – Position Vacuum Manifold*		
AHO-6024	SPE 24-Position Vacuum Manifold Set, complete assembly	ea
24 – Position Vacuum Manifold Replacement Parts		
AHO-6026	SPE Glass Chamber	ea
AHO-6028	SPE Cover, Gasket and 24 Stopcocks	ea
AHO-6030	SPE Gaskets	2/pk
AHO-6038	SPE Collection Rack Assembly, including plates, legs and clips ³	ea
AHO-6049	SPE Luer Stopcocks	24/pk
12 – Position Vacuum Manifold**		
AHO-6023	SPE 12-Position Vacuum Manifold Set, complete assembly	ea
12 – Position Vacuum Manifold Replacement Parts		
AHO-6025	SPE 12-Position Glass Chamber	ea
AHO-6027	SPE Cover, Gasket and 12 Stopcocks	ea
AHO-6029	SPE Gaskets	2/pk
AHO-6037	SPE Collection Rack Assembly, including plates, legs and clips ²	ea
AHO-6052	SPE 12-Position Vacuum Waste Container, polypropylene	10/pk
AHO-6049	SPE Luer Stopcocks	24/pk
10 – Position Tall-Boy™ Vacuum Manifold*†		
AHO-7502	SPE 10-Position Tall-Boy Vacuum Manifold, complete assembly	ea
10 – Position Tall-Boy™ Vacuum Manifold Replacement Parts		
AHO-7503	SPE 10-Position Tall-Boy Vacuum Manifold, Glass Chamber	ea
AHO-7504	SPE 10-Position Tall-Boy Vacuum Manifold, Cover, Gasket and 10 Stopcocks	ea

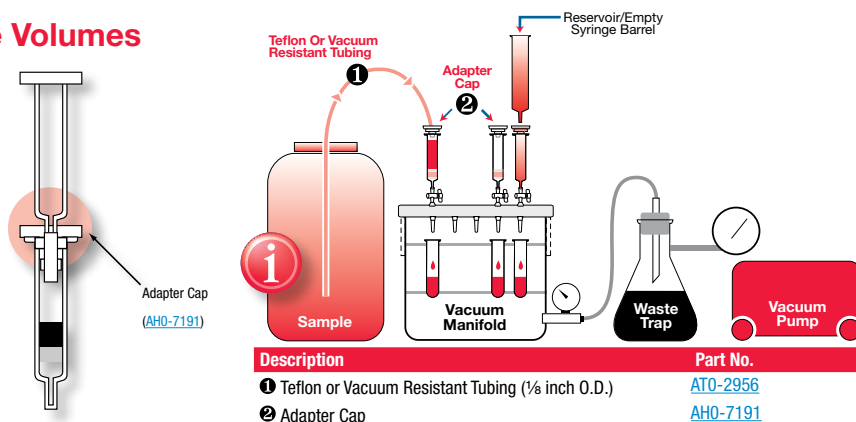
- Fits 13 mm and 16 mm test tubes up to 125 mm in height.
- A flow rate of 1 – 3 drops per second (1 – 3 mL /min) is recommended during the loading and elution steps for typical small volume samples (< 5 mL). At these critical steps the analytes are chemically interacting with the sorbent.
- Large volume samples (> 100 mL) in large cartridges (>1 gram) may be processed at flow rates between 5 – 10 mL/minute.
- Conditioning and Wash steps are generally not flow critical.
- Individual stopcocks are typically not needed when using the Strata-X family of sorbents. They are very forgiving of improper flow rates and are truly resistant to deconditioning effects caused by excessive drying during the method.
- Reversed phase methods are more forgiving of fast flow rates than ion-exchange or normal phase.

Compatible with:

Processing Large Sample Volumes

Have Large Sample Volume but Need a Small Bed Mass?

Use an adapter cap to attach another SPE tube, which can be used to increase the reservoir size for washing or eluting solvents.



* Manifolds include: Vacuum-tight glass chamber, vacuum gauge assembly, polypropylene lid with gasket, male and female luers and yellow end plugs, stopcock valves, collection rack assemblies, polypropylene needles, lid support legs. Waste container included with 12-position manifold.

- (1) The 10-position Tall Boy Vacuum Manifold Collection Rack includes 4 plates: one base plate, one dimple plate, one small plate and one large plate and three riser bar legs, along with 12 manifold clips to support the plates. The assembly also includes 10 polypropylene needles, 10 stopcocks and 4 black legs to support the lid when taken off the glass block.
- (2) The 12-position Collection Rack Assembly consists of 3 support legs, base plate, dimple plate, small plate, medium plate, large plate, volumetric plate, and 12 retaining clips.
- (3) The 24-position Collection Rack Assembly consists of 3 support legs, base plate, dimple plate, small plate, large plate, and 12 retaining clips.

Sample Preparation Accessories

Vacuum Manifolds

96-Well Plate Vacuum Manifold

- Includes vacuum valve attachment and two collection plate spacer inserts
- Made of durable acrylic
- Designed to accommodate 96-well plates, collection plates, protein precipitation plates, and filtration plates

Ordering Information


96-Well Plate Manifold**

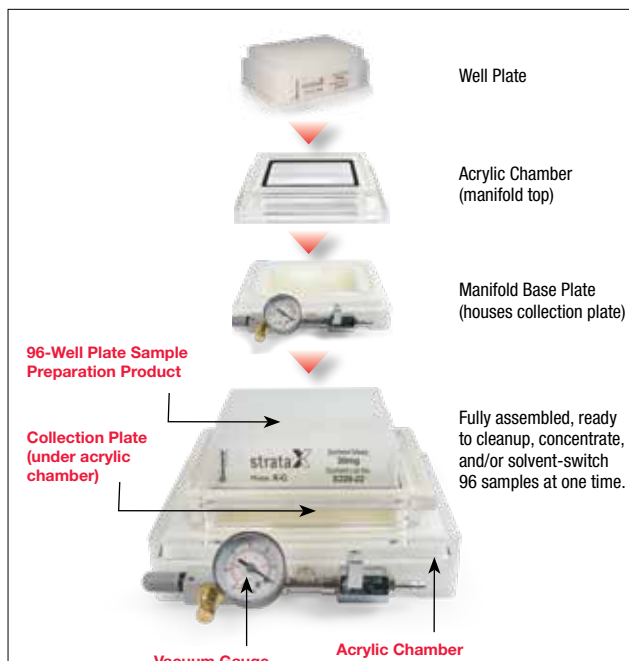
Part No.	Description	Unit
AH0-8950	96-Well Plate Manifold, Universal w/vacuum gauge	ea

Replacement Parts

Part No.	Description	Unit
AH0-7285	96-Well Plate Manifold Replacement Gasket, Flat (to fit between acrylic chamber and 96-well plate), black	ea
AH0-7198	96-Well Plate Manifold Replacement Gasket, Profile, (to fit between acrylic chamber and manifold base), white	ea
AH0-8637	Reservoir, Single Well, High Profile, 96 Bottom Troughs	25/pk

**Manifold, compatible with 2 mL Impact plate, Novum SLE 96-well plate, Phree Phospholipid Removal plate, Strata, and Strata-X 96-well plate formats.

 Collection plate spacers accommodate various collection plate heights.



Well Plate

Acrylic Chamber (manifold top)

Manifold Base Plate (houses collection plate)

96-Well Plate Sample Preparation Product


Collection Plate (under acrylic chamber)

Fully assembled, ready to cleanup, concentrate, and/or solvent-switch 96 samples at one time.

Vacuum Gauge

Acrylic Chamber

Compatible with:



Vacuum Manifold Accessories for Tube and 96-Well Plates



Adapter Caps (for 1, 3, and 6 mL tubes)

Female Luers

Retaining Clips

Polypropylene Manifold Needles

Male Luers

Plugs

Stainless Steel Manifold Needles

Vacuum Gauge and Assembly

Stopcock

Ordering Information

General Vacuum Manifold Accessories

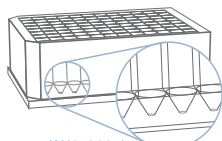
Part No.	Description	Unit
AH0-7191	Adapter Caps for 1, 3 and 6 mL SPE tubes, polyethylene, with Luer tip	15/pk
AH0-7379	Adapter Caps for 12, 20, and 60 mL SPE tubes, polyethylene, with Luer tip	6/pk
AH0-8278	Strata® Syringe and Adapter Kit	ea
AH0-6034	SPE Manifold Needles, polypropylene	24/pk
AH0-6035	SPE Manifold Needles, stainless steel	12/pk
AH0-6050	SPE Drying Attachment for 12-position manifold	ea
AH0-6051	SPE Drying Attachment for 24-position manifold	ea
AH0-6053	Female Luer Fittings	2/pk
AH0-6054	Male Luer Fittings	2/pk
AH0-6057	Vacuum Gauge and Valve Assembly	ea
AH0-6064	Teflon® Needles	100/pk
AH0-6065	Teflon Needles	500/pk
AH0-6060	Retaining Clips	12/pk
AH0-6061	Plugs	50/pk
AH0-6049	Stopcocks	24/pk

Sample Preparation Accessories

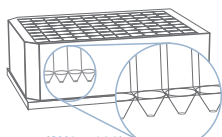
Collection Plates

- Available in conical V- and round-bottom formats
- Made of chemically inert polypropylene
- Available in 350 μ L, 1 and 2 mL volumes

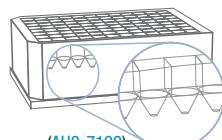
Conical V- and round-bottom for maximized sample delivery



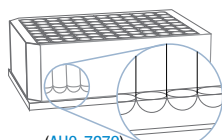
(AH0-8635)
2 mL Square Well



(AH0-7193)
1 mL Square Well



(AH0-7192)
350 μ L Square Well



(AH0-7279)
1 mL Round Well

Ordering Information

Collection Plates*

Part No.	Description	Unit
AH0-7192	350 μ L/well 96-Square Well Conical V-bottom Collection Plate	50/pk
AH0-7193	1 mL/well 96-Square Well Conical V-bottom Collection Plate	50/pk
AH0-7279	1 mL/well 96-Round Well Round Bottom 7 mm Collection Plate	50/pk
AH0-7194	2 mL/well 96-Square Well Conical V-bottom Collection Plate	50/pk
AH0-8635	2 mL/well 96-Square Well Round-Conical Bottom Collection Plate	50/pk
AH0-8636	2 mL/well 96-Round Well Round Bottom 8 mm Collection Plate	50/pk
AH0-9332	1.2 mL/well 96-Round Well Round Bottom Collection Plate	50/pk
AH0-9341	0.5 mL/well 96-Round Well Conical Bottom 7 mm Collection Plate	50/pk
AH1-7036	2 mL/well Low-Bind 96-Round Well Conical Bottom Collection Plate	120/pk

Filtration Plate

- Available in 0.7 μ m membrane porosity
- Inert surface eliminates non-specific binding for maximized results
- Cost effective solution to meet all filtration goals

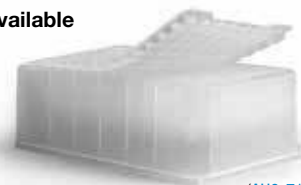
Ordering Information

Filtration Plates

Part No.	Description	Unit/Box
AF0-8300	0.7 μ m Glass Fiber 96-Well Filtration Plate	2

Sealing Mats and Tape

- Fits all Phenomenex 96-well plates, square-well collection plates, round-well collection plates, protein precipitation plates, and filtration plates
- Pierceable and Pre-Slit available



(AH0-7195)

Ordering Information

Sealing Mats*

Part No.	Description	Unit
AH0-8597	Sealing Mats, Pierceable, 96-Square Well, Silicone	50/pk
AH0-8598	Sealing Mats, Pre-Slit, 96-Square Well, Silicone	50/pk
AH0-8631***	Sealing Mats, Pierceable, 96-Round Well 7 mm, Silicone	50/pk
AH0-8632***	Sealing Mats, Pre-Slit, 96-Round Well 7 mm, Silicone	50/pk
AH0-8633**	Sealing Mats, Pierceable, 96-Round Well 8 mm, Silicone	50/pk
AH0-8634**	Sealing Mats, Pre-Slit, 96-Round Well 8 mm, Silicone	50/pk
AH0-8199	Sealing Mats, Pierceable, 96 Square Well, Santoprene™	100/pk
AH0-7195	Sealing Mats, Pierceable, 96-Square Well, Ethylene Vinyl Acetate (EVA)	50/pk
AH0-7362	Sealing Tape Pad	10/pk

*Square well sealing mats compatible with 2 mL Impact plates, Novum SLE 96-well plate, Phree Phospholipid Removal plate, Strata and Strata-X 96-well plates, and 96 square well collection plates.

**8 mm round-well sealing mats compatible with 2 mL round-well 8 mm collection plates ([AH0-8636](#))

***7 mm round-well sealing mats compatible with 1 mL round-well 7 mm collection plates ([AH0-7279](#))

96-Well Tab-less Tube Holders

- Easily process partial plates
- Arrange multiple SPE sorbents in one plate
- Easily replace a single SPE tube
- Compatible with Strata® and Strata-X 1 mL tab-less SPE tubes



(AH0-9054)

Ordering Information

96-Well Tab-less Tube Holders

Part No.	Description	Unit
AH0-9054	96-Well 1 mL Tab-less Tube Holder for use with the 96-Well plate vacuum manifold (AH0-8950)	ea
AH0-9055	96-Well 1 mL Tab-less Tube Holder for use with positive pressure manifolds	ea

Why Choose roQ QuEChERS?

Improved with you in mind, roQ picks up where other QuEChERS kits fail. The unique design of the roQ QuEChERS kits eliminates common problems seen with current QuEChERS kits on the market.

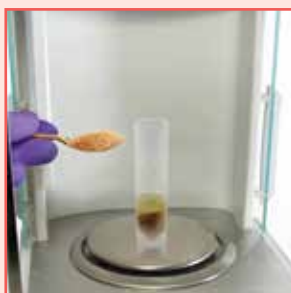


Ease of Use

Built-in Removable Rack



Stand Alone Extraction Tubes



Easy Pour Salt Packets

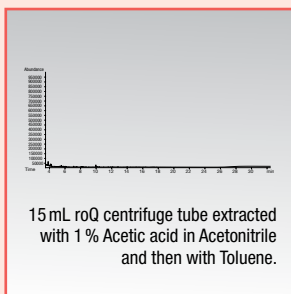


Quality

Leak-Free Tubes



Low Leachate Tubes



Quality Management System Certified

- Validates processes to be fully established, functional, and meet international standards
- MSDS and Certificate of Analysis (CoA) available for all kits
- roQ QuEChERS kits are guaranteed for quality

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV GL
= 9001:2015 =

Technical Support



Sample Preparation Support at Your Fingertips

- Dedicated sample preparation team available to assist your method development needs
- Expertise in sample preparation and solid phase extraction
- Access to up-to-date sample preparation applications

Free Method Development Services

- Let our specialists help you with new method development, method optimization, and validation, including FDA compliant and GMP compliant validation.

Select Your roQ QuEChERS Kit (Quick - Easy - Cheap - Effective - Rugged - Safe)

Step 1

Extraction*

QuEChERS can be performed by following 3 different methods: The AOAC 2007.01 Method, the EN 15662 Method, or the Original Non-Buffered Method.

Select Your roQ Extraction Kit

AOAC 2007.01 Method	Original Non-Buffered Method	EN 15662 Method
6.0 g MgSO ₄ , 1.5 g NaOAc KS0-8911	4.0 g MgSO ₄ , 1.0 g NaCl KS0-8910	4.0 g MgSO ₄ , 1.0 g NaCl, 1.0 g SCTD, 0.5 g SCDS KS0-8909
	6.0 g MgSO ₄ , 1.5 g NaCl KS0-8912	

Step 2

Clean Up/dSPE**

	AOAC 2007.01		EN 15662	
	1 mL	8 mL	1 mL	6 mL
General 	150 mg MgSO ₄ 50 mg PSA KS0-9511	1200 mg MgSO ₄ 400 mg PSA KS0-9515	150 mg MgSO ₄ 25 mg PSA KS0-9503	900 mg MgSO ₄ 150 mg PSA KS0-9507
Fats and Waxes 	150 mg MgSO ₄ 50 mg PSA 50 mg C18E KS0-9512	1200 mg MgSO ₄ 400 mg PSA 400 mg C18E KS0-9516	150 mg MgSO ₄ 25 mg PSA 25 mg C18E KS0-9504	900 mg MgSO ₄ 150 mg PSA 150 mg C18E KS0-9508
Pigmented 	150 mg MgSO ₄ 50 mg PSA 50 mg GCB KS0-9513	1200 mg MgSO ₄ 400 mg PSA 400 mg GCB KS0-9517	150 mg MgSO ₄ 25 mg PSA 2.5 mg GCB KS0-9505	900 mg MgSO ₄ 150 mg PSA 15 mg GCB KS0-9509
Highly Pigmented 	—	—	150 mg MgSO ₄ 25 mg PSA 7.5 mg GCB KS0-9506	900 mg MgSO ₄ 150 mg PSA 45 mg GCB KS0-9510
Pigments and Fats 	150 mg MgSO ₄ 50 mg PSA 50 mg GCB 50 mg C18E KS0-9514	1200 mg MgSO ₄ 400 mg PSA 400 mg GCB 400 mg C18E KS0-9518	—	—

*All roQ Extraction kits contain fifty easy-pour salt packets and fifty 50 mL stand-alone centrifuge tubes.

**All roQ dSPE kits contain pre-weighed sorbents/salts inside 2 mL or 15 mL centrifuge tubes.

Salts and Sorbents used in roQ Kits

Extraction:

- Magnesium Sulfate (MgSO₄)
- Sodium Acetate (NaOAc)
- Sodium Chloride (NaCl)
- Sodium Citrate Tribasic Dihydrate (SCTD)
- Sodium Citrate Dibasic Sesquihydrate (SCDS)

Clean Up/dSPE:

- Magnesium Sulfate (MgSO₄)
- Primary/Secondary Amine (PSA)
- Endcapped C18 Sorbent (C18E)
- Graphitized Carbon Black (GCB)

roQ™ Extraction Kits

Extraction kits contain fifty easy-pour salt packets and fifty 50 mL stand-alone centrifuge tubes

Ordering Information

Description	Unit	Part No.
AOAC 2007.01 Method Extraction Kits		
6.0 g MgSO ₄ , 1.5 g NaOAc	50/pk	KSO-8911*
EN 15662 Method Extraction Kits		
4.0 g MgSO ₄ , 1.0 g NaCl, 1.0 g SCTD, 0.5 g SCDS	50/pk	KSO-8909*
Original Non-Buffered Method Extraction Kits		
4.0 g MgSO ₄ , 1.0 g NaCl	50/pk	KSO-8910
6.0 g MgSO ₄ , 1.5 g NaCl	50/pk	KSO-8912

*AOAC and EN Extraction Kits also available in traditional non-collared 50 mL centrifuge tubes, Part No.: [KSO-8911-NC](#) and [KSO-8909-NC](#)

roQ dSPE Kits

dSPE kits contain pre-weighed sorbents/salts inside 2 mL or 15 mL centrifuge tubes

Ordering Information

Description	Unit	Part No.
2 mL dSPE Kits		
150 mg MgSO ₄ , 25 mg PSA, 25 mg C18E	100/pk	KSO-9504
150 mg MgSO ₄ , 25 mg PSA, 2.5 mg GCB	100/pk	KSO-9505
150 mg MgSO ₄ , 25 mg PSA, 7.5 mg GCB	100/pk	KSO-9506
150 mg MgSO ₄ , 25 mg PSA	100/pk	KSO-9503
150 mg MgSO ₄ , 50 mg PSA, 50 mg C18E, 50 mg GCB	100/pk	KSO-9514
150 mg MgSO ₄ , 50 mg PSA, 50 mg C18E	100/pk	KSO-9512
150 mg MgSO ₄ , 50 mg PSA, 50 mg GCB	100/pk	KSO-9513
150 mg MgSO ₄ , 50 mg PSA	100/pk	KSO-9511
15 mL dSPE Kits		
900 mg MgSO ₄ , 150 mg PSA, 150 mg C18E	100/pk	KSO-9508
900 mg MgSO ₄ , 150 mg PSA, 15 mg GCB	100/pk	KSO-9509
900 mg MgSO ₄ , 150 mg PSA, 45 mg GCB	100/pk	KSO-9510
900 mg MgSO ₄ , 150 mg PSA	100/pk	KSO-9507
1200 mg MgSO ₄ , 400 mg PSA, 400 mg C18E, 400 mg GCB	100/pk	KSO-9518
1200 mg MgSO ₄ , 400 mg PSA, 400 mg C18E	100/pk	KSO-9516
1200 mg MgSO ₄ , 400 mg PSA, 400 mg GCB	100/pk	KSO-9517
1200 mg MgSO ₄ , 400 mg PSA	100/pk	KSO-9515

roQ Extraction Salt Packets

Salt packets only. Centrifuge tubes not included.

Ordering Information

Description	Unit	Part No.
AOAC 2007.01 Method Extraction Packets		
6.0 g MgSO ₄ , 1.5 g NaOAc	50/pk	AHO-9043
EN 15662 Method Extraction Packets		
4.0 g MgSO ₄ , 1.0 g NaCl, 1.0 g SCTD, 0.5 g SCDS	50/pk	AHO-9041
Original Non-Buffered Method Extraction Packets		
4.0 g MgSO ₄ , 1.0 g NaCl	50/pk	AHO-9042
6.0 g MgSO ₄ , 1.5 g NaCl	50/pk	AHO-9044

Bulk roQ QuEChERS Sorbents

Ordering Information

Phase	10 g	100 g
C18-E	—	04G-4348
GCB (Graphitized Carbon Black)	04D-4615	04G-4615
PSA	—	04G-4610



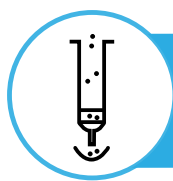
We're here to help!
Speak with your Sample Preparation Specialist

- Applications
- Technical Notes
- Tutorials and Webinars
- Tools
- And More



Sample Preparation Resources

Resources



SPE Basics Overview

A Simple Approach to Fast and Practical Solid Phase Extraction (SPE) Method Development



Search Hundreds of Applications

Know the name of your analyte? Then start here. Immediately find key Sample Prep applications for small molecules and biomolecules by entering the name or the synonym of the analyte.



SPE Method Development Tool

Develop SPE methods for sample cleanup and concentration in under a minute



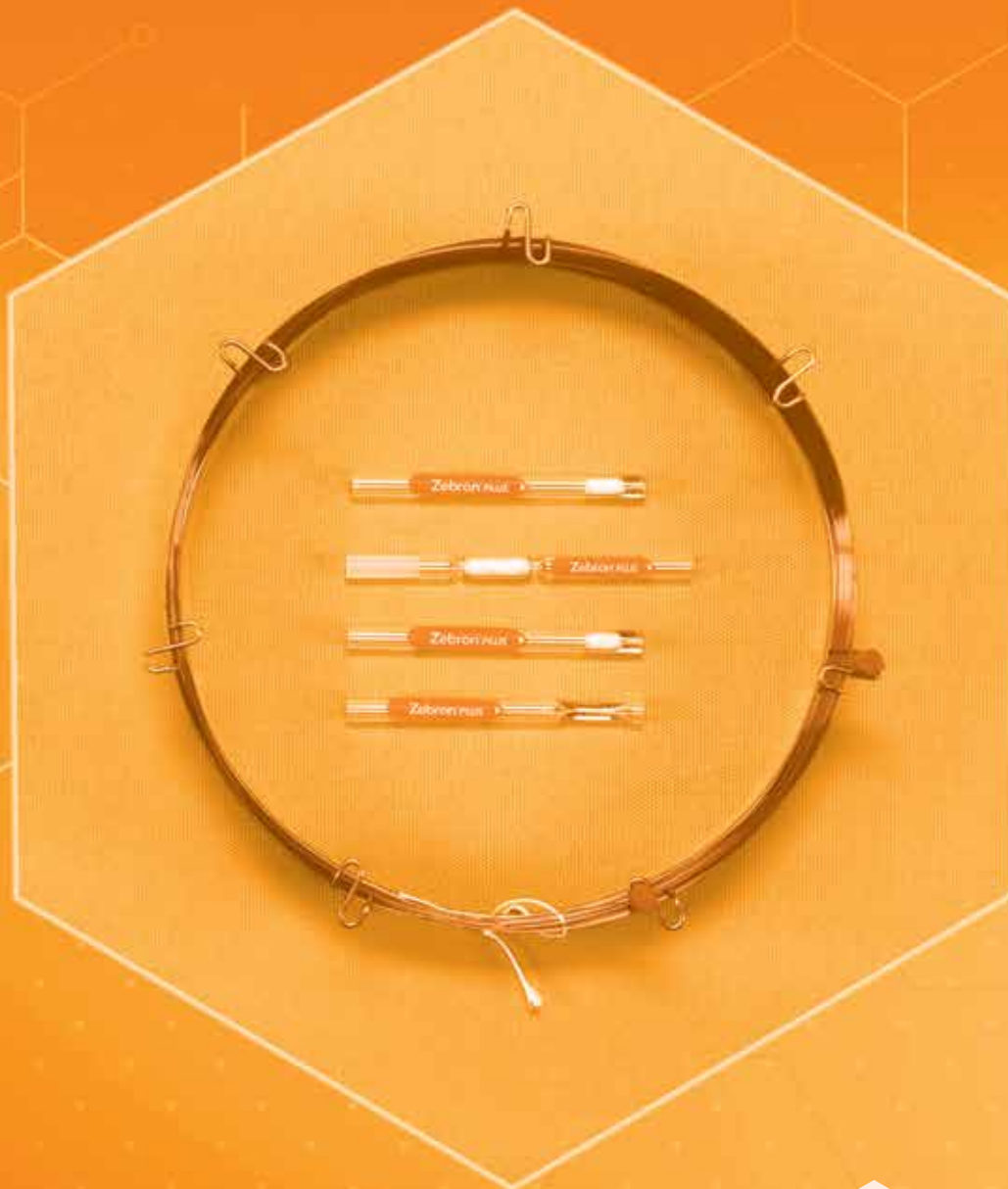
Syringe Filter Finder

3-step tool designed to help you find the appropriate syringe filter to help you successfully remove particulates from your sample matrix



Sample Preparation Support at Your Fingertips

Dedicated sample preparation team available to assist your method development needs



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GC Column Selection Guidelines

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Zebtron GC Columns

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“The chromatography quality and performance are excellent [with Zebtron]. Column bleed is minimal at 320 °C. Peak quality remains good for 5 to 6 months averaging 40 injections in a 24 hour period, 6 to 7 days per week.”

Kevin Walkup
Specialized Assays, Inc.

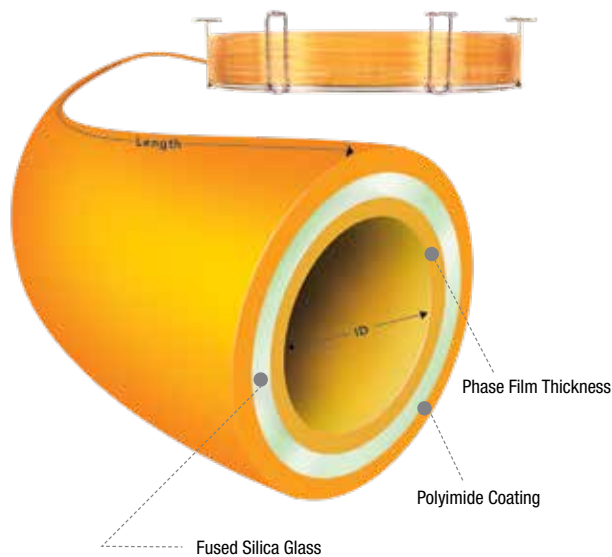
The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

The Basic Principle of Column Selection

How do you choose a column? Do you reach into a cabinet of mystery columns, look to your favorite 5% phenyl phase, or borrow one from a colleague? Understanding how column parameters impact key elements of the master resolution equation will help you quickly make the right column selection for successful separations.

$$R_s = \left[\frac{\sqrt{N}}{4} \right] \times \left[\frac{\alpha - 1}{\alpha} \right] \times \left[\frac{k}{k + 1} \right]$$

	Efficiency Term	Selectivity Term	Retention Term
Relates to:	Column Length Column ID	Column Phase	Column ID Film Thickness
Other Considerations:	Carrier Gas Linear Velocity	Temperature	Temperature



Selectivity Has the Biggest Impact on Resolution

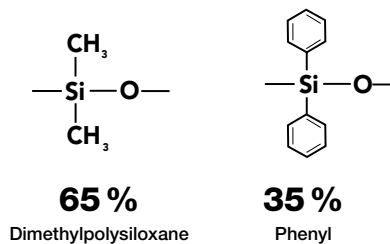
Resolution between two analytes is mainly determined by the selectivity of the stationary phase. By increasing the resolution between two compounds, the total analysis time can often be reduced significantly!

Selectivity vs. Polarity

Polarity gives a general guideline for sample capacity and separation, which can affect peak shape and resolution. However, two columns may have similar polarity but show different separation profiles due to dissimilar phase chemistries. For example, ZB-35 and ZB-1701 are close in polarity, but the cyanopropyl group makes ZB-1701 very different from ZB-35 in terms of selectivity.

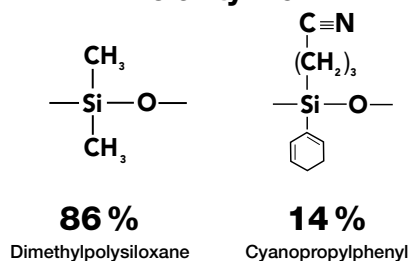
ZB-35

Polarity: 18



ZB-1701

Polarity: 19



Choosing Your Selectivity (cont'd)

The 3 Most Prevalent GC Interactions

The following selection guidelines can be a starting point for choosing Zebron™ columns in common selectivities. Please contact your Phenomenex representative for additional assistance.

Dispersive Forces (Van der Waals Interactions)

- Weakest of all intermolecular forces and occurs between non-polar compounds
- Separation is based on boiling point (classic example – hydrocarbon separation in SimDist analysis)

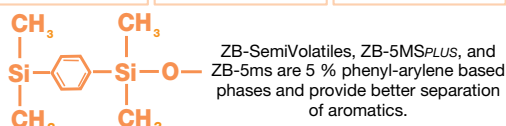
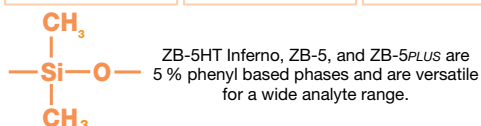
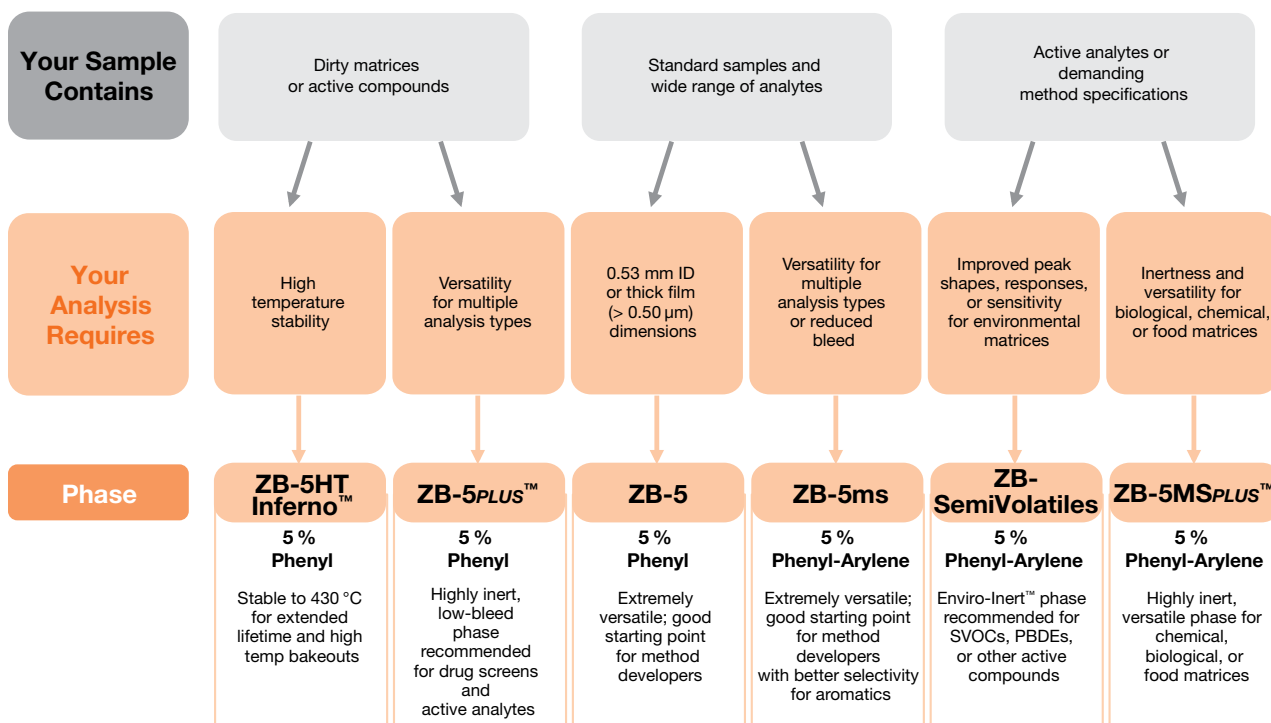
Dipole-Dipole Interactions

- Either permanently present or induced by analyte-stationary phase interactions
- Higher dipole-dipole interaction can help separate compounds with similar boiling points, but different chemical structures

Hydrogen Bonding (Acid-Base Interactions)

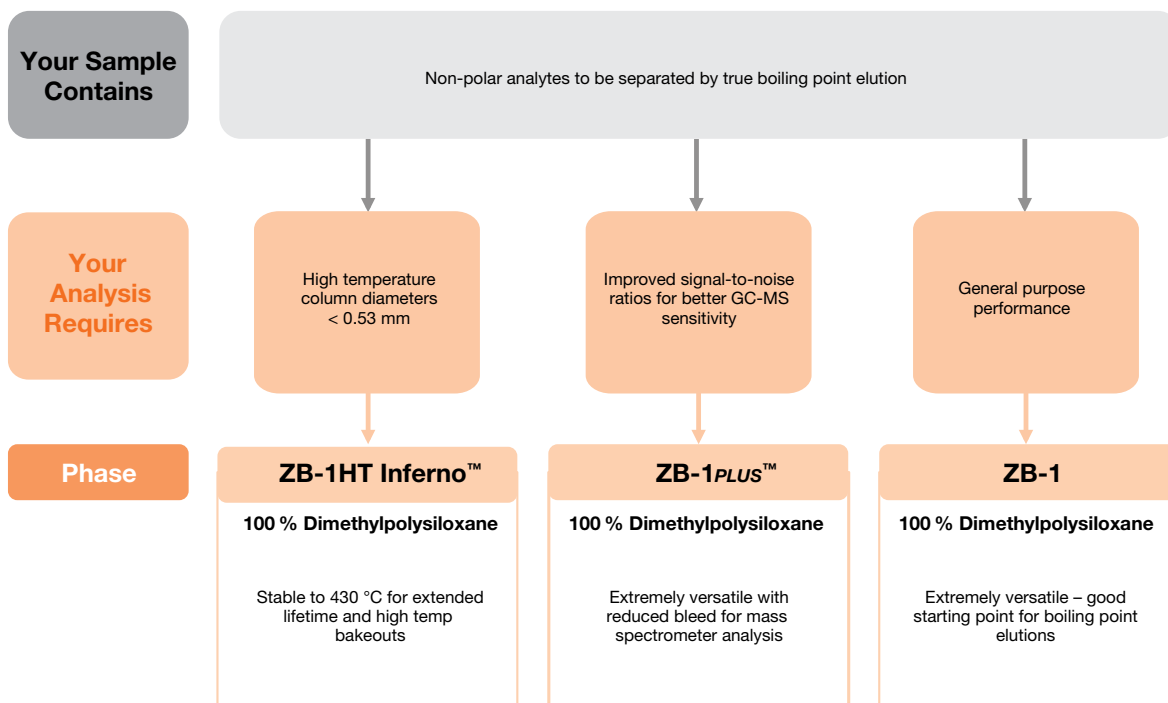
- Can cause poor peak shape or irreversible binding to the inlet liner or to the column itself
- Zebron columns are specially deactivated to minimize these interactions

Choosing A “5” Phase

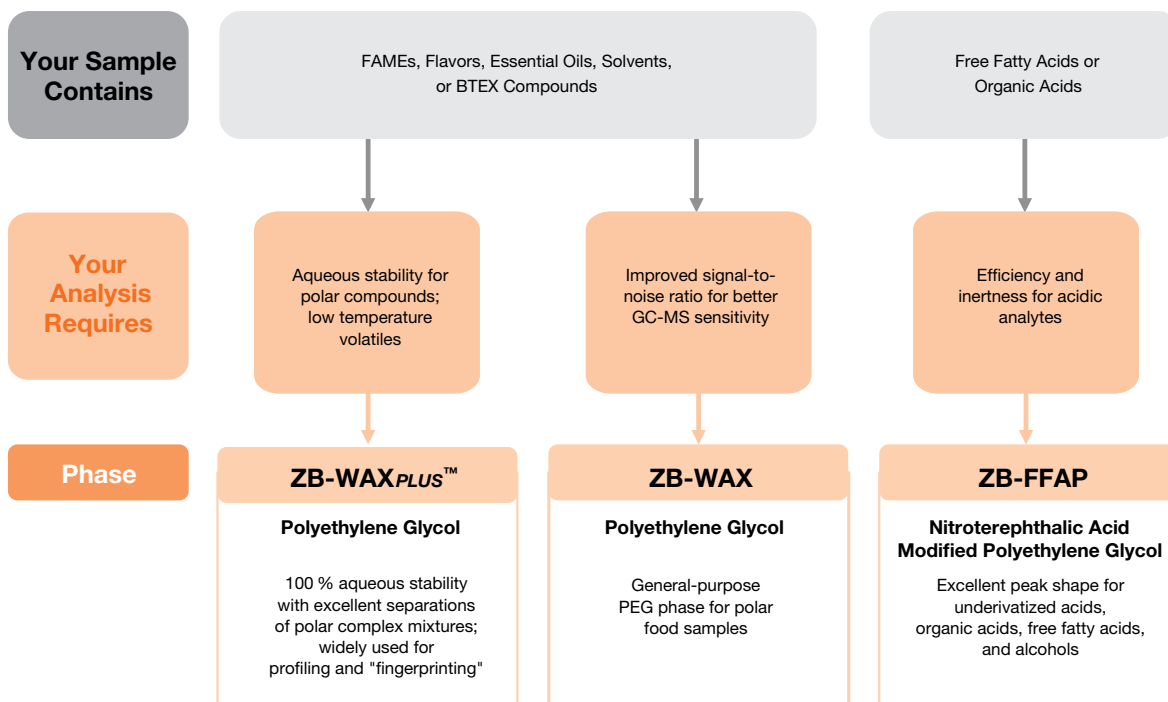


Choosing Your Selectivity *(cont'd)*

Choosing A "1" Phase



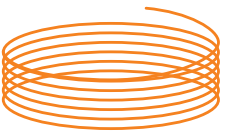
Choosing A "PEG" Phase



Choosing Your Dimensions

Length

Longer columns can improve resolution, but they will also increase run times. Under isothermal conditions, doubling column length only increases resolution by 41 %, but doubles the run time! Choose a column length that balances efficiency with acceptable run times.

Short	Good Starting Length	Long
15 m or less	30 m	60 m or more
<p>Applications</p> <ul style="list-style-type: none">• High boilers• GC-MS applications <p>Advantages</p> <ul style="list-style-type: none">• Faster run times• Higher temp. limits• Lower bleed• Higher efficiency <p>Disadvantages</p> <ul style="list-style-type: none">• Less inert• Limited retention	<p>30 m</p> 	<p>Applications</p> <ul style="list-style-type: none">• Complex samples with closely eluting peaks• Low boilers• Less active samples• Complex temperature ramps <p>Advantages</p> <ul style="list-style-type: none">• Better resolution <p>Disadvantages</p> <ul style="list-style-type: none">• Slow run times

Try The GC Column Finder!

Easily select a column by part number, manufacturer, industry, application, or official method **in under 1 minute.**



Choosing Your Dimensions *(cont'd)*

Internal Diameter

Column internal diameter (ID) has a major impact on both resolution and sample capacity. Unlike column length, using smaller ID columns can actually lead to faster run times, because the column length required with a small ID is often shorter due to increased efficiency.

Narrow	Good Starting ID	Wide
0.10, 0.18, 0.20 mm	0.25 mm	0.32, 0.53 mm
<p>Applications</p> <ul style="list-style-type: none"> • Complex samples <p>Advantages</p> <ul style="list-style-type: none"> • Faster run times • Better resolution <p>Disadvantages</p> <ul style="list-style-type: none"> • Lower sample capacity • Easily overloaded 		<p>Applications</p> <ul style="list-style-type: none"> • Dirty samples • Highly concentrated samples <p>Advantages</p> <ul style="list-style-type: none"> • Increased sample capacity • Good for on-column injections <p>Disadvantages</p> <ul style="list-style-type: none"> • Decreased efficiency • May need higher flow rates unsuitable for GC-MS

Film Thickness

Film thickness determines solute retention and plays an important role in column sample capacity. Thin film columns are faster and provide higher resolution, but lower sample capacity. In most instances, choose the thinnest film possible that still provides adequate retention. When working with active samples, using a slightly thicker film can significantly improve peak shape.

Thin	Good Starting Film	Thick
0.10, 0.18 μm	0.25 μm	0.50 μm or more
<p>Applications</p> <ul style="list-style-type: none"> • High boilers • GC-MS applications <p>Advantages</p> <ul style="list-style-type: none"> • Faster run times • Higher temp. limits • Lower bleed • Higher efficiency <p>Disadvantages</p> <ul style="list-style-type: none"> • Less inert • Limited retention 		<p>Applications</p> <ul style="list-style-type: none"> • Low boilers • Gases, solvents, purgeables, volatiles • Purity testing <p>Advantages</p> <ul style="list-style-type: none"> • Better inertness • Higher capacity <p>Disadvantages</p> <ul style="list-style-type: none"> • Slow run times • Lower temp. limits • Higher bleed

Cross-Reference by Manufacturer

Upgrade to Zebron!

Our commitment to quality and innovation is what makes Zebron GC columns well-suited for any application. Performance is GUARANTEED.

Zebron Phase	Zebron Composition	Restek®	Agilent®	Supelco®	SGE®	OV
ZB-1	100% Dimethylpolysiloxane	Rtx®-1, Rtx-1PONA, Rtx-1 F&F	DB®-1, DB-2887, DB-1 EVDX, HP-1, HP-101, HP-PONA,Ultra 1, CP-Sil 5 CB	SPB®-1, SPB-1 TG, SE-30, MET-1, SPB-1 Sulfur, SPB-HAP	BP1, BP1-PONA, BPX1-SimD	OV-1
ZB-DHA-PONA	100% Dimethylpolysiloxane	Rtx-DHA	HP-PONA DB-PETRO CP-Sil PONA CB	Petrocol®-DH		
ZB-1 PLUS™	100% Dimethylpolysiloxane	Rtx-1ms, Rxi®-1ms	DB-1ms, DB-1ms Ultra Inert, HP-1ms, HP-1ms Ultra Inert, CP-Sil 5 CB MS, VF-1ms	MDN-1, Equity®-1	SolGel-1ms™	
ZB-1HT Inferno™	100% Dimethylpolysiloxane	Rxi-1HT	DB-1ht, CP-SimDist	Petrocol 2887		
ZB-1XT SimDist	100% Dimethylpolysiloxane	MXT®-1HT SimDist, MXT-1, MXT-1 SimDist, MXT-2887	CP-SimDist UltiMetal, CP-Sil 8 CB UltiMetal, BPX1-SimD, DB-HT SimDis, DB-PS1, DB-PS2887			
ZB-5	5% Phenyl 95% Dimethylpolysiloxane	Rtx-5	DB-5, HP-5, Ultra 2, HP-PAS-5, CP-Sil 8 CB	MDN-5, SPB-5, PTE-5, SE-54, PTA-5, Equity-5, Sac-5	BP5, BPX5	OV-5
ZB-5 PLUS™	5% Phenyl 95% Dimethylpolysiloxane	Rtx-5ms, Rxi-5ms, Rtx-5Amine	DB-5, HP-5ms, HP-5msi	MDN-5S		
ZB-5HT Inferno	5% Phenyl 95% Dimethylpolysiloxane	Rxi-5HT, Rtx-5HT Stx®-5HT, XTI®-5HT	DB-5ht, VF-5ht	HT-5		
ZB-5ms	5% Phenyl-Arylene 95% Dimethylpolysiloxane	Rtx-5SII MS, Rxi-5SII MS	DB-5ms, DB-5.625, DB-5ms EVDX, VF-5ms, CP-Sil 8 CB MS			
ZB-5MS PLUS™	5% Phenyl-Arylene 95% Dimethylpolysiloxane	Rxi-5SII MS	DB-5ms Ultra Inert, HP-5ms Ultra Inert, DB-5ms, VF-5ms	SLB®-5ms		
ZB-SemiVolatiles	5% Phenyl-Arylene 95% Dimethylpolysiloxane	Rxi-5SII MS, Rxi-5ms	DB-5ms Ultra Inert, HP-5ms Ultra Inert	SLB-5ms		
ZB-35	35% Phenyl 65% Dimethylpolysiloxane	Rtx-35, Rtx-35ms	DB-35, DB-35ms, HP-35, HP-35ms	MDN-35, SPB-35, SPB-608	BPX35, BPX608	OV-11
ZB-35HT Inferno	35% Phenyl 65% Dimethylpolysiloxane			Phenomenex Exclusive		
ZB-50	50% Phenyl 50% Dimethylpolysiloxane	Rtx-50	DB-17, DB-17HT, DB-17ms, DB-17 EVDX, HP-50+, CP-Sil 24 CB	SP-2250, SPB-17, SPB-50	BPX50	OV-17
ZB-624	6% Cyanopropylphenyl 94% Dimethylpolysiloxane	Rtx-1301, Rtx-624	DB-1301, DB-624, DB-VRX, HP-VOC, CP-1301, CP-Select 624 CB	SPB-1301, SPB-624	BP624	OV-624
ZB-624 PLUS™	Proprietary	Rxi-624SII MS	CP-Select 624 CB, DB-624UI Ultra Inert			
ZB-1701	14% Cyanopropylphenyl 86% Dimethylpolysiloxane	Rtx-1701	DB-1701, CP-Sil 19 CB	SPB-1701, Equity-1701	BP10	OV-1701
ZB-1701P	14% Cyanopropylphenyl 86% Dimethylpolysiloxane		DB-1701P			
ZB-FAME	High Cyanopropyl		CP-Sil 88, HP-88, DB-23	SP®-2560, SP-2380		
ZB-WAX	Polyethylene Glycol	Rtx-WAX, Famewax, Stabilwax-DB	DB-WAXetr, HP-INNOWax, CP-Wax 57 CB	MET-Wax, Omegawax	SolGel-WAX™	
ZB-WAX PLUS™	Polyethylene Glycol	Stabilwax®	DB-WAX, CAM, HP-20M, Carbowax 20M, CP-Wax 52 CB	SUPELCO WAX® 10	BP20	Carbowax 20M
ZB-FFAP	Nitroterephthalic Acid Modified Polyethylene Glycol	Stabilwax-DA	DB-FFAP, HP-FFAP, CP-Wax 58 FFAP CB, CP-FFAP CB	Nukol, SPB-1000	BP21	OV-351
ZB-MultiResidue™ -1	Proprietary	Rtx-CLPesticides, Stx-CLPesticides				
ZB-MultiResidue-2	Proprietary	Rtx-CLPesticides2, Stx-CLPesticides2				
ZB-CLPesticides-1	Proprietary	Rtx-CLPesticides, Stx-CLPesticides				
ZB-CLPesticides-2	Proprietary	Rtx-CLPesticides2, Stx-CLPesticides2				
ZB-XLB	Proprietary	Rtx-XLB, Rxi-XLB	DB-XLB, VF-XMS	MDN-12		
ZB-XLB-HT Inferno	Proprietary			Phenomenex Exclusive		
ZB-Drug-1	Proprietary			Phenomenex Exclusive		
ZB-BAC-1	Proprietary	Rtx-BAC1	DB-ALC1			
ZB-BAC-2	Proprietary	Rtx-BAC2	DB-ALC2			
ZB-Bioethanol	Proprietary			Phenomenex Exclusive		

This section is, neither in terms of manufacturers nor in terms of their products, a complete list, and the accuracy of the data is not guaranteed. Small differences in dimensions or performance might be possible and slight adjustments to your application may be necessary.

Environmental Selection Chart


Listed below are recommended Zebron columns for environmental and EPA methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

Drinking Water	Method #	Description	Primary Column	Confirmation Column	Page	
	501.3	Trihalomethanes by GC-MS with Selected Ion Monitoring (SIM)	ZB-624, ZB-624 ^{PLUS} [™]		147, 130	
	502.2	Volatile Halogenated Organics by Purge & Trap GC/PID/ELCD	ZB-624, ZB-624 ^{PLUS}		147, 130	
	503.1	Volatile Aromatics and Unsaturated Organics by Purge & Trap GC	ZB-624, ZB-624 ^{PLUS}		147, 130	
	504.1	1,2-Dibromoethane (EDB), 1,2-Dibromo-3-chloropropane (DBCP), and 1,2,3-Trichloropropane (123TCP) by GC	ZB-CLPesticides-1 ZB-MultiResidue [™] -1	ZB-CLPesticides-2 ZB-MultiResidue-2	106 108	
	505	Organohalide Pesticides & Aroclors by GC-ECD	ZB-CLPesticides-1 ZB-MultiResidue-1	ZB-CLPesticides-2 ZB-MultiResidue-2	106 108	
	507	Nitrogen & Phosphorus Containing Pesticides by GC/NPD	ZB-MultiResidue-1 ZB-CLPesticides-2	ZB-MultiResidue-2 ZB-CLPesticides-2	108 106	
	508	Chlorinated Pesticides by GC-ECD	ZB-CLPesticides-1 ZB-MultiResidue-1	ZB-CLPesticides-2 ZB-MultiResidue-2	106 108	
	509	Ethylene Thiourea (ETU) by GC/NPD	ZB-WAX ^{PLUS} [™]	ZB-1701	128, 148	
	513	2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin by GC/HRMS	ZB-SemiVolatiles		104	
	515.3	Chlorinated Acids by Liquid-Liquid Extraction, Derivatization and GC-ECD	ZB-XLB	ZB-35	152, 145	
	521	Nitrosamines by Solid Phase Extraction (SPE) and GC-MS/MS with Large Volume Injection	ZB-SemiVolatiles		104	
	522	1,4-Dioxane by Solid Phase Extraction (SPE) and GC-MS with Selected Ion Monitoring (SIM)	ZB-SemiVolatiles		104	
	523	Triazine Pesticides and their Degradates by GC-MS	ZB-50		146	
	524.3	Purgeable Organic Compounds by GC-MS	ZB-624, ZB-624 ^{PLUS}		147, 130	
	525.2	Semi-volatile Organic Chemicals by Solid Phase Extraction (SPE) and GC-MS	ZB-SemiVolatiles		104	
	526	Selected Semi-volatile Organic Compounds by Solid Phase Extraction (SPE) and GC-MS	ZB-SemiVolatiles		104	
	527	Selected Pesticides and Flame Retardants by Solid Phase Extraction (SPE) and GC-MS	ZB-5 ^{PLUS} [™]		124	
	528	Phenols by Solid Phase Extraction (SPE) and GC-MS	ZB-SemiVolatiles	ZB-35	104, 145	
	529	Explosives and Related Compounds by Solid Phase Extraction (SPE) and GC-MS	ZB-5 ^{PLUS} [™]		124	
	548	Endothall by Aqueous Derivatization, Liquid-Solid Extraction, and GC-ECD	ZB-SemiVolatiles	ZB-35	104, 145	
	551.1	Chlorinated Solvents & Disinfection Byproducts by Liquid-Liquid Extraction and GC-ECD	ZB-35		145	
	552.3	Haloacetic Acids and Dalapon by Liquid-Liquid Extraction, Derivatization, and GC-ECD	ZB-CLPesticides-1 ZB-XLB	ZB-CLPesticides-2 ZB-35	106 152, 145	
	556	Carbonyl Compounds by Pentafluorobenzylhydroxylamine Derivatization and GC-ECD	ZB-SemiVolatiles	ZB-1701	104, 148	
	Waste Water	Method #	Description	Primary Column	Confirmation Column	Page
		601	Purgeable Halocarbons by Purge & Trap GC	ZB-624, ZB-624 ^{PLUS}		147, 130
602		Purgeable Aromatics by Purge & Trap GC	ZB-624, ZB-624 ^{PLUS}		147, 130	
603		Acrolein & Acrylonitrile Purge & Trap GC	ZB-624, ZB-624 ^{PLUS}		147, 130	
604		Phenols by GC-ECD	ZB-SemiVolatiles		104	
606		Phthalate Esters by GC-ECD	ZB-5 ^{PLUS} [™]		124	
607		Nitrosamines by GC/NPD	ZB-SemiVolatiles		104	
608		Organochlorine Pesticides and PCBs by GC-ECD	ZB-MultiResidue-1	ZB-MultiResidue-2	108	
609		Nitroaromatics & Isophorone by GC-FID and GC-ECD	ZB-SemiVolatiles		104	
610		Polynuclear Aromatic Hydrocarbons by GC-FID	ZB-SemiVolatiles		104	
611		Haloethers by GC-ECD	ZB-SemiVolatiles		104	
612		Chlorinated Hydrocarbons by GC-ECD	ZB-SemiVolatiles		104	
613		2,3,7,8-Tetrachlorodibenzo-p-dioxin by GC-MS	ZB-SemiVolatiles		104	
615		Chlorinated Herbicides by GC-ECD	ZB-CLPesticides-1 ZB-XLB	ZB-CLPesticides-2 ZB-35	106 152, 145	
619		Triazine Herbicides by GC-MS	ZB-50		146	
622		Organophosphorus Pesticides by GC-MS	ZB-MultiResidue-1		108	
624		Purgeable Volatiles by Purge & Trap GC-MS	ZB-624		147	
625		Base/Neutral and Acids by GC-MS	ZB-SemiVolatiles		104	
1613		Tetra- through Octa-Chlorinated Dioxins & Furans by Isotope Dilution HRGC/HRMS	ZB-SemiVolatiles		104	
1614		Polybrominated Diphenyl Esters (PBDEs) by HRGC/HRMS	ZB-5HT Inferno [™] ZB-SemiVolatiles		136 104	
1618		Organohalide Pesticides, Organophosphorus Pesticides, and Phenoxy-Acid Herbicides by GC	ZB-MultiResidue-1	ZB-MultiResidue-2	108	
1624		Volatile Organic Compounds by Isotope Dilution GC-MS	ZB-624, ZB-624 ^{PLUS}		147, 130	
1625		Semi-volatile Organic Compounds by Isotope Dilution GC-MS	ZB-SemiVolatiles		104	
1653		Chlorinated Phenols by In-Situ Acetylation and GC-MS	ZB-SemiVolatiles		104	
1657		Organophosphorus Pesticides by GC/FPD	ZB-MultiResidue-1	ZB-MultiResidue-2	108	
1658		Phenoxy-Acid Herbicides by GC-ECD	ZB-MultiResidue-1	ZB-MultiResidue-2	108	
1659	Dazomet by GC/NPD	ZB-MultiResidue-1	ZB-MultiResidue-2	108		
1666	Pharmaceutical Volatile Organic Compounds by Purge & Trap GC or Isotope Dilution GC-MS	ZB-SemiVolatiles (Direct Injection) ZB-624 (Purge & Trap), ZB-624 ^{PLUS}		104 147 130		
1668	Polychlorinated Biphenyl (PCB) Congeners by HRGC/HRMS	ZB-MultiResidue-1	ZB-1	108, 142		
1671	Pharmaceutical Manufacturing Volatile Organic Compounds by GC-FID	ZB-1		142		
7850	White Phosphorus (P4) by Solvent Extraction and GC/NPD	ZB-1		142		

Environmental Selection Chart

Listed below are recommended Zebron columns for environmental and EPA methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

Solid Waste	Method #	Description	Primary Column	Confirmation Column	Page
	8010B	Halogenated Volatile Organics by GC/ELCD	ZB-624, ZB-624 ^{PLUS} [™]		147, 130
	8015C	Nonhalogenated Organics by GC	ZB-5HT		136
	8020A	Aromatic Volatile Organics by GC/PID	ZB-WAX, ZB-WAX ^{PLUS} [™]		150 128
	8021B	Aromatic and Halogenated Volatiles by GC/PID or GC/ELCD	ZB-624, ZB-624 ^{PLUS}	ZB-1 (thick phase)	147, 130, 142
	8030A	Acrolein and Acrylonitrile by GC-FID	ZB-624, ZB-624 ^{PLUS}		147, 130
	8032A	Acrylamide by GC-ECD	ZB-5HT Inferno [™]		136
	8041	Phenols by GC-ECD or GC-FID	ZB-SemiVolatiles		104
	8061A	Phthalate Esters by GC-ECD	ZB-SemiVolatiles	ZB-1701	104, 148
	8081B	Organochlorine Pesticides by GC-ECD	ZB-MultiResidue [™] -1 ZB-CLPesticides-1	ZB-MultiResidue-2 ZB-CLPesticides-2	108 106
	8082A	Polychlorinated Biphenyls (PCBs) by GC-ECD	ZB-MultiResidue-1 ZB-CLPesticides-1	ZB-MultiResidue-2 ZB-CLPesticides-2	108 106
	8091	Nitroaromatics and Cyclic Ketones by GC-ECD or GC/NPD	ZB-SemiVolatiles	ZB-1701	104, 148
	8095	Explosives by GC-ECD	ZB-50		146
	8100	Polynuclear Aromatic Hydrocarbons by GC-FID	ZB-SemiVolatiles, ZB-35		104, 145
	8121	Chlorinated Hydrocarbons by GC-ECD	ZB-MultiResidue-1	ZB-MultiResidue-2	108
	8131	Aniline and Selected Derivatives by GC/NPD	ZB-SemiVolatiles	ZB-1	104, 142
	8141B	Organophosphorus Pesticides by GC/FPD or GC/NPD	ZB-MultiResidue-1 ZB-CLPesticides-1	ZB-MultiResidue-2 ZB-CLPesticides-2	108 106
	8151A	Chlorinated Herbicides by GC-ECD	ZB-CLPesticides-1 ZB-XLB	ZB-CLPesticides-2 ZB-35	106 152, 145
	8260B	Volatile Organic Compounds by GC-MS	ZB-624, ZB-624 ^{PLUS}		147, 130
	8270D	Semi-volatile Organic Compounds by GC-MS	ZB-SemiVolatiles		104
	8272	Polynuclear Aromatic Hydrocarbons (PAHs) by SPME and GC-MS with Selected Ion Monitoring (SIM)	ZB-SemiVolatiles, ZB-35		104 145
	8280B	Polychlorinated Dibenzo-P-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) By HRGC/LRMS	ZB-SemiVolatiles		104
	8290A	Polychlorinated Dibenzo-P-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) By HRGC/HRMS	ZB-SemiVolatiles		104
	8410	Semi-Volatile Organic Compounds by GC/FTIR	ZB-SemiVolatiles		104
	8430	Bis(2-chloroethyl) Ether and Hydrolysis Products by Direct Aqueous Injection GC/FT-IR	ZB-WAX ^{PLUS}		128

Air	Method #	Description	Primary Column	Page
	TO-1	Volatile Organic Compounds by Thermal Adsorption and GC-MS	ZB-1 ^{PLUS} [™]	122
	TO-2	Volatile Organic Compounds by Carbon Molecular Sieve Adsorption and GC-MS	ZB-1 ^{PLUS}	122
	TO-3	Volatile Organic Compounds by Cryogenic Preconcentration Techniques and GC-FID /ECD	ZB-1 ^{PLUS}	122
	TO-4A	Pesticides and Polychlorinated Biphenyls (PCBs) by High Volume Polyurethane Foam (PUF) Sampling and GC	ZB-MultiResidue-1	108
	TO-7	N-Nitrosodimethylamine by GC-MS	ZB-WAX ^{PLUS}	128
	TO-9A	Polychlorinated, Polybrominated, and Brominated/Chlorinated Dibenzo-p-Dioxins and Dibenzofurans by HRGC/HRMS	ZB-SemiVolatiles	104
	TO-10A	Pesticides and Polychlorinated Biphenyls (PCBs) by Low Volume Polyurethane Foam (PUF) Sampling and GC	ZB-MultiResidue-1	108
	TO-13A	Polycyclic Aromatic Hydrocarbons (PAHs) by GC-MS	ZB-SemiVolatiles	104
	TO-14A	Volatile Organic Compounds by Specially Prepared Canisters and GC	ZB-1 ^{PLUS}	122
	TO-15	Volatile Organic Compounds by Specially Prepared Canisters and GC-MS	ZB-1 ^{PLUS}	122

Food & Flavors Selection Chart

Listed below are recommended Zebron columns for food safety, food quality, and flavor/fragrance methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

Food Safety	Compound Class	Analysis	Recommended Columns	Page
	Pesticides & Antimicrobials	Multi-Residue Pesticide Screening	ZB-MultiResidue™-1 and -2	108
		Organochlorine Pesticides in Water	ZB-MultiResidue-1 and -2	108
		Organochlorine Pesticides in Foods of Plant Origin	ZB-MultiResidue-1 and -2	108
		Organophosphorus Pesticides in Foods of Plant Origin	ZB-MultiResidue-1 and -2	108
		Triazine Pesticides in Water	ZB-50	146
		Triazine Pesticides in Foods of Plant Origin	ZB-50	146
		Chloramphenicol in Foods of Animal Origin	ZB-1 ^{PLUS} ™	122
Environmental Contaminants	Polybrominated Diphenyl Ethers (PBDEs) in Food	ZB-5MS ^{PLUS} ™, ZB-SemiVolatiles, ZB-35	124, 104, 145	
	Polychlorinated Biphenyls (PCBs) in Water	ZB-MultiResidue-1, ZB-XLB-HT Inferno™	108, 140	
	Polychlorinated Dibenzo-dioxins (PCDDs) in Food	ZB-5MS ^{PLUS} , ZB-SemiVolatiles	126, 104	
	Polychlorinated Dibenzo-furans (PCDFs) in Food	ZB-5MS ^{PLUS} , ZB-SemiVolatiles	126, 104	
	Polycyclic Aromatic Hydrocarbons (PAHs) in Water	ZB-5MS ^{PLUS} , ZB-SemiVolatiles, ZB-35	126, 104, 145	
Food Contact Materials	Food Packaging Volatiles	ZB-624, ZB-624 ^{PLUS} ™	147, 130	
	Melamine in Food	ZB-XLB-HT Inferno	140	
	Cyanuric Acid in Food	ZB-XLB-HT Inferno	140	
	Phthalates in Food	ZB-5MS ^{PLUS}	126	
	Residual Solvents in Food	ZB-624, ZB-624 ^{PLUS} , ZB-WAX ^{PLUS}	147, 130, 128	
	Bisphenol A & F (BPA/BPF) in Food	ZB-5MS ^{PLUS}	126	
Additives & Preservatives	Parabens in Food	ZB-5MS ^{PLUS}	126	
	Chloropropanols (3-MCPD) in Food	ZB-5MS ^{PLUS}	126	
	Flavor Additives (Borneol)	ZB-MultiResidue-1	108	
	Phenolic Antioxidants (BHA & BHT) in Food	ZB-50	146	
	Tocopherols in Food	ZB-5MS ^{PLUS}	126	
Process Contaminants	Acrylamide in Foods	ZB-5HT Inferno	136	
	Acrylamide, Acrylonitrile, and Acrolein in Water	ZB-624, ZB-624 ^{PLUS}	147, 130	
	Benzene in Food	ZB-WAX ^{PLUS}	128	
	Glycols in Food	ZB-WAX ^{PLUS}	128	
Hormones	Steroid Hormones in Food	ZB-5MS ^{PLUS} , ZB-1 ^{PLUS}	126, 122	


Try The GC Column Finder!


Easily select a column by part number, manufacturer, industry, application, or official method **in under 1 minute.**



Food & Flavors Selection Chart

Listed below are recommended Zebron columns for food safety, food quality, and flavor/fragrance methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.


Food Quality	Compound Class	Analysis	Recommended Columns	Page
	Fatty Acids & FAMES	Food Industry Fatty Acid Methyl Esters (FAMES)	ZB-FAME	102
		Marine Oil Fatty Acid Methyl Esters (FAMES)	ZB-FAME	102
		Saw Palmetto Fatty Acid Methyl Esters (FAMES)	ZB-FAME	102
		Free Fatty Acids	ZB-FFAP	151
		Essential Fatty Acids (EFAs) Omega-3 and Omega-6	ZB-FAME	102
	Triglycerides	Butter, Canola Oil, Olive Oil, and Peanut Oil Triglycerides	ZB-5HT Inferno™	136
	Alcoholic Beverages	Cognac Compounds	ZB-WAX ^{PLUS} ™	128
		Distilled Liquor Screen	ZB-FFAP	151
		Ethanol in Beer	ZB-Bioethanol	112
		Sulfur in Beer	ZB-1 ^{PLUS} ™	122
		Whiskey Compounds	ZB-WAX ^{PLUS}	128
		Wine Compounds	ZB-WAX, ZB-WAX ^{PLUS}	150, 128
	Other Acids	Organic Acids	ZB-FFAP	151
		Amino Acids	ZB-50	146
	Sterols	Sterols in Lard, Margarine, Peanut Butter, or Olive Oil	ZB-5HT Inferno	136
Sugars	Alditol Acetates	ZB-5MS ^{PLUS} ™	126	
	Trimethylsilyl (TMS) Sugars	ZB-MultiResidue™-1	108	

Flavors & Fragrances	Compound Class	Analysis	Recommended Columns	Page
	Essential Oils	Cold-Pressed Orange Oil	ZB-WAX ^{PLUS}	128
		Ginkgo Biloba Oil, Lavender Oil, and Ylang Ylang Oil	ZB-1 ^{PLUS}	122
		Peppermint Oil	ZB-WAX	150
		Rose Oil	ZB-XLB	152
		Spearmint Oil	ZB-5MS ^{PLUS}	126
	Flavors	Flavors Screening	ZB-FFAP	151
		Flavor Allergens	ZB-5MS ^{PLUS}	126
		Flavor Volatiles	ZB-1 ^{PLUS} , ZB-WAX ^{PLUS} , ZB-624	122, 128, 147
		Alcoholic Beverage Profile	ZB-FFAP	151
		Honey Profile	ZB-WAX ^{PLUS}	128
	Fragrances	Fragrance Screening	ZB-WAX ^{PLUS} , ZB-624	128, 147
		Fragrance Allergens	ZB-1 ^{PLUS}	122

Pharmaceutical Selection Chart


Listed below are recommended Zebron columns for USP and pharmaceutical methods. Other columns may also be used for these analyses – please contact Phenomenex for your specific GC column needs.

USP	Phase Composition	Recommended Columns	Page
	G1 Dimethylpolysiloxane Oil	ZB-1, ZB-1 ^{PLUS} [™] , ZB-1HT Inferno [™]	142, 122, 134
	G2 Dimethylpolysiloxane Gum	ZB-1, ZB-1 ^{PLUS} , ZB-1HT Inferno	142, 122, 134
	G3 50 % Phenyl 50 % Methylpolysiloxane	ZB-50	146
	G5 Not less than 70 % of 3-Cyanopropylpolysiloxane	ZB-FAME	102
	G8 80 % Bis (3-Cyanopropyl-20 % 3-Cyanopropylphenylpolysiloxane)	ZB-FAME	102
	G9 Methylvinylpolysiloxane	ZB-1 ^{PLUS} , ZB-1HT Inferno, ZB-1	122, 134, 142
	G14 Polyethylene Glycol (Average MW 950-1,050)	ZB-WAX, ZB-WAX ^{PLUS} [™]	150, 128
	G15 Polyethylene Glycol (Average MW 3,000-3,700)	ZB-WAX, ZB-WAX ^{PLUS}	150, 128
	G16 Polyethylene Glycol (Average MW 15,000)	ZB-WAX, ZB-WAX ^{PLUS}	150, 128
	G17 75 % Phenyl 25 % Methylpolysiloxane	ZB-50	146
	G20 Polyethylene Glycol (Average MW of 380-420)	ZB-WAX, ZB-WAX ^{PLUS}	150, 128
	G25 Polyethylene Glycol TPA (Carbowax 20M Terephthalic Acid)	ZB-FFAP	151
	G27 5 % Phenyl 95 % Methylpolysiloxane	ZB-5, ZB-5 ^{PLUS} [™] , ZB-5HT Inferno	143, 124, 136
	5 % Phenyl-Arylene 95 % Methylpolysiloxane	ZB-5ms, ZB-5MS ^{PLUS} [™] , ZB-SemiVolatiles	144, 126, 104
	G28 25 % Phenyl 75 % Methylpolysiloxane	ZB-35, ZB-35HT Inferno	145, 138
	G32 20 % Phenylmethyl 80 % Dimethylpolysiloxane	ZB-35, ZB-35HT Inferno	145, 138
	G35 Polyethylene Glycol & Diepoxide Esterified with Nitroterephthalic Acid	ZB-FFAP	151
	G36 1 % Vinyl 5 % Phenylmethylpolysiloxane	ZB-5, ZB-5 ^{PLUS} , ZB-5HT Inferno	143, 124, 136
	G38 Phase G1 Plus A Tailing Inhibitor	ZB-1, ZB-1 ^{PLUS} , ZB-1HT Inferno	142, 122, 134
	G39 Polyethylene Glycol (Average MW 1,500)	ZB-WAX, ZB-WAX ^{PLUS} [™]	150, 128
	G41 Phenylmethyldimethylsilicone (10 % Phenyl Substituted)	ZB-5, ZB-5 ^{PLUS} , ZB-5HT Inferno	143, 124, 136
	G42 35 % Phenyl 65 % Dimethylpolysiloxane	ZB-35, ZB-35HT Inferno	145, 138
	G43 6 % Cyanopropylphenyl 94 % Dimethylpolysiloxane	ZB-624, ZB-624 ^{PLUS} [™]	147, 130
	G46 14 % Cyanopropylphenyl 86 % Methylpolysiloxane	ZB-1701, ZB-1701P	148, 149
	G47 Polyethylene glycol (average MW 8,000)	ZB-WAX ^{PLUS} , ZB-WAX	128, 150
	G48 Highly polar, partially cross-linked cyanopolysiloxane	ZB-FAME	102

Residual Solvents	USP <467> Procedure	USP Phase for Residual Solvents	Recommended Columns	Page
	Procedure A	G43 (6 % Cyanopropyl 94 % Dimethylpolysiloxane)	ZB-624, ZB-624 ^{PLUS}	147, 130
	Procedure B	G16 (Polyethylene Glycol)	ZB-WAX ^{PLUS}	128
	Procedure C	G43 or G16	ZB-624 ^{PLUS} or ZB-WAX ^{PLUS}	130, 128

ASTM Method Selection Chart

Listed below are recommended Zebron columns for ASTM methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

ASTM	Method	Description	Recommended Columns	Page
	D 1946	Reformed gas	ZB-1	142
	D 2268	Analysis of n-heptane and iso-octane (high purity)	ZB-1	142
	D 2306-96	Xylene isomers	ZB-WAX, ZB-WAX _{PLUS} [™]	150, 128
	D 2426	Butadiene and styrene in butadiene concentrates	ZB-1	142
	D 2504	Non-condensable gases in C1-C3 hydrocarbons	ZB-1 (thick phase)	142
	D 2580	Phenols in water	ZB-WAX _{PLUS}	128
	D 2600	Aromatic traces in light saturated hydrocarbons	ZB-WAX	150
	D 2804	Purity of methyl ethyl ketone	ZB-WAX	150
	D 2887	SimDist analysis of petroleum fractions	ZB-1, ZB-1XT SimDist	142, 114
	D 2908	Volatile organics in water	ZB-WAX, ZB-WAX _{PLUS}	150, 128
	D 2998	Polyhydric alcohols in alkyd resins	ZB-1	142
	D 2999	Monopentaerythritol in commercial pentaerythritol	ZB-1	142
	D 3009	Composition of turpentine	ZB-WAX _{PLUS}	128
	D 3054	Purity and benzene content of cyclohexane	ZB-1	142
	D 3086	Organochlorine pesticides in water	ZB-CLPesticides-1 or -2, ZB-MultiResidue [™] -1 or -2	106, 108
	D 3168	Polymers in emulsion paints	ZB-1	142
	D 3271	Solvent analysis in paints	ZB-WAX _{PLUS}	128
	D 3304	PCBs in environmental materials	ZB-MultiResidue-1 or -2	108
	D 3328	Comparison of waterborne petroleum oils	ZB-1	142
	D 3329	Purity of methyl isobutyl ketone	ZB-WAX _{PLUS}	128
	D 3432	Toluene diisocyanates in urethane prepolymers	ZB-1	142
	D 3447	Purity of trichlorotrifluoroethane (CFC-113)	ZB-1, ZB-624	142, 147
	D 3452	Identification of rubber	ZB-1HT Inferno [™]	134
	D 3465	Purity of monomeric plasticizers	ZB-1	142
	D 3524	Diesel fuel in lubricating oil (SAE 30)	ZB-1HT Inferno	134
	D 3534	PCBs in water	ZB-5, ZB-5 _{PLUS} [™]	143, 126
	D 3606	Benzene and toluene in gasoline	ZB-1	142
	D 3687	Volatile organic compounds	ZB-WAX, ZB-WAX _{PLUS}	150, 128
	D 3710	Gasoline fractions	ZB-1XT SimDist	114
	D 3725	Fatty acids in drying oils	ZB-FFAP	151
	D 3760	Analysis of cumene	ZB-WAX, ZB-WAX _{PLUS}	150, 128
	D 3797	Analysis of o-xylene	ZB-WAX, ZB-WAX _{PLUS}	150, 128
	D 3798	Analysis of p-xylene impurities	ZB-WAX, ZB-WAX _{PLUS}	150, 128
	D 3876	Methoxyl and hydroxypropyl substitution in cellulose ether products	ZB-1	142
	D 3962	Impurities in styrene	ZB-FFAP	151
	D 4059	PCBs in insulating liquids	ZB-5 _{PLUS} , ZB-5HT Inferno	124, 136
	D 4275	Butylated hydroxy toluene in ethylene and ethylenevinylacetate polymers	ZB-1	142
	D 4367	Benzene in hydrocarbon solvent	ZB-1	142
	D 4420	Aromatics in gasoline	ZB-1	142
	D 4735	Thiophene impurities in benzene	ZB-FFAP	151
	D 4768	Phenol and cresol inhibitors in insulating oils	ZB-FFAP	151
	D 5060	Impurities in ethylbenzene	ZB-FFAP, ZB-WAX, ZB-WAX _{PLUS}	151, 150, 128
	D 5134	Petroleum naphthas through n-nonane	ZB-1, ZB-DHA-PONA	142
	D 5135-95	Analysis of styrene	ZB-WAX, ZB-WAX _{PLUS}	150, 128
	D 5441	Analysis of Methyl Tert-Butyl Ether (MTBE)	ZB-DHA-PONA	116
	D 5501	Determination of denatured bioethanol	ZB-1, ZB-Bioethanol, ZB-DHA-PONA	142, 116
	D 5580	Aromatics in finished gasoline	ZB-1	142
	D 6352	Extended SimDist	ZB-1HT Inferno, ZB-1XT SimDist	134, 114
	D 6584	Determination of glycerine in biodiesel	ZB-5HT Inferno	136
	D 6729-30, D 6733	Components in spark ignition fuels	ZB-DHA-PONA	116
D 7169	Crude Oil; Vacuum distillates	ZB-1XT SimDist	114	
E 0202	Analysis of glycols	ZB-WAX _{PLUS} , ZB-1	128, 142	
E 1100	Analysis of denatured ethanol	ZB-WAX _{PLUS} , ZB-Bioethanol	128, 112	



Essentials

A collection of tried-and-true selectivities, Essentials phases are the smart starting point for the GC method developer.

ZB-1	ZB-50
ZB-1ms	ZB-624
ZB-5	ZB-1701
ZB-5ms	ZB-WAX
ZB-35	ZB-FFAP
	ZB-XLB



Plus

Plus phases offer a suite of upgrades compared to their Essentials counterparts – from exceptional inertness to enhanced aqueous stability.

ZB-1 ^{PLUS} ™
ZB-5 ^{PLUS} ™
ZB-5MS ^{PLUS} ™
ZB-WAX ^{PLUS} ™
ZB-624 ^{PLUS} ™



Inferno™

Resilient under even the most intense GC conditions, Inferno phases dare to defy high boilers, contaminants, and carry-overs.

ZB-1HT
ZB-5HT
ZB-35HT
ZB-XLB-HT



Unlimited

Designed for the truly bold GC scientist, Unlimited phases unleash the power of selectivity for targeted performance that breaks from the mold.

ZB-FAME
ZB-SemiVolatiles
ZB-MultiResidue™ -1 & -2
ZB-CLPesticides -1 & -2
ZB-Drug-1
ZB-BAC-1 & -2
ZB-1XT SimDist
ZB-Bioethanol
ZB-DHA-PONA

Selected Zebron Polarities

Polarity	5	ZB-1 ZB-DHA-PONA ZB-1PLUS™ ZB-1HT Inferno™ ZB-1XT SimDist	For Non-Polar Analytes <ul style="list-style-type: none"> • Alkanes • Aromatics • Oils • Boiling Point Separations
	8	ZB-5 ZB-5ms ZB-5PLUS™ ZB-5MSPLUS™ ZB-5HT Inferno ZB-SemiVolatiles	
	9	ZB-XLB ZB-XLB-HT Inferno	
	11	ZB-MultiResidue™-1	
	13	ZB-624 ZB-624PLUS™	For Slightly Polar Analytes <ul style="list-style-type: none"> • Volatiles • Drugs • Pesticides
	15	ZB-MultiResidue-2	
	18	ZB-35 ZB-35HT Inferno	
	19	ZB-1701 ZB-1701P	
	24	ZB-50	
	52	ZB-WAXPLUS™	For Very Polar Analytes <ul style="list-style-type: none"> • Polar Volatiles • Alcohols • Phenols • Acids
	57	ZB-WAX	
	58	ZB-FFAP	

Meet Your GC Column Family Zebron Unlimited

Food Testing

ZB-FAME	102
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Environmental Testing

ZB-SemiVolatiles	104
ZB-CLPesticides-1 & -2	106
ZB-MultiResidue™-1 & -2	108

Fuels

ZB-Bioethanol	112
ZB-1XT SimDist	114
ZB-DHA-PONA	116

Forensics & Toxicology

ZB-Drug-1	118
ZB-BAC-1 & -2	120

Zebron PLUS

ZB-1PLUS™	122
ZB-5PLUS™	124
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Zebron Inferno™

ZB-1HT Inferno	134
ZB-5HT Inferno	136
ZB-35HT Inferno	138
ZB-XLB-HT Inferno	140

Zebron Essentials

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ZB-5	143
ZB-5ms	144
ZB-35	145
ZB-50	146
ZB-624	147
ZB-1701	148
ZB-1701P	149
ZB-WAX	150
ZB-FFAP	151
ZB-XLB	152

Zebron Guard Columns

Guardian™ Integrated Guard Columns	153
Z-Guard™ Columns	154

ZB-FAME

- Reduce traditional run times up to 75%
- Improve separation of cis/trans FAME isomers
- Suitable with AOAC, AOCS, and IOC methods

Upgrade to Zebron from any high cyanopropyl phase:

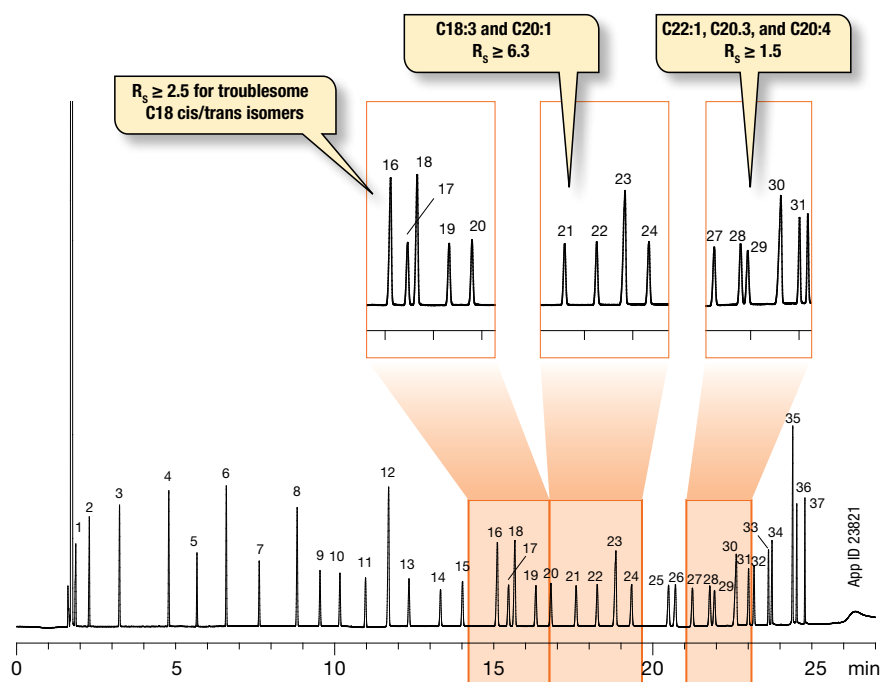
Agilent®

- CP-Sil 88
- HP-88
- DB-23

Supelco®

- SP®-2380
- SP-2560

Baseline Separation of Common Isomers



Column: Zebron ZB-FAME
Dimensions: 30 meter x 0.25 mm x 0.20 µm
Part No.: [ZHG-G033-10](#)
Injection: Split 50:1 @ 240 °C, 1 µL
Recommended Liner: Zebron PLUS Single Taper with Wool, 4 mm ID
Liner Part No.: [AG2-0A11-05](#) (for Agilent® systems)
Carrier Gas: Helium @ 1.2 mL/min (constant flow)
Oven Program: 100 °C for 2 min to 140 °C @ 10 °C/min to 190 °C @ 3 °C/min to 260 °C @ 30 °C/min for 2 min
Detector: FID @ 260 °C
Sample: 37 FAME standard

Easy Liner Selection

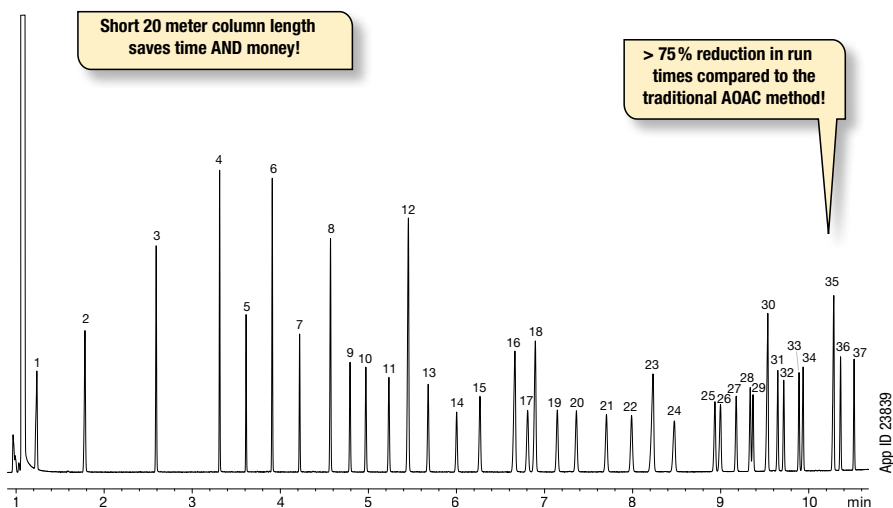


Our GC liner finder tool makes liner selection a breeze. You can even search by application, injection type, GC system, or your current liner part number.

The Fast FAME GC Column

Traditionally, cis/trans FAME separations require the use of long (100 meters or more) columns and can run up to 60 minutes, resulting in a bottleneck to higher productivity. Zebron ZB-FAME provides targeted selectivity that allows for reduced column length – run times as short as 11 minutes without compromising your results!

37 FAMES In A Short 11 Minute Run



Column: Zebron ZB-FAME

Dimensions: 20 meter x 0.18 mm x 0.15 µm

Part No.: [7FD-G033-05](#)

Injection: Split 100:1 @ 250 °C, 1 µL

Recommended Liner: Zebron PLUS Single Taper Z-Liner™

Liner Part No.: [AG2-0A13-05](#) (for Agilent® systems)

Carrier Gas: Helium @ 1.0 mL/min (constant flow)

Oven Program: 80 °C for 1.5 min to 160 °C @ 40 °C/min to 185 °C @ 5 °C/min to 260 °C @ 30 °C/min

Detector: FID @ 260 °C

Sample: 37 FAME standard



Ordering Information

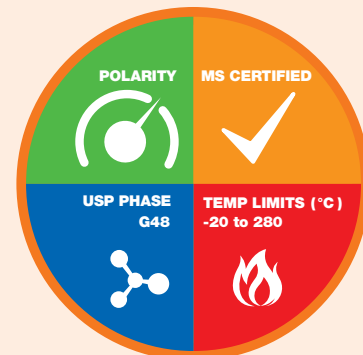
Zebron ZB-FAME GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
20-Meter			
0.18	0.15	-20 to 280	7FD-G033-05
30-Meter			
0.25	0.20	-20 to 280	7HG-G033-10
30-Meter with 5-Meter Guardian™ Integrated Guard			
0.25	0.20	-20 to 280	7HG-G033-10-GGA
60-Meter			
0.25	0.20	-20 to 280	7KG-G033-10
100-Meter			
0.25	0.20	-20 to 280	7MG-G033-10

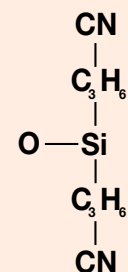
Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G033-10-B](#). Some exceptions may apply. Injection 6850 and some SRI and process GC systems use only 5 in. cages.

Phenomenex

Column Profile



Phase Chemistry



High Cyanopropyl

Recommended Applications

- Fatty Acid Methyl Ester (FAMES)
- cis/trans FAME isomers
- Omega 3, Omega 6 FAMES

ZB-SemiVolatiles

Maximize Inertness

- Specifically designed to overcome obstacles for sensitive semi-volatiles methods
- **Enviro-Inert™ Technology** provides a rugged 5% phenyl-arylene phase – reduce activity without compromising selectivity
- Rugged QC test includes EPA 8270 tuning standard to ensure column is ready to pass suitability requirements
- Popular for EPA Methods 525, 610, 625, 8100, and 8270D

Upgrade to Zebron from any 5%-phenyl or 5% phenyl-arylene / 95% dimethylpolysiloxane phase:

Agilent®

- DB®-5ms
- DB-5ms Ultra Inert
- DB-5.625
- DB-UI 8270D

- HP-5ms
- HP-5ms Ultra Inert
- VP-5ms
- CP-5il 8 CB MS

Restek®

- Rxi®-5Sil MS
- Rxi-5ms

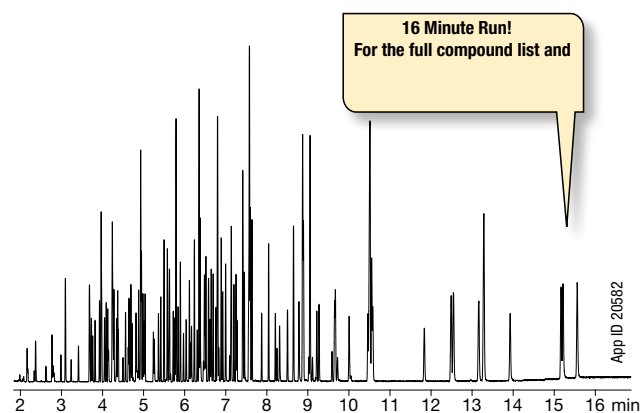
Supelco®

- SLB®-5ms

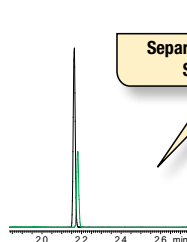
135 Compounds in Under 16 Minutes

ZB-SemiVolatiles provides improved productivity with shorter run times for EPA 8270D, while maintaining resolution of key critical pairs.

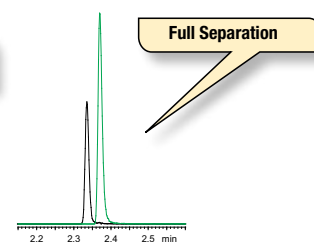
Semivolatile Organic Compounds



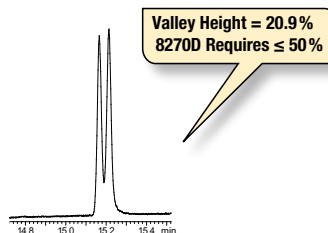
Improved Peak Shapes



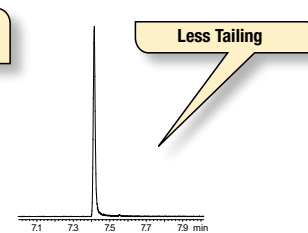
1,4-Dioxane-D8 and 1,4-Dioxane



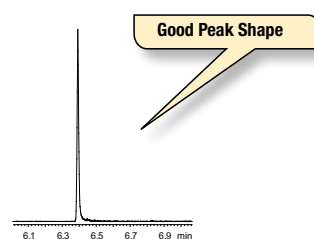
N-Nitrosodimethylamine and Pyridine



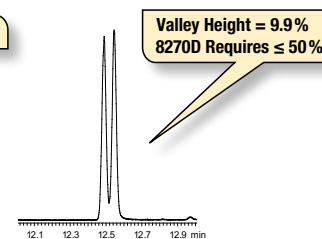
Indeno[1,2,3-cd]pyrene and Dibenz[a,h]anthracene, both share mass 276



Pentachlorophenol



2,4-Dinitrophenol



Benzo[b]fluoranthene and Benzo[k]fluoranthene

Column: Zebron ZB-SemiVolatiles
Dimensions: 30 meter x 0.25 mm x 0.25 μm
Part No.: [7HG-G027-11](#)
Injection: Split 10:1 @ 280 °C, 1 μL
Liner: [AG0-8499](#) (Single Taper with Wool)
Septum: [AG0-4697](#) (PhenoRed™-400)
Inlet Seal: [AG0-8620](#) (Easy Seals™ Inlet Base Seal)
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 40 °C for 0.5 min to 260 °C @ 40 °C/min to 295 °C @ 6 °C/min to 325 °C @ 25 °C/min for 2 min
Detector: MSD @ 340 °C; 45 – 450 amu
Sample: Analytes are 25 ppm in Dichloromethane
 135 compounds in EPA Method 8270D



ZB-SemiVolatiles

We QC Test For the Compounds You Analyze

We take the guesswork out of meeting method requirements by aggressively testing ZB-SemiVolatiles with two different test mixes. We incorporated troublesome analytes from your samples and compounds in the EPA 8270D tuning standard into our QC test, so you can be sure your column is ready to meet suitability requirements for the method.

Meet Requirements Out-of-the-Box

Test Probe	Criteria	EPA Requirement	Our Requirement
Pyridine Very active amine that exposes even the smallest amount of column activity. This ensures that our Enviro-Inert™ deactivated column performs at the highest possible level for difficult basic compounds.	Peak Response	Not Specified	≥ 0.6
Pentachlorophenol Disappears and tails on active columns; it is important to measure relative response and peak skew criteria.	Peak Skew Peak Response	≤ 2.0 Not Specified	≤ 2.0 ≥ 0.3
Benzidine Active amine that tails when column activity is present, complicating peak quantification.	Peak Skew	≤ 2.0	≤ 2.0
DDT Breaks down in an active system to DDE and DDD. With our QC test, you are assured that your column will meet the EPA requirements upon installation.	Breakdown	< 20 %	< 20 %
Injection To ensure trace-level sensitivity, QC is performed with a 20 ppm mix using a 100:1 split injection – effectively 250 times less than the EPA maximum allowed.	Sensitivity	50 ng or less on column	0.2 ng on column

Stands Up to Tough Samples for Increased Lifetime

“ I have found the Phenomenex ZB-SemiVolatiles columns to be superior in quality and durability than any other columns we have previously used. The columns not only last longer, but the reproducibility of column is extraordinary. The column holds calibrations particularly well, even after multiple injections of samples with far less than desirable matrices. All of this equates to less downtime and maintenance and more productivity for TestAmerica. ”

Ryan McKernan, GC-MS Semi-Volatile Analyst
TestAmerica Laboratories, Inc. Buffalo

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Column Profile

Engineered Self Cross-linking™ (ESC)

Phase Chemistry

5 % Phenyl-Arylene

95 % Dimethylpolysiloxane

Recommended Applications

- Semivolatiles (SVOCs)
- EPA Methods (525, 610, 625, 8100, 8270D)
- PAHs
- PBDEs

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Ordering Information

Zebtron ZB-SemiVolatiles GC Columns			
ID (mm)	df (µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.25	-60 to 325/350	7EG-G027-11
0.25	0.50	-60 to 325/350	7EG-G027-17
20-Meter			
0.18	0.18	-60 to 325/350	7FD-G027-08
0.18	0.36	-60 to 325/350	7FD-G027-53
30-Meter			
0.25	0.25	-60 to 325/350	7HG-G027-11
0.25	0.50	-60 to 325/350	7HG-G027-17
0.32	0.25	-60 to 325/350	7HM-G027-11
30-Meter with 5-Meter Guardian™ Integrated Guard			
0.25	0.25	-60 to 325/350	7HG-G027-11-GGA
0.25	0.50	-60 to 325/350	7HG-G027-17-GGA
30-Meter with 10-Meter Guardian Integrated Guard			
0.25	0.25	-60 to 325/350	7HG-G027-11-GGC
0.25	0.50	-60 to 325/350	7HG-G027-17-GGC
60-Meter			
0.25	0.25	-60 to 325/350	7KG-G027-11

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G027-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

ZB-CLPesticides-1 and -2

7 EPA Methods, One Column Set

- Guaranteed alternative to Restek Rtx-CLPesticides
- Optimized, versatile selectivity for chlorinated pesticides and herbicides
- Well-suited for dual-column configurations using GC-ECD
- Run EPA Methods 8081 and 8081 extended, 8082, 8151, 504, 505, 508, and 552 without changing columns – save time

Direct Replacement for Restek Rtx-CLPesticides Phases

You asked for optimized performance for pesticides by GC-ECD detectors, without time-consuming method development. We've delivered a direct replacement**! ZB-CLPesticides-1 and -2 provide guaranteed drop-in performance compared to your current Rtx-CLPesticides column set, without the hassle.

Upgrade to Zebron from these similar* phases:

Restek®

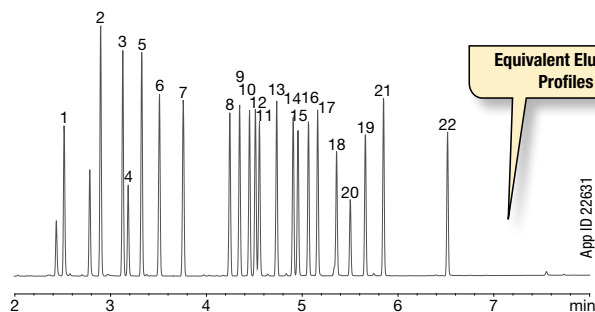
- Rtx®-CLPesticides
- Rtx-CLPesticides2
- Stx®-CLPesticides
- Stx-CLPesticides2

*not exact equivalent, selectivity may differ

Zebron

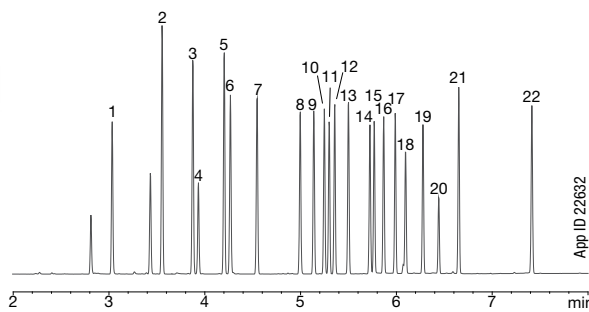
ZB-CLPesticides-1

30 m x 0.32 mm x 0.32 µm



ZB-CLPesticides-2

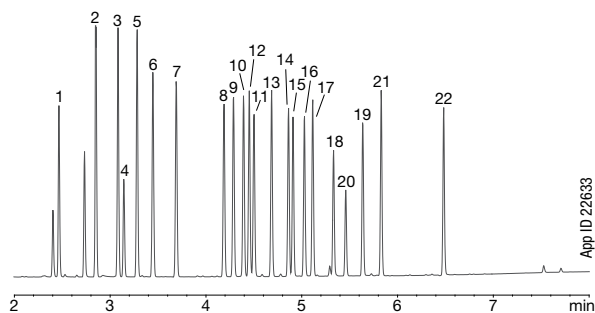
30 m x 0.32 mm x 0.25 µm



Restek®

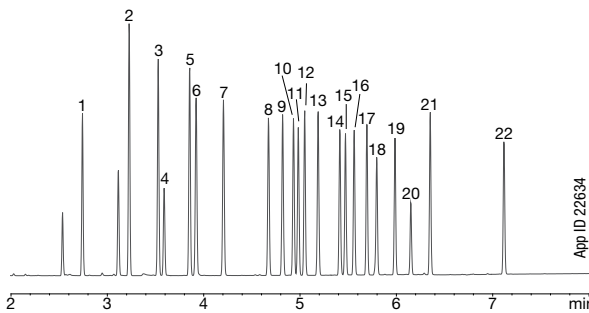
Rtx®-CLPesticides

30 m x 0.32 mm x 0.32 µm



Rtx-CLPesticides2

30 m x 0.32 mm x 0.25 µm



Conditions for all columns:

- Columns: As listed
- Dimensions: As listed
- Part No.: [ZHM-G028-51](#) (ZB-CLPesticides-1)
- [ZHM-G029-11](#) (ZB-CLPesticides-2)
- Injection: Splitless (hold 0.3 min) @ 250 °C, 1 µL
- Carrier Gas: Helium @ 3.9 mL/min (constant flow)
- Oven Program: 120 °C to 200 °C @ 45 °C/min to 230 °C @ 15 °C/min to 330 °C @ 30 °C/min for 2 min

- Detector: ECD @ 330 °C
- Y-Connector: [AGO-4717](#) (Fused Quartz)
- Guard Column: [ZAM-G000-00-GZO](#) (5 m Z-Guard™)
- Liner: [AGO-8499](#) (Single Taper with Wool at Bottom)
- Septum: [AGO-4696](#) (PhenoRed™-400)
- Inlet Seal: [AGO-8620](#) (Gold-Plated Easy Seals™)
- Sample: Analytes are 250 ng/mL in hexane.

See page 107 for compound list.

**Direct replacement: this category indicates an alternative column which will likely give a similar selectivity. Conditions for each method were the same for all columns tested. Comparative separations may not be representative of all applications.

ZB-CLPesticides-1 and -2

Five-Point Calibration Curve at 5, 15, 25, 100, and 250 ng/mL

Peak No.	Analyte	ZB-CLPesticides-1 % RSD*	ZB-CLPesticides-2 % RSD*	US EPA Specifications
1	2,4,5,6-TCMX (Surr)	3.8	3.0	< 20
2	α-BHC	8.3	3.8	< 20
3	γ-BHC	5.9	5.6	< 20
4	β-BHC	6.9	6.9	< 20
5	δ-BHC	4.9	5.7	< 20
6	Heptachlor	8.0	6.5	< 20
7	Aldrin	4.2	2.3	< 20
8	Heptachlor epoxide	3.8	2.3	< 20
9	trans-Chlordane	4.1	3.8	< 20
10	cis-Chlordane	4.0	3.3	< 20
11	4,4'-DDE	4.8	2.9	< 20
12	Endosulfan I	6.0	2.5	< 20
13	Dieldrin	7.7	4.9	< 20
14	Endrin	9.4	6.6	< 20
15	4,4'-DDD	9.2	3.6	< 20
16	Endosulfan II	6.6	4.1	< 20
17	4,4'-DDT	11.6	6.9	< 20
18	Endrin aldehyde	8.3	7.3	< 20
19	Endosulfan sulfate	8.0	7.1	< 20
20	Methoxychlor	6.7	6.1	< 20
21	Endrin ketone	6.5	7.2	< 20
22	Decachlorobiphenyl (Surr)	6.7	6.6	< 20
Average		6.6%	4.9%	< 20

*Calculated using response factors as per EPA guidelines


ZB-CLPesticides GC Column Kits

Ordering Information

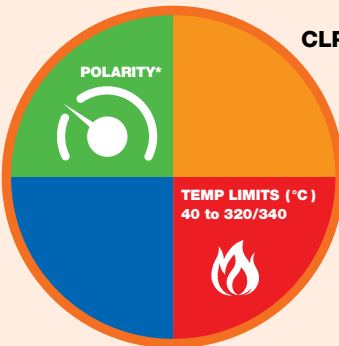
0.25 mm ID Kit (includes 1 of each below) Part No.: KG0-9285		
Description	Dimension	Part No.
ZB-CLPesticides-1	30 meter x 0.25 mm x 0.25 µm	7HG-G028-11
ZB-CLPesticides-2	30 meter x 0.25 mm x 0.20 µm	7HG-G029-10
Z-Guard™ Column	5 meter x 0.25 mm	7AG-G000-00-GZ0
Y-Connector	Fused Quartz	AGO-4717
Polyimide Resin	0.5 mL, rated to 350 °C	AGO-5722

0.32 mm ID Kit (includes 1 of each below) Part No.: KG0-9286		
Description	Dimension	Part No.
ZB-CLPesticides-1	30 meter x 0.32 mm x 0.32 µm	7HM-G028-51
ZB-CLPesticides-2	30 meter x 0.32 mm x 0.25 µm	7HM-G029-11
Z-Guard Column	5 meter x 0.32 mm	7AM-G000-00-GZ0
Y-Connector	Fused Quartz	AGO-4717
Polyimide Resin	0.5 mL, rated to 350 °C	AGO-5722

0.53 mm ID Kit (includes 1 of each below) Part No.: KG0-9290		
Description	Dimension	Part No.
ZB-CLPesticides-1	30 meter x 0.53 mm x 0.50 µm	7HK-G028-17
ZB-CLPesticides-2	30 meter x 0.53 mm x 0.42 µm	7HK-G029-16
Z-Guard Column	5 meter x 0.53 mm	7AK-G000-00-GZ0
Y-Connector	Fused Quartz	AGO-4717
Polyimide Resin	0.5 mL, rated to 350 °C	AGO-5722

 Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Column Profile

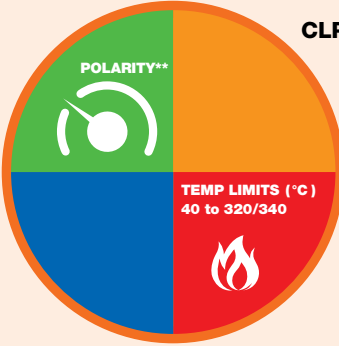


CLP-1

POLARITY*

TEMP LIMITS (°C)
40 to 320/340

*Similar polarity to ZB-35.



CLP-2

POLARITY**

TEMP LIMITS (°C)
40 to 320/340

**Similar polarity to ZB-MultiResidue-2

Phase Chemistry

- Proprietary

Recommended Applications

- Dual-Column Chlorinated Pesticide Methods
- EPA Methods (8081 and 8081 extended, 8082, 8151, 504, 505, 508, 552)

ZB-CLPesticides GC Columns

Ordering Information

ZB-CLPesticides-1 GC Columns			
ID (mm)	df (µm)	Temp. Limits °C	Part No.
30-Meter			
0.25	0.25	40 to 320/340	7HG-G028-11
0.32	0.32	40 to 320/340	7HM-G028-51
0.32	0.50	40 to 320/340	7HM-G028-17
0.53	0.50	40 to 320/340	7HK-G028-17
ZB-CLPesticides-2 GC Columns			
ID (mm)	df (µm)	Temp. Limits °C	Part No.
30-Meter			
0.25	0.20	40 to 320/340	7HG-G029-10
0.32	0.25	40 to 320/340	7HM-G029-11
0.32	0.50	40 to 320/340	7HM-G029-17
0.53	0.42	40 to 320/340	7HK-G029-16

ZB-MultiResidue™ -1 and -2

Optimized Selectivity for Pesticides

- Specially designed for the separation of all types of pesticides, herbicides, and insecticides
- Baseline resolution and confirmation of all 20 chlorinated pesticides regulated under EPA Method 8081 in ≤ 10 min
- Decreased breakdown of sensitive pesticides such as DDT
- Robust performance for high temperature bakeouts
- Low bleed performance for pesticide confirmation by MS

Upgrade to Zebron from these similar* phases:

Agilent®

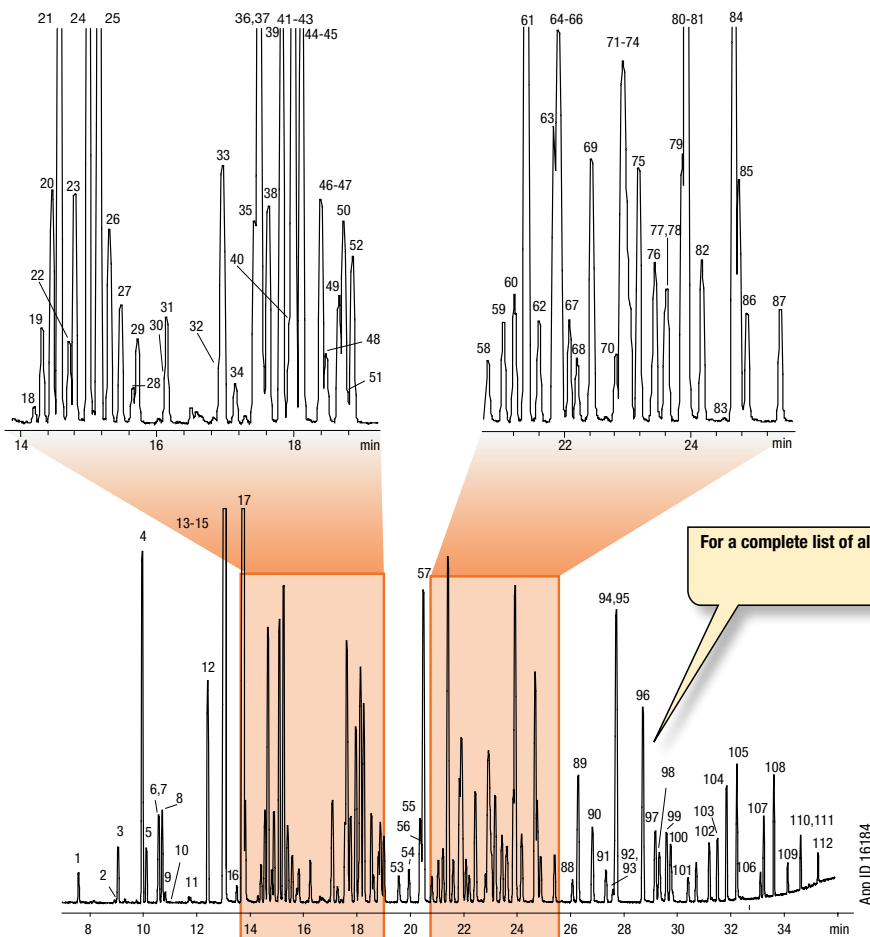
- DB®-CLP1
- DB-CLP2

Restek®

- Rtx®-CLPesticides
- Rtx-CLPesticides2
- Stx®-CLPesticides
- Stx-CLPesticides2

*not exact equivalent, selectivity may differ

Improved Multi-Residue Pesticide Screening by GC-MS



Column: Zebron MultiResidue™ -1

Dimensions: 30 meter x 0.25 mm x 0.25 μ m

Part No.: ZHG-G016-11

Injection: Splitless @ 260 °C, 1 μ L

Carrier Gas: Helium @ 0.9 mL/min (constant flow)

Oven Program: 80 °C for 0.5 min to 150 °C @ 10 °C/min to 240 °C @

4 °C/min to 320 °C @ 15 °C/min for 3 min

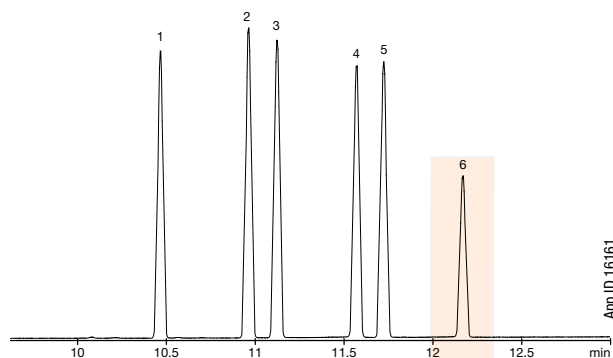
Detector: MSD @ 320 °C; 45-400 amu

Sample: Analytes were 1 ppm in Dichloromethane

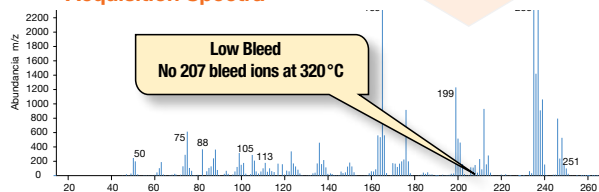
ZB-MultiResidue™ -1 and -2 (cont'd)

Resolve Common Pesticide Isomers

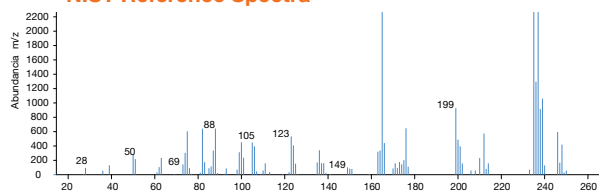
ZB-MultiResidue optimized selectivities improve resolution of complex pesticide, herbicide, and insecticide isomers. Our extremely stable siloxane-based polymer contains absolutely no nitrogen or halogenated functionality, which can be unfriendly to NPD and ECD detectors. Engineered Self-Crosslinking™ (ESC) bonding incorporates ladders into the phase backbone for low bleed and unmatched spectral integrity – even for trace-level samples.



Acquisition Spectra

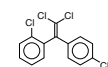


NIST Reference Spectra

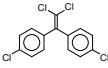


Column: Zebron ZB-MultiResidue-1
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: [7HG-G016-11](#)
Injection: Splitless (hold 0.5 min) @ 260 °C, 1 µL
Carrier Gas: Helium @ 0.8 mL/min (constant flow)
Oven Program: 100 °C for 0.5 min to 200 °C at 25 °C/min to 320 °C at 15 °C/min for 2 min
Detector: MSD @ 320 °C, 45-400 amu
Sample:

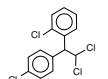
1. o,p-DDE



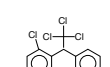
2. p,p-DDE



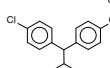
3. o,p-DDD



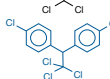
4. o,p-DDT



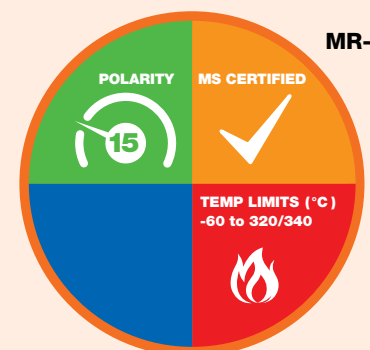
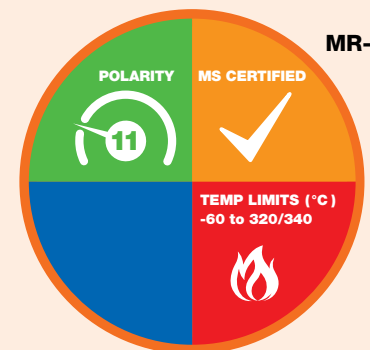
5. p,p-DDD



6. p,p-DDT



Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry

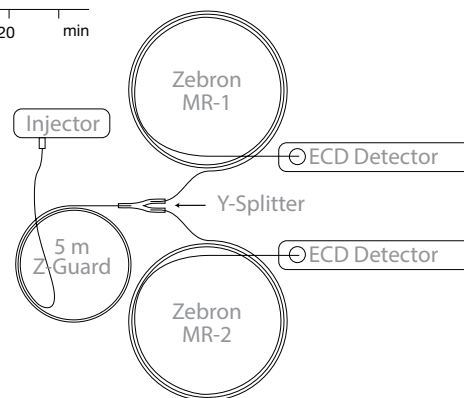
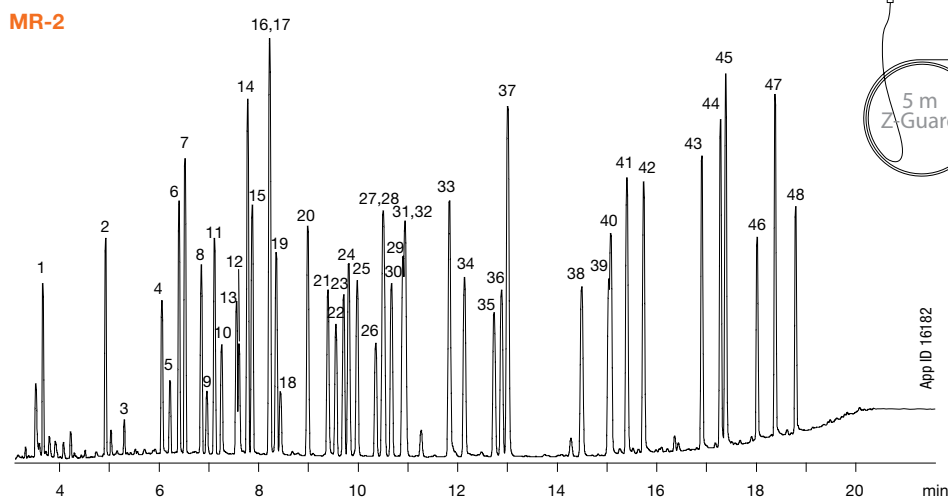
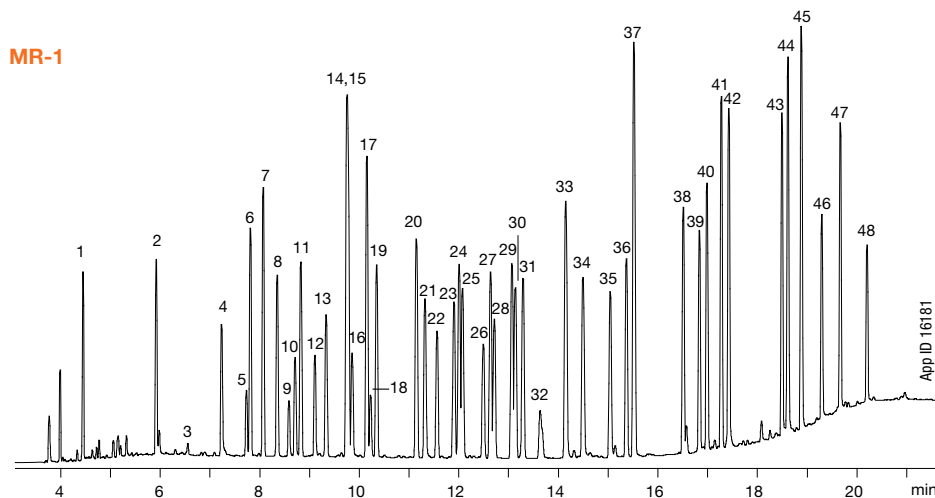
- Proprietary

Recommended Applications

- Haloacetic Acids (HAAs)
- Herbicides / Insecticides
- Multi-Pesticide Screening
- Nitrogen Containing Pesticides
- Organochlorine Pesticides
- Organophosphorous Pesticides
- PCBs / Aroclors

ZB-MultiResidue™ -1 and -2 (cont'd)

Great Results for Organophosphate Pesticides



Conditions for both column

Columns: Zebron MultiResidue-1
Zebron MultiResidue-2

Dimensions: 30 meter x 0.32 mm x 0.50 µm
30 meter x 0.32 mm x 0.25 µm

Part No.: [7HM-G016-17](#)
[7HM-G017-11](#)

Injection: On-Column @ 103 °C, 1 µL

Carrier Gas: Helium @ 2.8 mL/min (constant flow)

Oven Program: 100 °C for 0.5 min to 180 °C @ 20 °C/min to 240 °C @ 6 °C/min to 320 °C @ 15 °C/min for 2 min

Detector: FID @ 340 °C

Note: Columns connected using a 5 m Z-Guard Column and a "Y" splitter.

Sample: Analytes are 2 ppm in Dichloromethane.

- | | | |
|------------------------------------|-------------------------|----------------------------|
| 1. Dichlorvos | 17. Fonofos | 33. Chlorfenvinphos |
| 2. Mevinphos | 18. Phosphamidon Isomer | 34. Crotoxyphos |
| 3. Trichlorfon | 19. Disulfoton | 35. Stirofos |
| 4. TEPP (Tetraethyl Pyrophosphate) | 20. Dichlofenthion | 36. Tokuthion |
| 5. Demeton Isomer | 21. Phosphamidon | 37. Merphos Oxide (Tribus) |
| 6. Thionazin | 22. Chlorpyrifos Methyl | 38. Ethion |
| 7. Ethoprop | 23. Ronnel | 39. Fensulfothion |
| 8. Sulfotep | 24. Aspon | 40. Contaminant |
| 9. Naled | 25. Methyl Parathion | 41. Carbophenothion |
| 10. Dicrotophos | 26. Malathion | 42. Famfur |
| 11. Phorate | 27. Fenitrothion | 43. EPN |
| 12. Monocrotophos | 28. Chlorpyrifos | 44. Phosmet |
| 13. Demeton | 29. Fenthion | 45. Leptophos |
| 14. Terbufos | 30. Trichloronate | 46. Azinphos Methyl |
| 15. Diazinon | 31. Parathion | 47. Azinphos Ethyl |
| 16. Dimethoate | 32. Merphos | 48. Coumaphos |

ZB-MultiResidue™ -1 and -2 (cont'd)

Ordering Information

Zebron ZB-MultiResidue -1 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
20-Meter			
0.18	0.18	-60 to 320/340	7FD-G016-08
30-Meter			
0.25	0.25	-60 to 320/340	7HG-G016-11
0.32	0.25	-60 to 320/340	7HM-G016-11
0.32	0.50	-60 to 320/340	7HM-G016-17
0.53	0.50	-60 to 320/340	7HK-G016-17

Ordering Information

Zebron ZB-MultiResidue -2 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
30-Meter			
0.25	0.20	-60 to 320/340	7HG-G017-10
0.32	0.25	-60 to 320/340	7HM-G017-11
0.53	0.50	-60 to 320/340	7HK-G017-17



Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G016-11-B](#) or [7HG-G017-10-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

ZB-MultiResidue Column Kits

Ordering Information

0.25 mm ID (kit consists of products below)			Part No.: KGO-8237
Description	Dimension	Part No.	
ZB-MultiResidue-1 Column	30 meter x 0.25 mm x 0.25 µm df	7HG-G016-11	
ZB-MultiResidue-2 Column	30 meter x 0.25 mm x 0.20 µm df	7HG-G017-10	
Z-Guard™	5 meter x 0.25 mm	7AG-G000-00-GZ0	
Universal Capillary Column Y-connector, Fused Quartz		AGO-4717	
Polyimide Resin	0.5 mL, rated to 350 °C	AGO-5722	
0.32 mm ID (kit consists of products below)			Part No.: KGO-8238
Description	Dimension	Part No.	
ZB-MultiResidue-1 Column	30 meter x 0.32 mm x 0.50 µm df	7HM-G016-17	
ZB-MultiResidue-2 Column	30 meter x 0.32 mm x 0.25 µm df	7HM-G017-11	
Z-Guard	5 meter x 0.32 mm	7AM-G000-00-GZ0	
Universal Capillary Column Y-connector, Fused Quartz		AGO-4717	
Polyimide Resin	0.5 mL, rated to 350 °C	AGO-5722	
0.53 mm ID (kit consists of products below)			Part No.: KGO-8239
Description	Dimension	Part No.	
ZB-MultiResidue-1 Column	30 meter x 0.53 mm x 0.50 µm df	7HK-G016-17	
ZB-MultiResidue-2 Column	30 meter x 0.53 mm x 0.50 µm df	7HK-G017-17	
Z-Guard	5 meter x 0.53 mm	7AK-G000-00-GZ0	
Universal Capillary Column Y-connector, Fused Quartz		AGO-4717	
Polyimide Resin	0.5 mL, rated to 350 °C	AGO-5722	

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-Bioethanol

Quicker Bioethanol Testing

- Specially designed for fast and accurate bioethanol testing
- Provides accurate and reproducible results for Certificate of Analysis (COA)
- Resolve methanol and ethanol from all other denaturant peaks
- Great resolution of fusel alcohols
- Allows for quick bake out in between runs to eliminate contaminants

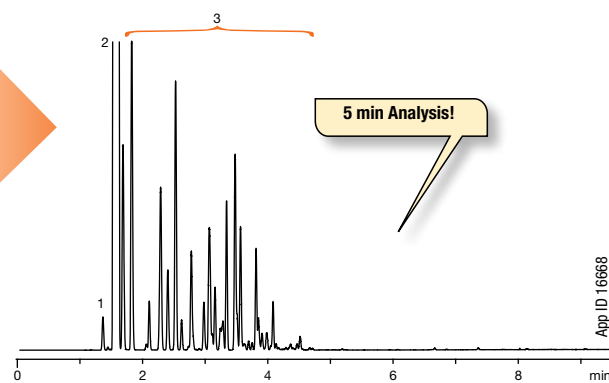
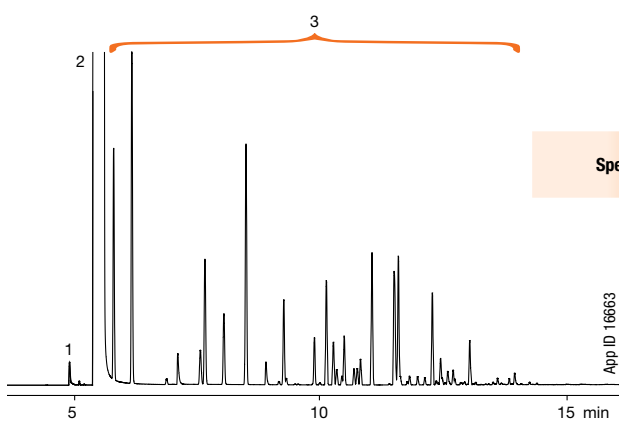
Upgrade to Zebron from traditional phases used for bioethanol:

Agilent®	Restek®	SGE®	Supelco®
• DB®-1	• Rtx®-1	• BP1	• SPB®-1
• HP-1	• Rxi®-1ms		• SE-30
• CP-Sil 5 CB			



Fast, Accurate Analysis

Determination of Denatured Bioethanol: ASTM Method D5501



Column: Zebron ZB-1

Dimensions: 100 meter x 0.25 mm x 0.50 µm

Part No.: [7MG-G001-17](#)

Injection: Split 50:1 @ 300 °C, 1 µL

Carrier Gas: Helium @ 35 cm/sec (constant flow)

Oven Program: 45 °C for 7 min to 255 °C @ 30 °C/min for 6 min

Detector: FID @ 300 °C

Instrument: Shimadzu® [GC-2010](#) with Flame Ionization

Sample: 1. Methanol
2. Ethanol
3. Denaturant

Column: Zebron ZB-Bioethanol

Dimensions: 15 meter x 0.25 mm x 1.00 µm

Part No.: [7EG-G020-22](#)

Injection: Split 50:1 @ 300 °C, 1 µL

Carrier Gas: Hydrogen @ 25 cm/sec (constant flow)

Oven Program: 55 °C for 1.7 min to 260 °C @ 40 °C/min (hold 2.67 min)

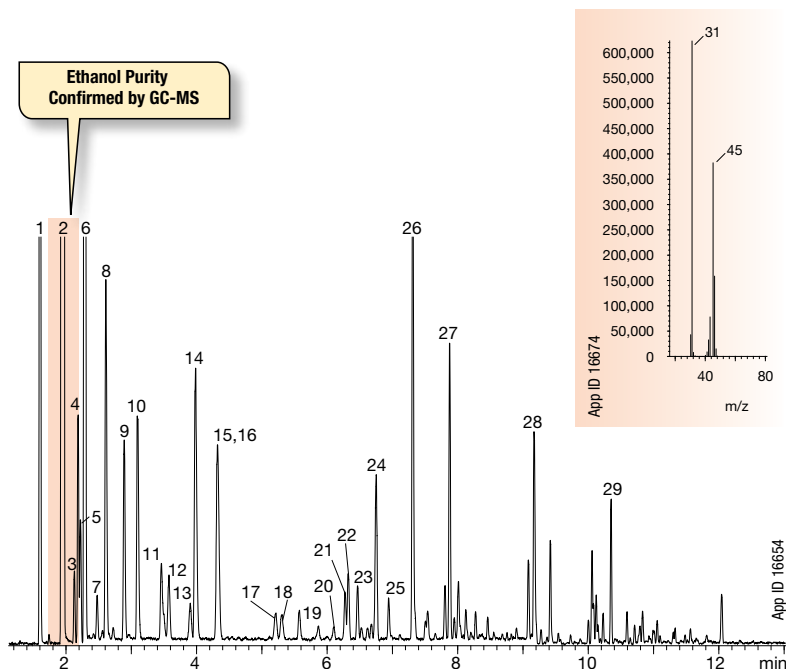
Detector: FID @ 300 °C

Instrument: Shimadzu® [GC-2010](#) with Flame Ionization Detection and AOC-20i Automatic Liquid

Sample: 1. Methanol
2. Ethanol
3. Denaturant

ZB-Bioethanol

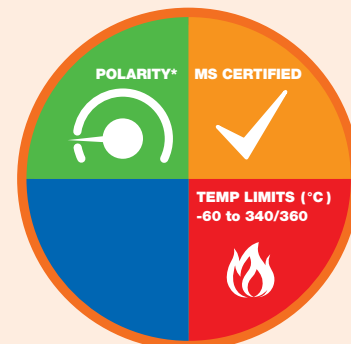
Resolve Fusel Alcohols



Column: Zebron ZB-Bioethanol
Dimensions: 30 meter x 0.25 mm x 1.00 µm
Part No.: [7HG-G020-22](#)
Injection: Split 100:1 @ 240 °C, 0.1 µL
Carrier Gas: Helium @ 1.2 mL/min (constant flow)
Oven Program: 40 °C for 5 min to 300 °C @ 25 °C/min
Detector: MSD @ 230 °C; 30-450 amu

- Sample:**
- | | |
|------------------------|----------------------------|
| 1. Methanol | 17. Methylcyclopentane |
| 2. Ethanol | 18. 2,4-Dimethylpentane |
| 3. Acrolein | 19. Benzene |
| 4. Acetone | 20. Cyclohexane |
| 5. 2-Methylbutane | 21. 2-Methylhexane |
| 6. Isopropyl alcohol | 22. 2,3-Dimethylpentane |
| 7. Pentane | 23. 3-Methylhexane |
| 8. t-Butanol | 24. 2,2,4-Trimethylpentane |
| 9. Allyl alcohol | 25. Heptane |
| 10. n-Propanol | 26. Acetal |
| 11. 2,3-Dimethylbutane | 27. Toluene |
| 12. 2-Methylpentane | 28. Xylene |
| 13. 3-Methylpentane | 29. Trimethylbenzene |
| 14. 2-Butanol | |
| 15. Ethyl acetate | |
| 16. Hexane | |

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Alcohols
- Ethanol Testing
- Fusel Alcohols



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



For Bioethanol fermentation monitoring, use Rezex-ROA HPLC columns, see p. 305

Ordering Information

Zebron ZB-Bioethanol GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	1.00	-60 to 340/360	7EG-G020-22
30-Meter			
0.25	1.00	-60 to 340/360	7HG-G020-22

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G020-22-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

ZB-1XT SimDist

High Efficiency Metal Column Performance

- Glass Infusion™ technology for higher efficiency and greater column-to-column reproducibility
- Individual QC testing for every column
- Up to 70% higher efficiency than other columns
- Increased accuracy for high temperature simulated distillation

Upgrade to Zebron from any 100% dimethylpolysiloxane phase:

Agilent®

- DB®-1
- DB-HT SimDis
- DB-PS1
- DB-PS2887
- CP-SimDist
- CP-SimDist UltiMetal

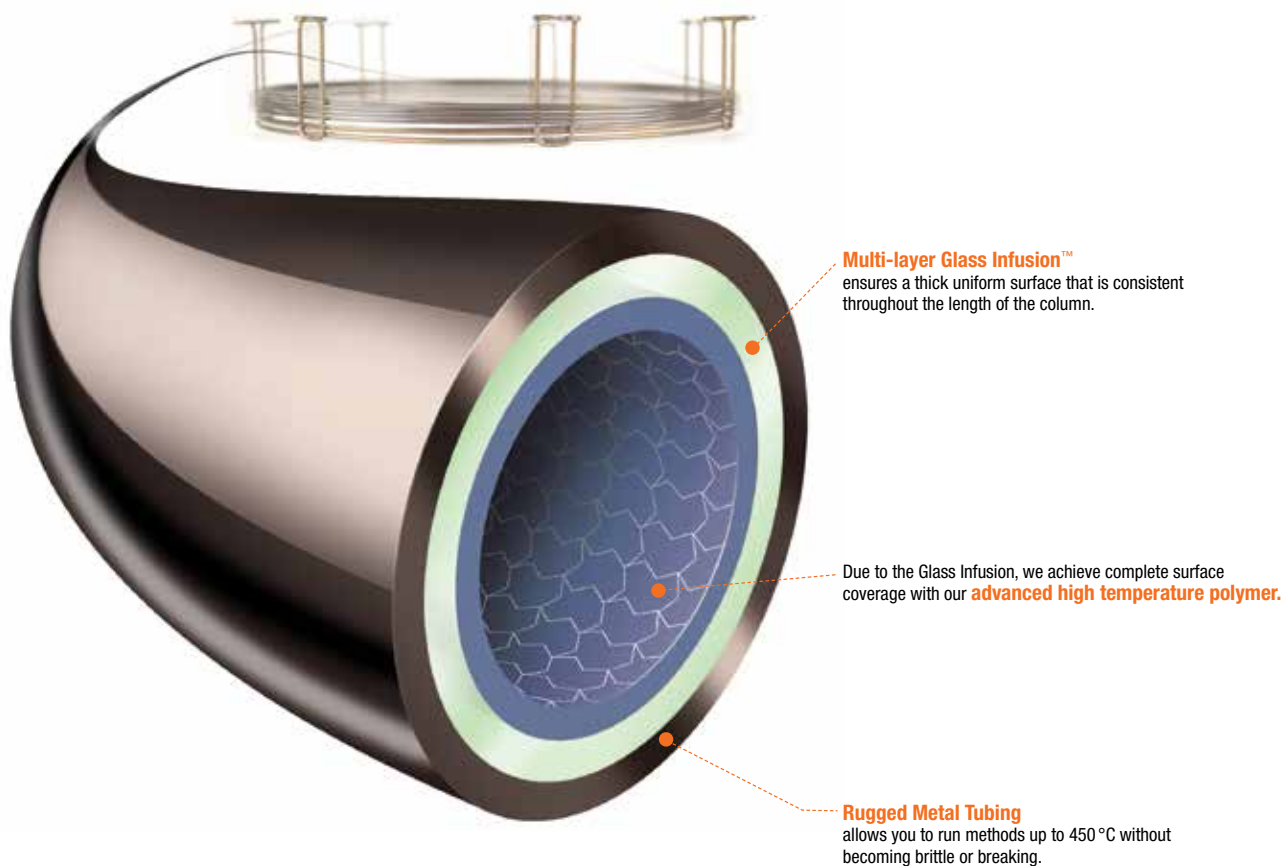
Restek®

- Rtx®-1
- Rxi®-1HT
- MXT®-1HT
SimDist

SGE®

- BP1
- BPX1-SimD

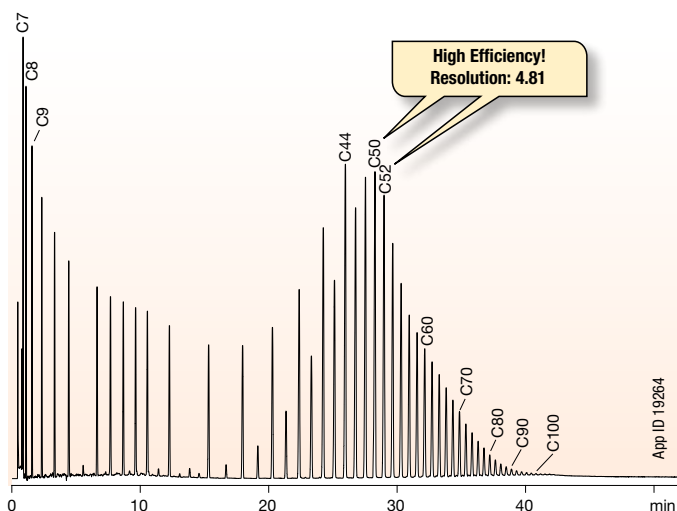
Glass Infusion™ Technology for Improved Performance



ZB-1XT SimDist

Improve Results for Simulated Distillation

Hydrocarbons C7–C100+: ASTM Method D7169



Column: Zebron ZB-1XT SimDist
Dimensions: 5 meter x 0.53 mm x 0.15 µm
Part No.: [7AK-G026-05](#)
Injection: On-Column @ 33 °C, 1 µL
Carrier Gas: Helium @ 7 mL/min (constant flow)
Oven Program: 30 °C to 450 °C @ 10 °C/min for 10 min
Detector: FID @ 450 °C
Sample: C7 to C44 hydrocarbons and POLYWAX® 655 in CS₂
 Note: Chromatogram is baseline subtracted.

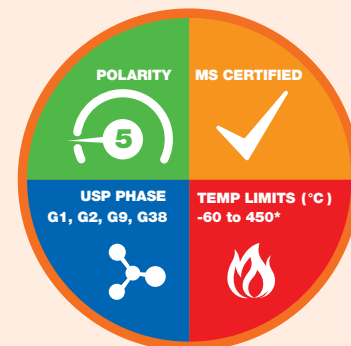
Ordering Information

Zebron ZB-1XT SimDist GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
5-Meter			
0.53	0.09	-60 to 450	7AK-G026-55
0.53	0.15	-60 to 450	7AK-G026-05
0.53	0.88	-60 to 450	7AK-G046-49
5-Meter with 2-Meter Guardian™ Integrated Guard			
0.53	0.09	-60 to 450	7AK-G026-55-GGT
0.53	0.15	-60 to 450	7AK-G026-05-GGT
10-Meter			
0.53	0.15	-60 to 450	7CK-G026-05
0.53	0.88	-60 to 450	7CK-G026-49
0.53	2.65	-60 to 400	7CK-G026-35
10-Meter with 5-Meter Guardian Integrated Guard			
0.53	2.65	-60 to 450	7CK-G026-35-GGA
15-Meter			
0.53	0.25	-60 to 450	7EK-G026-11

If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7CK-G026-05-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

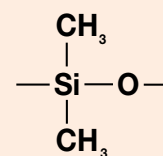
Column Profile



*Thicker film (2.65 µm) is rated to 400 °C.

Engineered Self Cross-linking™ (ESC)

Phase Chemistry



100 % Dimethylpolysiloxane

Recommended Applications

- ASTM Methods (D2887, D3710, D6352, D7169)
- Crude Oil
- Gasoline Fractions
- Petroleum Distillates
- Petroleum Fractions
- Simulated Distillation
- Vacuum Distillates



ZB-1XT SimDist Test Mix
Part No.: [AG0-8645](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Guard Column Connections
 SiTite™ Mini-Unions for 0.8mm ID columns (P/N: [AG0-8825](#)) and Replacement Ferrules (P/N: [AG0-8824](#))

ZB-DHA-PONA

- Excellent peak shape for polar and nonpolar compounds
- Temperature stability and flexibility
- Highly efficient dimension and consistent film thickness delivers excellent separation of paraffins, iso-paraffins, olefins, naphthenes, aromatics and polar compounds
- Extensive ESC™ provides intact stationary phase and MS certified low bleed
- Well-suited for true boiling point separation
- Excellent resolving power for critical pairs in complex petrochemical samples

The Choice for PIONA, DHA and PONA

Zebron ZB-DHA-PONA is the choice for the analysis of Detailed Hydrocarbon Analysis (DHA) within the fuel industry. The Engineered Self Cross-linking™(ESC) stationary phase provides low bleed and exceptional column life for separation of DHA critical pairs with symmetric peaks. In addition, Zebron ZB-DHA-PONA GC columns provide excellent response and peak symmetry for polar oxygenates.

The Zebron ZB-DHA-PONA GC column provides excellent separation of DHA critical pairs with symmetric peaks suitable for ASTM Method D6730, see table below.

Upgrade to Zebron from any 100% dimethylpolysiloxane phase:

Agilent®

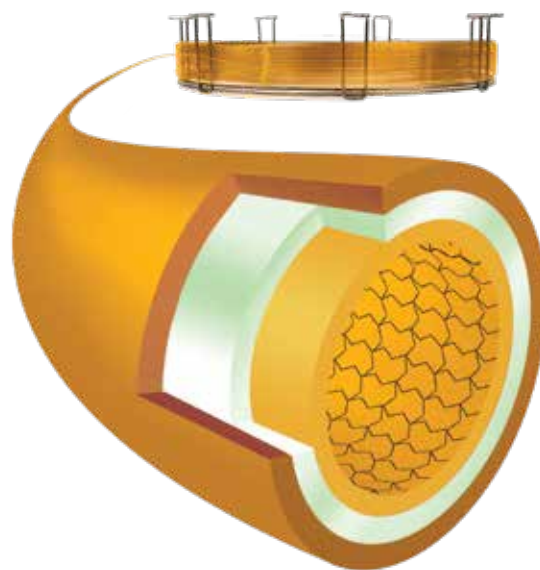
- HP-PONA
- DB®-PETRO
- CP-Sil PONA CB

Restek®

- Rtx®-DHA

Supelco®

- Petrocol®-DH

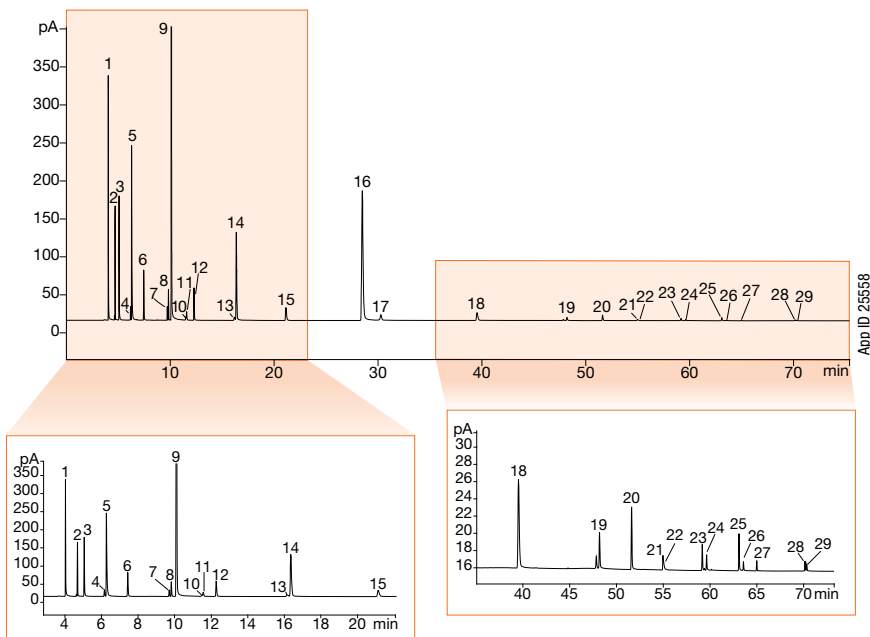


Easy ZB-DHA-PONA Selection for Your ASTM Method

Method	Description	Recommended Column	Recommended Dimensions	Part Number
ASTM D5134	Standard Test Method for Detailed Analysis of Petroleum Naphtha's through n-Nonane by Capillary Gas Chromatography	ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	7JE-G042-17
ASTM D5441	Standard Test Method for Analysis of Methyl Tert-Butyl Ether (MTBE) by GC	ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	7MG-G042-17
		ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	7JE-G042-17
		ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	7MG-G042-17
ASTM D5501	Standard Test Method for Determination of Ethanol and Methanol Content in Fuels Containing Greater than 20% Ethanol by Gas Chromatography	ZB-DHA-PONA	150 m x 0.25 mm x 1 µm	7QG-G042-22
		ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	7MG-G042-17
ASTM D6729	Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100 Meter Capillary High Resolution Gas Chromatography	ZB-DHA-PONA	150 m x 0.25 mm x 1 µm	7QG-G042-22
ASTM D6730	Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100-Meter Capillary (with Pre-column) High-Resolution Gas Chromatography	ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	7MG-G042-17
		ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	7JE-G042-17
		ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	7MG-G042-17
		ZB-DHA-PONA-TUNE	150 m x 0.25 mm x 1 µm	7QG-G042-22
ASTM D6733	Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 50-Meter Capillary High Resolution Gas Chromatography	ZB-DHA-PONA	5 m x 0.25 mm x 1 µm	7AG-G042-22
ASTM D6733	Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 50-Meter Capillary High Resolution Gas Chromatography	ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	7JE-G042-17

ZB-DHA-PONA

Analysis of ASTM D6730 Components by GC-FID on ZB-DHA-PONA & ZB-DHA-PONA-TUNE GC Column



Column 1 (Tuning): Zebron ZB-DHA-PONA-TUNE
Phase: 5% Phenyl 95% Dimethylpolysiloxane
Dimensions: 5 meter x 0.25 mm x 1.00 μm
Part No.: [7AG-G042-22](#)
Column 2: Zebron ZB-DHA-PONA
Phase: 100% Dimethylpolysiloxane
Dimensions: 100 meter x 0.25 mm x 0.50 μm
Part No.: [7MG-G042-17](#)

Recommended Column Union: [AG0-4716](#)
Injection: Split 150:1 @ 200 °C, 0.2 μL
Recommended Liner: Zebron PLUS Straight Z-Liner™
Part No.: [AG2-0A03-05](#)
Carrier Gas: Hydrogen @ 2 mL/min (constant flow)
Oven Program: 30 °C for 8.5 min, to 48 °C @ 22 °C/min for 27 min, to 141 °C @ 3 °C/min for 1 min, to 275 °C @ 1 °C/min for 2 min
Detection: Flame Ionization (FID) @ 275 °C

Sample:

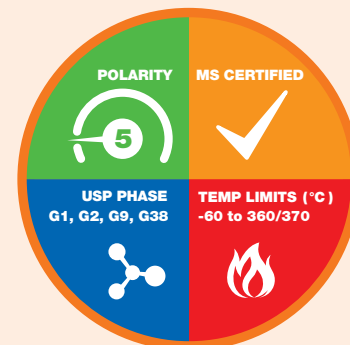
1. Ethanol	16. C8 (n-octane)
2. C5 (n-pentane)	17. Ethylbenzene
3. 2-Methylbutane	18. 2,3-Dimethylheptane
4. Tert-Butanol	19. p-Xylene
5. 2,3-Dimethylbutane	20. C9 (n-nonane)
6. Methyl tert-butyl ether (MTBE)	21. 5-Methylnonane
7. C6 (n-hexane)	22. 1-Methyl-2-ethylbenzene
8. 1-Methylcyclopentane	23. C10 (n-decane)
9. Benzene	24. C11 (undecane)
10. Cyclohexane	25. 1,2,3,5-Tetramethylbenzene
11. 3-Ethylpentane	26. Naphthalene
12. trans-1,2-Dimethylcyclopentane	27. C12 (dodecane)
13. C7 (n-heptane)	28. 1-Methylnaphthalene
14. 2,3,3-Trimethylpentane	29. C13 (Tridecane)
15. Toluene	

Ordering Information

Zebron ZB-DHA-PONA GC Columns

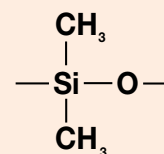
ID (mm)	df (μm)	Temp. Limits °C	Part No.
5-Meter			
0.25	1.00	-60 to 340/360	7AG-G042-22
50-Meter			
0.20	0.50	-60 to 360/370	7GE-G042-17
100-Meter			
0.25	0.50	-60 to 360/370	7MG-G042-17
150-Meter			
0.25	1.00	-60 to 340/360	7QG-G042-22

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry



100 % Dimethylpolysiloxane

Recommended Applications

- DHA
- PONA
- PIONA
- PIANO
- ASTM D5134, D5441, D5501, D6729, D6730 and D6733

i Engineered Self Cross-linking™ (ESC) polymer technology. Zebron GC Columns MS Certification, see p. 411

i Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

△ Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-Drug-1

Faster Drugs of Abuse Testing

- Optimized phase for the separation of drugs of abuse
- Provides fast analysis with great peak shape
- Improves resolution of target analytes from matrix interferences
- Specially deactivated to improve quantitation for drug compounds

Upgrade to Zebron from traditional phases used for drugs of abuse:

Agilent®

- DB®-1ms
- DB-5ms
- DB-35

Restek®

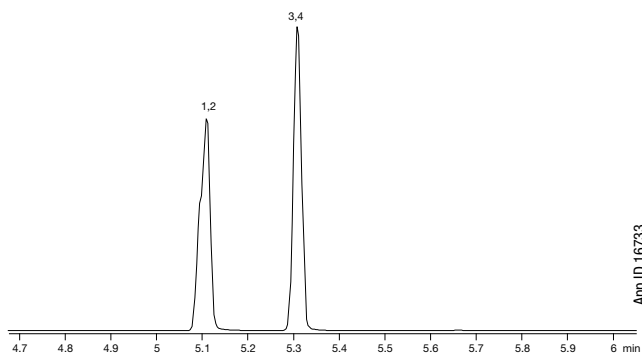
- Rxi®-1ms
- Rtx®-5
- Rtx-5ms
- Rtx-35ms

Supelco®

- SPB®-1

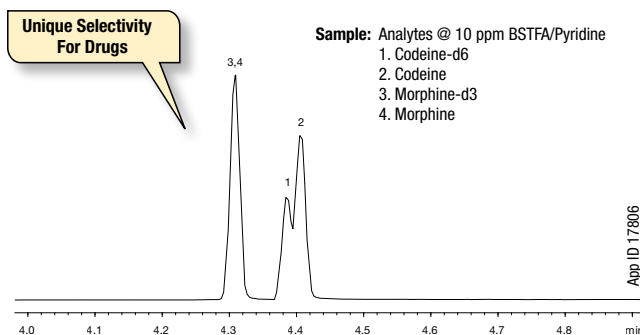
Optimized Selectivity for Multiple Drug Classes

Traditional 5% Phenyl Phase



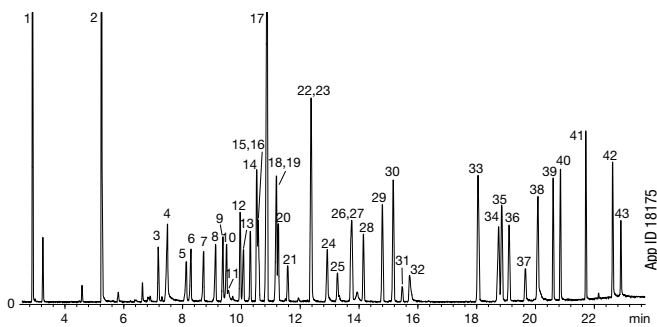
Column: As listed
Dimensions: 10 meter x 0.18 mm x 0.18 µm
Injection: Split 10:1 @ 240 °C, 1 µL
Carrier Gas: Helium @ 1.2 mL/min (constant flow)
Oven Program: 140 °C to 320 °C @ 20 °C for 1 min
Detector: MSD @ 230 °C

Zebron ZB-Drug-1



Column: As listed
Dimensions: 10 meter x 0.18 mm x 0.18 µm
Part No.: [ZCD-G023-08](#)
Injection: Split 10:1 @ 280 °C, 1 µL
Carrier Gas: Helium @ 55 cm/sec (constant flow)
Oven Program: 180 °C to 340 °C @ 20 °C/min
Detector: MSD @ 230 °C

Common Drug Screen by GC-MS



Column: Zebron ZB-Drug-1
Dimensions: 10 meter x 0.18 mm x 0.18 µm
Part No.: [ZCD-G023-08](#)
Injection: Split 10:1 @ 260 °C, 1 µL
Carrier Gas: Helium @ 1 mL/min (constant flow)
Oven Program: 50 °C to 150 °C @ 15 °C/min to 240 °C @ 7 °C/min to 320 °C @ 25 °C/min for 2 min
Detector: MSD @ 320 °C; 45-450 amu

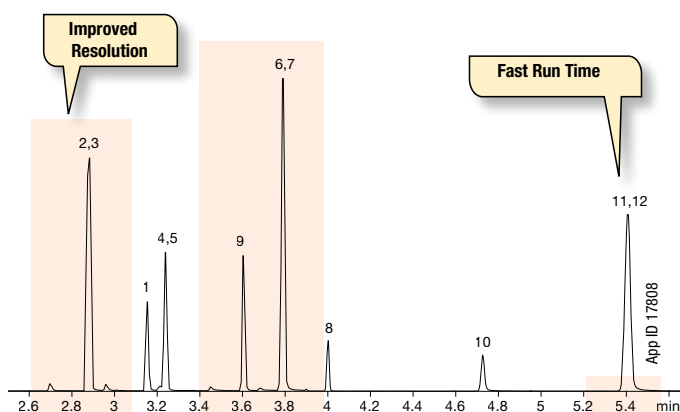
Sample: Analytes are 25 ppm in Methanol

- | | | |
|-------------------|----------------------|--------------------|
| 1. Acetophenone | 15. Meprobamate | 29. Trimipramine |
| 2. Nicotine | 16. Diphenhydramine | 30. Chlorcyclizine |
| 3. Benzocaine | 17. Lidocaine | 31. Cocaine |
| 4. Ibuprofen | 18. Hexobarbital | 32. Desipramine |
| 5. Allobarbitol | 19. Doxylamine | 33. Codeine |
| 6. Aprobarbital | 20. Glutethimide | 34. Morphine |
| 7. Butalbital | 21. Caffeine | 35. Diazepam |
| 8. Amobarbital | 22. Chlorpheniramine | 36. Hydrocodone |
| 9. Phenacetin | 23. Methapyrilene | 37. 6-MAM |
| 10. Pentobarbital | 24. Phenobarbital | 38. Oxycodone |
| 11. Acetaminophen | 25. Procaine | 39. Heroin |
| 12. Benzphetamine | 26. Methadone | 40. Fentanyl |
| 13. Secobarbital | 27. Brompheniramine | 41. Ibogaine |
| 14. Phencyclidine | 28. Propoxyphene | 42. Triazolam |
| | | 43. LSD |

ZB-Drug-1

Faster Run Times and Improved Resolution

Zebron ZB-Drug-1

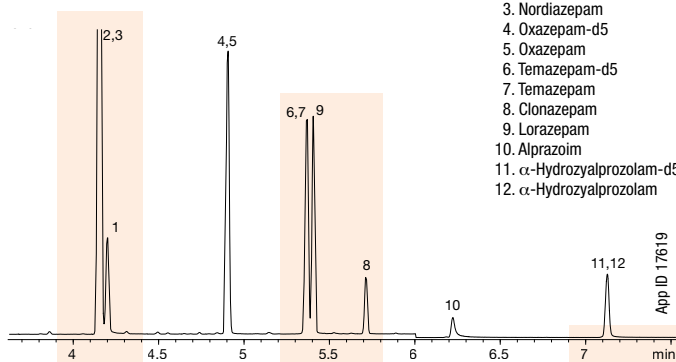


Column: Zebron ZB-Drug-1
Dimensions: 10 meter x 0.18 mm x 0.18 µm
Part No.: [7CD-G023-08](#)
Injection: Split 10:1 @ 280 °C, 1 µL
Carrier Gas: Helium @ 0.7 mL/min (constant flow)
Oven Program: 200 °C to 210 °C @ 20 °C/min at 320 °C @ 30 °C/min for 1 min
Detector: MSD @ 320 °C

Traditional Mid-Polar Phase

Sample:

1. Diazepam
2. Nordiazepam-d5
3. Nordiazepam
4. Oxazepam-d5
5. Oxazepam
6. Temazepam-d5
7. Temazepam
8. Clonazepam
9. Lorazepam
10. Alprazolam
11. α-Hydroxyalprazolam-d5
12. α-Hydroxyalprazolam



Dimensions: 10 meter x 0.18 mm x 0.18 µm
Injection: Split 10:1 @ 250 °C, 1 µL
Carrier Gas: Helium @ 0.6 mL/min (constant flow)
Oven Program: 180 °C to 340 °C @ 20 °C/min for 2 min
Detector: MSD @ 320 °C

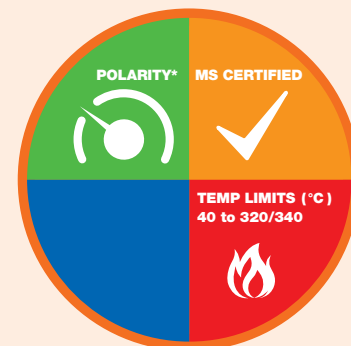
Ordering Information

Zebron ZB-Drug-1 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.18	0.18	40 to 320/340	7CD-G023-08
15-Meter			
0.25	0.25	40 to 320/340	7EG-G023-11
15-Meter with 5-Meter Guardian™ Integrated Guard			
0.25	0.25	40 to 320/340	7EG-G023-11-GGA
30-Meter			
0.25	0.25	40 to 320/340	7HG-G023-11

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G023-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile



*Similar polarity to ZB-MultiResidue™-2.

Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Drug Screening
- 6-MAM
- Amphetamines
- Barbiturates
- Benzodiazepines
- PCP
- THC



ZB-Drug-1 Test Mix
Part No.: [AGO-8431](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-BAC-1 and -2

Optimized Pair for Blood Alcohol Testing

- Enhanced accuracy for post mortem samples
- Fast run time with baseline resolution of key components in just 2 minutes
- Enhanced resolution of ethanol and acetone peaks
- Achieve confirmation with two elution order changes when running columns in parallel
- Allows for the use of t-butanol or n-propanol as an internal standard

Upgrade to Zebron from these similar* phases:

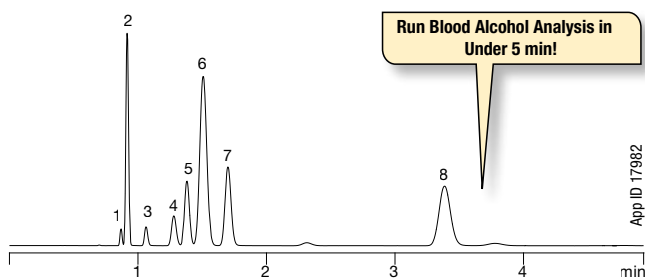
- | | |
|-----------------|----------------|
| Agilent® | Restek® |
| • DB®-ALC1 | • Rtx®-BAC1 |
| • DB-ALC2 | • Rtx-BAC2 |

*not exact equivalent, selectivity may differ

Faster, More Sensitive Blood Alcohol Analysis

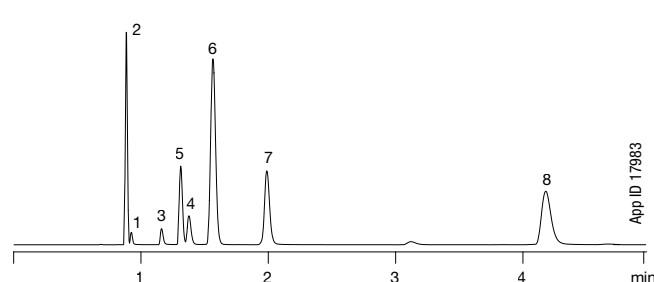
Zebron ZB-BAC-1

30 meter x 0.53 mm x 3.00 µm



Zebron ZB-BAC-2

30 meter x 0.53 mm x 2.00 µm



Conditions for both columns:

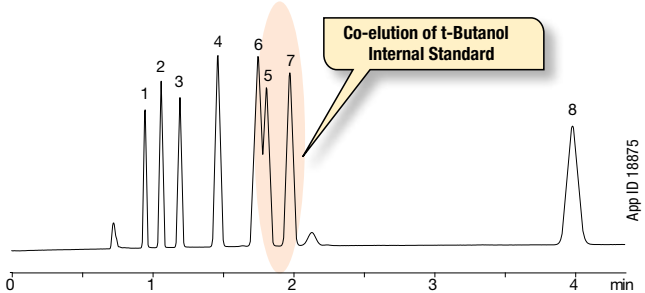
Column: As listed
Dimensions: As listed
Part No.: ZHK-G021-36 (ZB-BAC-1)
 ZHK-G022-32 (ZB-BAC-2)
Injection: Split 0.8:1 @ 150 °C, 1 mL
Carrier Gas: Helium @ 80 cm/sec (constant flow)
Oven Program: 40 °C (Isothermal)
Detector: FID @ 250 °C

Sample: Analytes 0.025 % and internal standards 0.100 % in water

1. Methanol
2. Acetaldehyde
3. Ethanol
4. Isopropanol
5. Acetone
6. t-Butanol (IS)
7. n-Propanol (IS)
8. 2-Butanol (IS)

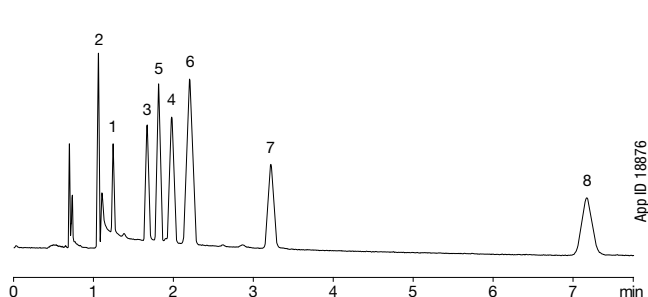
Restek Rtx-BAC1

30 meter x 0.53 mm x 3.00 µm



Restek Rtx-BAC2

30 meter x 0.53 mm x 2.00 µm



Conditions for both columns:

Column: As listed
Dimensions: As listed
Injection: Split 5:1 @ 150 °C, 1 mL
Carrier Gas: Helium @ 80 cm/sec (constant flow)
Oven Program: 40 °C (Isothermal)
Detector: FID @ 220 °C

Sample: Analytes and internal standards 0.100 % in water

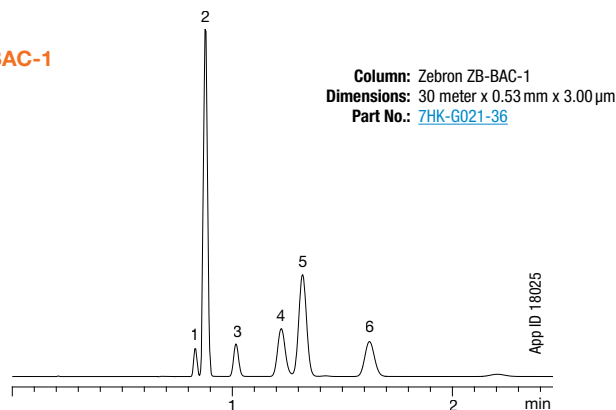
- | | |
|-----------------|--------------------|
| 1. Methanol | 5. Acetone |
| 2. Acetaldehyde | 6. t-Butanol (IS) |
| 3. Ethanol | 7. n-Propanol (IS) |
| 4. Isopropanol | 8. 2-Butanol (IS) |

Comparative separations may not be representative of all applications.

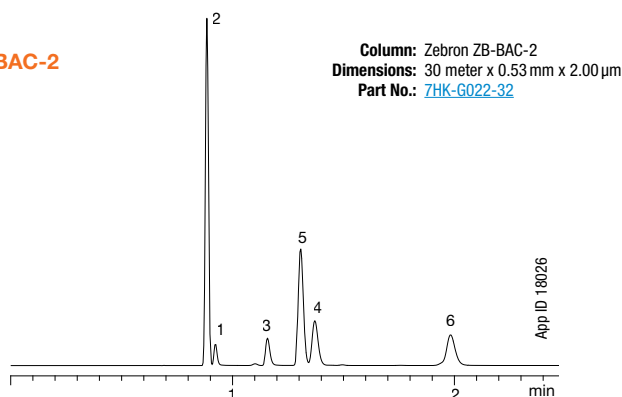
ZB-BAC-1 and -2

Run On Helium Or Hydrogen

BAC-1



BAC-2



Conditions for both columns:

- Injection:** Split 5:1 @ 150 °C, 1 mL
- Carrier Gas:** Hydrogen @ 80 cm/sec (constant flow)
- Oven Program:** 40 °C (Isothermal)
- Detector:** FID @ 250 °C
- Sample:** Analytes are 0.100% in water
 1. Methanol
 2. Acetaldehyde
 3. Ethanol
 4. Isopropanol
 5. Acetone
 6. n-Propanol

Ordering Information

Zebron ZB-BAC-1 GC Columns			
ID(mm)	df(μ m)	Temp. Limits °C	Part No.
30-Meter			
0.32	1.80	-20 to 260/280	7HM-G021-31
0.53	3.00	-20 to 260/280	7HK-G021-36

Zebron ZB-BAC-2 GC Columns			
ID(mm)	df(μ m)	Temp. Limits °C	Part No.
30-Meter			
0.32	1.20	-20 to 260/280	7HM-G022-25
0.53	2.00	-20 to 260/280	7HK-G022-32

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HM-G021-31-B](#) or [7HM-G022-25-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile

POLARITY*

MS CERTIFIED

BAC-1

TEMP LIMITS (°C)
-20 to 260/280

*Similar polarity to ZB-35.

POLARITY**

MS CERTIFIED

BAC-2

TEMP LIMITS (°C)
-20 to 260/280

**Similar polarity to ZB-624.

Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Abused Inhalant Anesthetics
- Blood Alcohol Analysis

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-1PLUS™

MS Certified “1” Phase

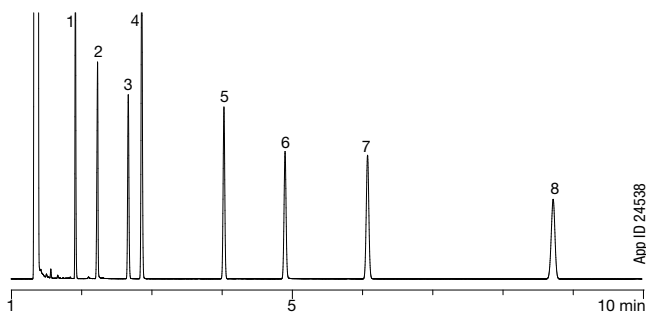
- **Very low bleed (MS Certified) phase especially suited to high sensitivity GC-MS**
- **Extremely inert for active compounds such as drugs, pesticides, or acids and bases**
- **Improved signal-to-noise ratio for better sensitivity and mass spectral integrity**
- **Identical selectivity to 100% dimethylpolysiloxane phases**

Upgrade to Zebron from any 100% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®
• DB®-1	• Rtx®-1	• BP1	• SPB®-1
• DB-1ms	• Rtx-1ms	• SolGel-1ms™	• SE-30
• DB-1ms Ultra Inert	• Rxi®-1ms		• MET-1
• HP-1			• MDN-1
• HP-1ms			• Equity®-1
• HP-1ms Ultra Inert			
• VF-1ms			
• CP-Sil 5 CB			
• Ultra 1			

Lower Overall Column Activity

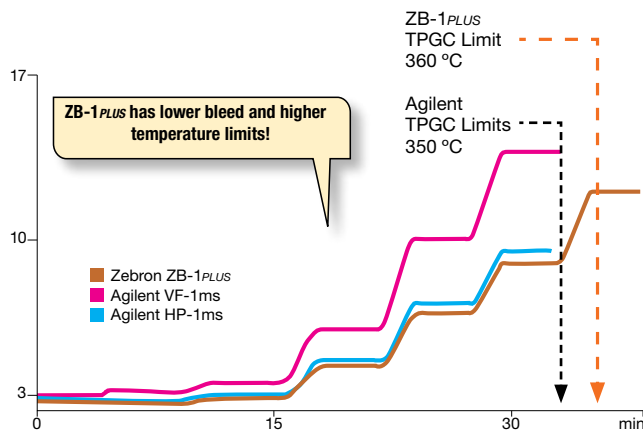
Activity is a key measure of column quality. ZB-1PLUS columns are aggressively tested to ensure full deactivation. Our QC test below demonstrates low tailing on ZB-1PLUS for even the most active compounds, like 2-ethylhexanoic acid.



Column: Zebron ZB-1PLUS
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: ZHG-G031-11
Injection: Split 100:1 @ 250 °C, 1.0 µL
Carrier Gas: Hydrogen @ 1.18 mL/min (constant flow)
Oven Program: 140 °C (Isothermal)
Detector: FID @ 325 °C
Sample: 1. Decane
 2. 2-Ethylhexanoic Acid
 3. 4-Chlorophenol
 4. Naphthalene
 5. Tridecane
 6. 1-Undecanol
 7. Dicyclohexylamine
 8. Pentadecane

Lower Column Bleed

We tested the ZB-1PLUS column bleed profile against other “MS” columns on the market – ZB-1PLUS shows the lowest bleed, even at temperatures up to 360 °C.



Test conditions were stopped at 350 °C for all competitor columns so as not to cause damage to the stationary phase by exceeding their maximum temperature limit.

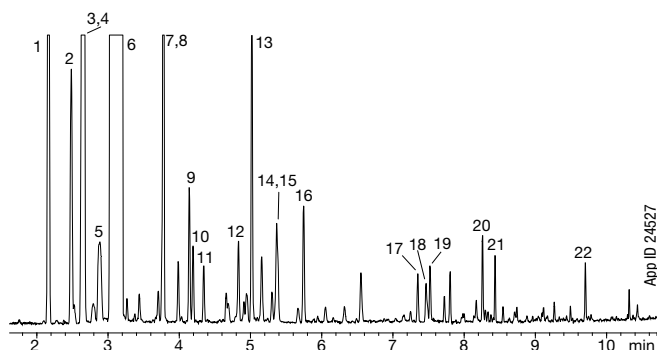
Conditions for all columns:

Columns: As listed
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Injection: Null Injection @ 250 °C
Carrier Gas: Hydrogen @ 100 mL/min (constant flow)
Oven Program: 240 °C for 9 min to 280 °C for 6.3 min to 320 °C for 6.4 min to 340 °C for 5.8 min to 350 °C for 5.5 min to 360 °C
Detector: FID @ 320 °C

ZB-1PLUS™

Well-Suited for Food & Flavors

Cold Pressed Orange Oil by GC-MS



Column: Zebron ZB-1PLUS
Dimensions: 10 meter x 0.10 mm x 0.10 μm
Part No.: [7CB-G031-02](#)
Injection: Split 120:1 @ 160 °C, 0.2 μL
Carrier Gas: Helium @ 0.3 mL/min (constant flow)
Oven Program: 60 °C to 130 °C @ 10 °C/min to 280 °C @ 30 °C/min for 3 min
Detector: MSD
Sample: Sample was 10% in dichloromethane

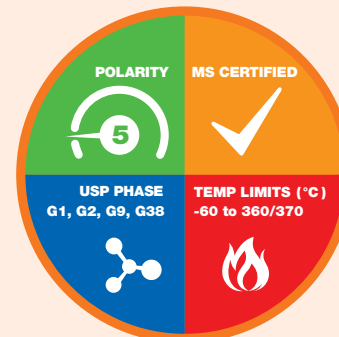
1. α-Pinene	9. cis-Limonene oxide	17. α-Cubebene
2. β-Phellandrine	10. trans-Limonene oxide	18. β-Cubebene
3. β-Myrcene	11. Citronellal	19. Dodecanal
4. Octanal	12. α-Terpineol	20. Valencene
5. 3-Carene	13. Decanal	21. Cadinene
6. Limonene	14. Carvone	22. Nootkatone
7. Nonanal	15. Neral	
8. Linalool	16. Geranial	

Ordering Information

Zebron ZB-1PLUS GC Columns			
ID(mm)	df(μm)	Temp. Limits °C	Part No.
5-Meter			
0.18	0.18	-60 to 360/370	7AD-G031-08
10-Meter			
0.10	0.10	-60 to 360/370	7CB-G031-02
12-Meter			
0.20	0.33	-60 to 360/370	7DE-G031-14
15-Meter			
0.25	0.25	-60 to 360/370	7EG-G031-11
0.32	0.25	-60 to 360/370	7EM-G031-11
15-Meter with 10-Meter Guardian™ Integrated Guard			
0.25	0.25	-60 to 360/370	7EG-G031-11-GGC
20-Meter			
0.18	0.18	-60 to 360/370	7FD-G031-08
25-Meter			
0.20	0.33	-60 to 360/370	7GE-G031-14
30-Meter			
0.25	0.10	-60 to 360/370	7HG-G031-02
0.25	0.25	-60 to 360/370	7HG-G031-11
0.32	0.25	-60 to 360/370	7HM-G031-11
30-Meter with 5-Meter Guardian Integrated Guard			
0.25	0.25	-60 to 360/370	7HG-G031-11-GGA
30-Meter with 10-Meter Guardian Integrated Guard			
0.25	0.25	-60 to 360/370	7HG-G031-11-GGC
60-Meter			
0.25	0.25	-60 to 360/370	7KG-G031-11
0.25	1.00	-60 to 360/370	7KG-G031-22
0.32	0.25	-60 to 360/370	7KM-G031-11

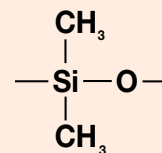
Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G031-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry



100 % Dimethylpolysiloxane

Recommended Applications

- Acids
- Amines
- Drugs
- EPA Methods (1668)
- Essential Oils
- Flavors & Fragrances
- Oxygenates and GROs
- PCBs
- Pesticides
- Solvent Impurities
- Sulfur Compounds (Light)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-5PLUS™

Inert 5% Phenyl Selectivity

- Highly inert—improved peak shape for acidic/basic compounds, drugs of abuse, and pesticides
- Very low bleed (MS certified) levels provide maximum sensitivity
- Intense QC specifications ensure column-to-column performance
- ESC bonding results in phase stability and high temperature limits
- Traditional bonding chemistry provides the same selectivity as the ZB-5 columns

Upgrade to Zebron from any

5% phenyl / 95% dimethylpolysiloxane phase:

Agilent®

- DB®-5
- HP-5
- HP-5ms
- HP-5msi

Restek®

- Rtx®-5
- Rtx-5MS
- Rtx-5Amine
- Rxi®-5ms

SGE®

- BP5
- BPX5

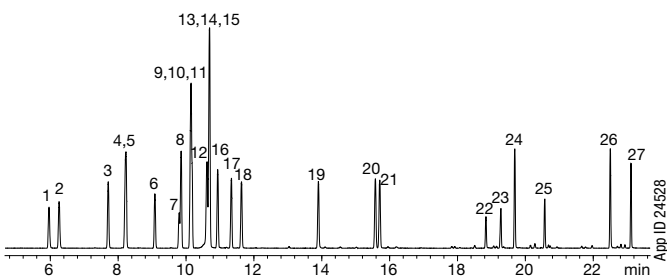
Supelco®

- MDN-5S
- SPB®-5
- Equity®-5

OV®

- OV-5

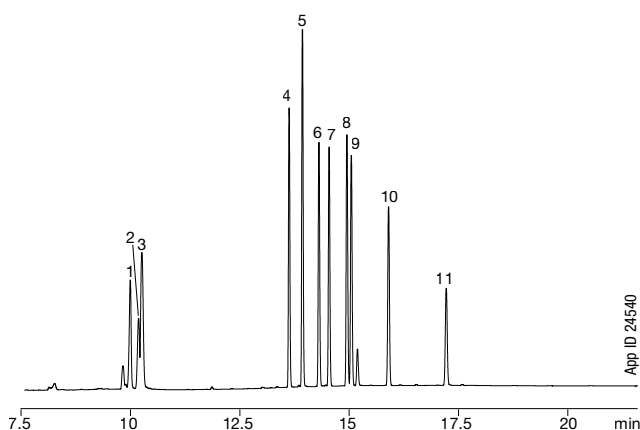
Phenols



Column: Zebron ZB-5PLUS
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: ZHG-G032-11
Injection: Split 5:1 @ 240 °C, 1 µL
Carrier Gas: Helium @ 1.2 mL/min (constant flow)
Oven Program: 60 °C to 140 °C @ 5 °C/min to 280 °C @ 10 °C/min
Detector: MSD @ 230 °C, 45-450 amu
Sample:

1. Phenol	16. 2,3-Dimethylphenol
2. 2-Chlorophenol	17. 3,4-Dimethylphenol
3. 2-Methylphenol	18. 2,6-Dichlorophenol
4. 4-Methylphenol	19. 4-Chloro-3-methylphenol
5. 3-Methylphenol	20. 2,4,6-Trichlorophenol
6. 2,6-Dimethylphenol	21. 2,4,5-Trichlorophenol
7. 2-Nitrophenol	22. 2,4-Dinitrophenol
8. 2-Ethylphenol	23. 4-Nitrophenol
9. 2,4-Dimethylphenol	24. 2,3,4,6-Tetrachlorophenol
10. 3,5-Dimethylphenol	25. 4,6-Dinitro-2-methylphenol
11. 2,5-Dimethylphenol	26. Pentachlorophenol
12. 4-Ethylphenol	27. Dinoseb
13. 3-Ethylphenol	
14. 2,4-Dichlorophenol	
15. Benzoic Acid	

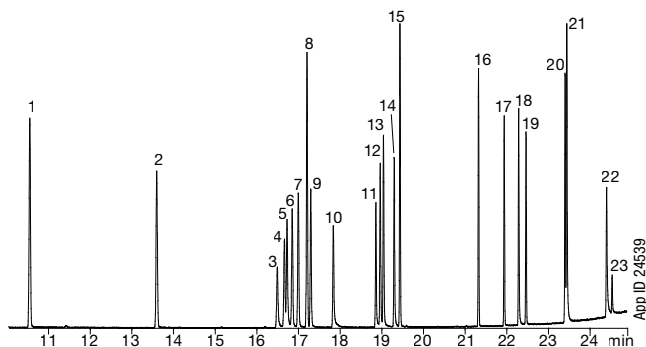
Underivatized Antihistamines by GC-FID



Column: Zebron ZB-5PLUS
Dimensions: 30 meter x 0.25 mm x 1.0 µm
Part No.: ZHG-G032-22
Injection: Split 50:1 @ 305 °C, 1 µL
Carrier Gas: Helium @ 1.3 mL/min (constant flow)
Oven Program: 40 °C for 1 min to 240 °C @ 25 °C/min for 2 min to 305 °C @ 25 °C/min for 8 min
Detector: FID @ 320 °C
Sample:

1. Phenylpropanolamine	7. Phenyltoloxamine
2. Ephedrine	8. Methapyrilene
3. Pseudoephedrine	9. Chlorpheniramine
4. Pheniramine	10. Brompheniramine
5. Diphenhydramine	11. Triprolidine
6. Doxylamine	

Endocrine Disruptors by GC-MS



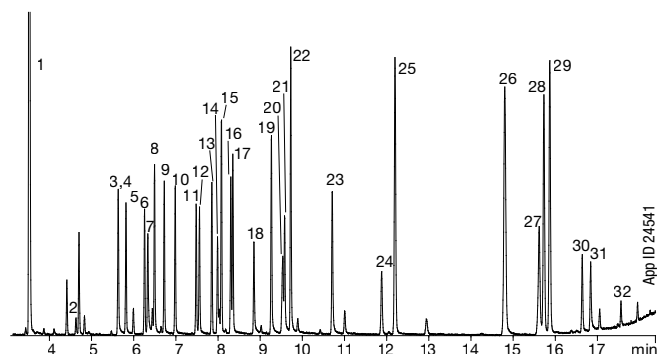
Column: Zebron ZB-5PLUS
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: ZHG-G032-11
Injection: Split 40:1 @ 250 °C, 1 µL
Carrier Gas: Helium @ 1.2 mL/min (constant flow)
Oven Program: 100 °C to 180 °C @ 5 °C/min to 320 °C @ 15 °C/min
Detector: MSD @ 180 °C, 45-450 amu
Sample: Analytes are 50 ppm in acetone

1. Dimethyl phthalate	9. Terbutylazine	17. 4,4'-DDD
2. Diethyl phthalate	10. Secbumentone	18. Di-n-hexyl phthalate
3. Atraton	11. Simetryn	19. 4,4'-DDT
4. Simazine	12. Ametryn	20. Dicyclohexyl phthalate
5. Prometon	13. Prometryn	21. bis(2-Ethylhexyl)phthalate
6. Atrazine	14. Terbutryn	22. Di-n-octyl phthalate
7. Propazine	15. Dibutyl phthalate	23. Ethinyl estradiol
8. Dipropyl phthalate	16. 4,4'-DDE	

ZB-5PLUS™

Good Results for Drugs

Drug Screening by GC-MS



Column: Zebron ZB-5PLUS
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G032-11
Injection: Split 15:1 @ 240 °C, 1 µL
Carrier Gas: Helium @ 1.1 mL/min (constant flow)
Oven Program: 140 °C to 240 °C @ 10 °C/min for 5 min to 320 °C @ 25 °C/min for 2.25 min
Detector: MSD @ 230 °C, 45-450 amu

Sample: Analytes (underivatized) are 25 ppm in dichloromethane

1. Nicotine	14. Caffeine	27. Morphine
2. Methylecgonine	15. Benzphetamine	28. Diazepam
3. Ibuprofen	16. Hexobarbital	29. Hydrocodone
4. Allobarbitol	17. Dimenhydrinate	30. 6-Monoacetylmorphine
5. Aprobital	18. Doxylamine	31. Oxycodone
6. Butobarbital	19. Phenobarbital	32. Diacetylmorphine (Heroin)
7. Acetaminophen	20. 8-Chlorotheophylline	
8. Phenacetin	21. Methapyrilene	
9. Amobarbital	22. Chlorpheniramine	
10. Pentobarbital	23. Brompheniramine	
11. Secobarbital	24. Cocaine	
12. Meprobamate	25. Chlorcyclizine	
13. Methyl benzilate	26. Codeine	

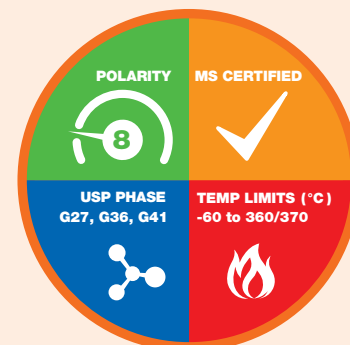
Ordering Information

Zebron ZB-5PLUS GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.18	0.18	-60 to 360/370	7CD-G032-08
15-Meter			
0.25	0.25	-60 to 360/370	7EG-G032-11
20-Meter			
0.18	0.18	-60 to 360/370	7FD-G032-08
0.18	0.36	-60 to 360/370	7FD-G032-53
20-Meter with 5-Meter Guardian™ Integrated Guard			
0.18	0.18	-60 to 360/370	7FD-G032-08-GGA
30-Meter			
0.25	0.25	-60 to 360/370	7HG-G032-11
0.25	0.50	-60 to 360/370	7HG-G032-17
0.25	1.00	-60 to 360/370	7HG-G032-22
0.32	0.25	-60 to 360/370	7HM-G032-11
0.32	0.50	-60 to 360/370	7HM-G032-17
0.32	1.00	-60 to 360/370	7HM-G032-22
30-Meter with 5-Meter Guardian Integrated Guard			
0.25	0.10	-60 to 360/370	7HG-G032-02-GGA
0.25	0.25	-60 to 360/370	7HG-G032-11-GGA
60-Meter			
0.25	0.25	-60 to 360/370	7KG-G032-11
60-Meter with 5-Meter Guardian Integrated Guard			
0.25	0.25	-60 to 360/370	7KG-G032-11-GGA

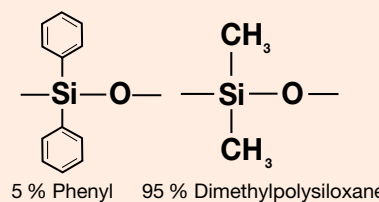
Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G032-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile



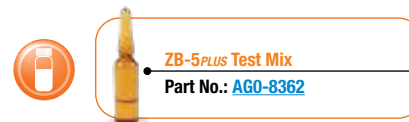
Engineered Self Cross-linking™ (ESC)

Phase Chemistry



Recommended Applications

- Drugs
- EPA Methods
- FAMES
- Nitrosamines
- Pesticides
- Phenols



For high temperature analysis, consider using a ZB-5HT, see p. 136

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-5MS^{PLUS}™

The Next Generation of Inertness

- The next generation of inertness for specialty chemical, forensic, toxicology, and food testing applications
- Specialized deactivation for versatile 5% phenyl-arylene selectivity with improved sensitivity
- Low bleed (MS Certified) and well-suited to high sensitivity GC-MS and GC-MS/MS work

Upgrade to Zebron from any 5% phenyl or 5% phenyl-arylene / 95% dimethylpolysiloxane phase:

Agilent®

- DB®-5ms
- DB-5ms Ultra Inert
- HP-5ms
- HP-5ms Ultra Inert
- VF-5ms

Restek®

- Rxi®-5Sil MS

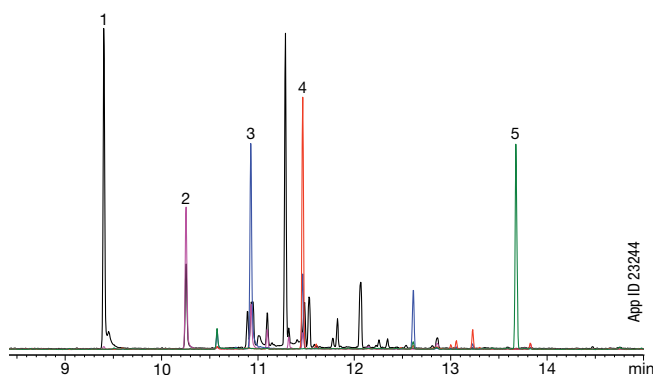
Supelco®

- SLB®-5ms

Engineered for High Performance

Active sites on a GC column's surface can result in analyte adsorption and degradation, negatively affecting peak shape and response. To reduce potential surface activity, Zebron ZB-5MS^{PLUS} is designed with a rigorous fused silica deactivation process that improves inertness for troublesome compounds. Instantly achieve higher responses for active compounds compared to your current 5ms phase column, without changing your selectivity.

Melamine in Dog Food by GC-MS



- Extraction Protocol:**
1. Combine 0.5 g of homogenized dog food with 10 mL of DEA/Water/ Acetonitrile (1:4:5) in a 15 mL centrifuge tube
 2. Sonicate for 30 min
 3. Centrifuge at 5000 rpm for 10 min
 4. Transfer 100 µL of supernatant to an autosampler vial and evaporate to dryness using nitrogen gas
 5. Reconstitute with 100 µL of Acetonitrile/Pyridine (1:1) and then derivatize using 100 µL BSTFA with 1% TCMS at 70 °C for 45 min

Column: Zebron ZB-5MS^{PLUS}

Dimensions: 30 meter x 0.25 mm x 0.25 µm

Part No.: 7HG-G030-11

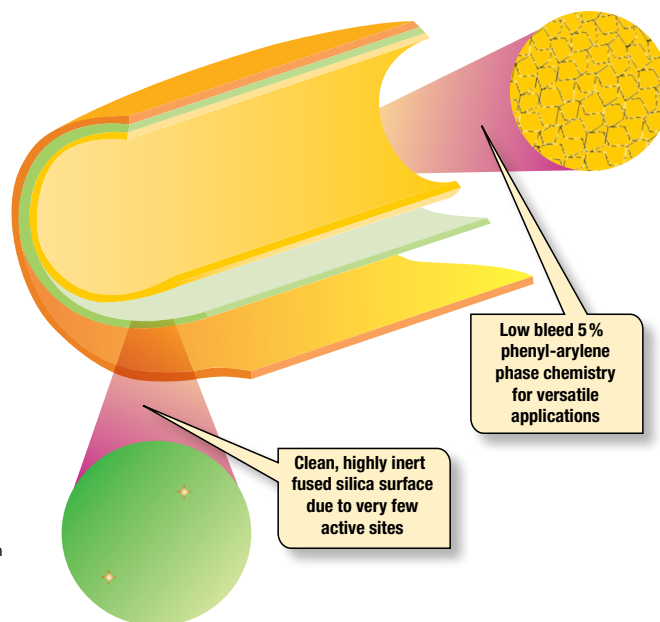
Injection: Splitless @ 280 °C, 1 µL

Carrier Gas: Helium @ 1 mL/min (constant flow)

Oven Program: 75 °C for 1 min to 320 °C @ 15 °C/min hold for 4 min

Detector: MSD @ 320 °C

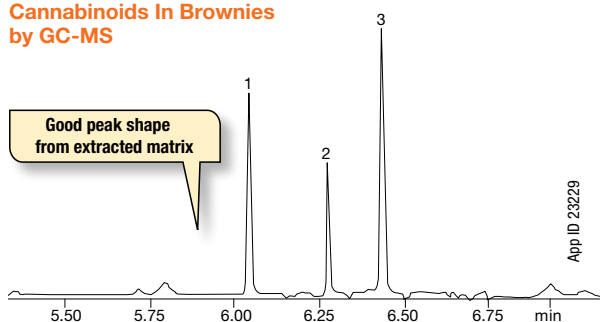
- Sample:**
1. Cyanuric acid
 2. Ammelide
 3. Ammeline
 4. Melamine
 5. Benzoguanamine



ZB-5MSPLUS™

Versatile Performance For Drugs and Chemicals

Cannabinoids In Brownies by GC-MS

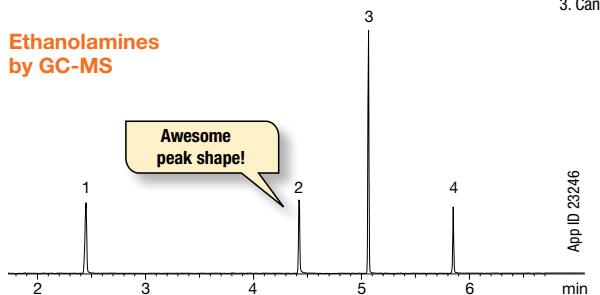


Extraction Protocol:

1. Combine 1 g of chocolate brownie with 10 mL of water in a 50 mL centrifuge tube
2. Shake using a mechanical shaker until dissolved
3. Add roQ™ QuEChERS EN15662 extraction salt packet (KSO-8909) and 10 mL of acetonitrile
4. Shake tube for 3 min using mechanical shaker
5. Centrifuge at 2700 rpm for 5 min
6. Transfer 1 mL of supernatant to an autosampler vial for GC-MS analysis

Column: Zebron ZB-5MSPLUS
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G030-11
Injection: Splitless @ 250 °C, 1 µL
Carrier Gas: Helium @ 1.5 mL/min (constant flow)
Oven Program: 100 °C for 1 min to 320 °C @ 50 °C/min, hold for 2 min
Detector: MSD @ 320 °C
Sample: 1. Cannabidiol
 2. Δ-9-Tetrahydrocannabinol
 3. Cannabinol

Ethanolamines by GC-MS



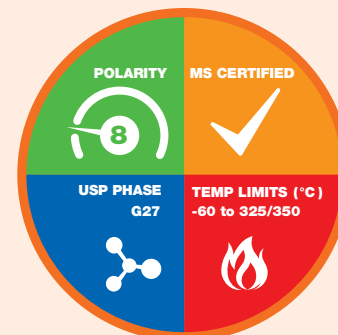
Column: Zebron ZB-5MSPLUS
Dimensions: 30 meter x 0.25 mm x 1.00 µm
Part No.: 7HG-G030-22
Injection: Split 200:1 @ 250 °C, 1 µL
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 30 °C to 300 °C @ 40 °C/min
Detector: MSD @ 320 °C
Sample: 1. Monoethanolamine
 2. Diethanolamine
 3. Triethylene glycol monomethyl ether (IS)
 4. Triethanolamine

Ordering Information

Zebron ZB-5MSPLUS GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
1.5-Meter			
0.25	0.25	-60 to 325/350	7XG-G030-11
15-Meter			
0.25	0.25	-60 to 325/350	7EG-G030-11
0.25	0.50	-60 to 325/350	7EG-G030-17
0.25	1.00	-60 to 325/350	7EG-G030-22
20-Meter			
0.18	0.18	-60 to 325/350	7FD-G030-08
0.18	0.36	-60 to 325/350	7FD-G030-53
30-Meter			
0.25	0.25	-60 to 325/350	7HG-G030-11
0.25	0.50	-60 to 325/350	7HG-G030-17
0.25	1.00	-60 to 325/350	7HG-G030-22
0.32	0.25	-60 to 325/350	7HM-G030-11
0.32	0.50	-60 to 325/350	7HM-G030-17
0.32	1.00	-60 to 325/350	7HM-G030-22
0.32	1.50	-60 to 325/350	7HM-G030-28
0.53	1.00	-60 to 325/350	7HK-G030-22
0.53	3.00	-60 to 325/350	7HG-G030-36

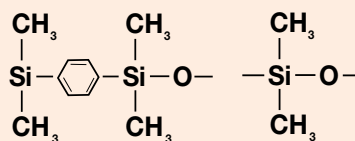
Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry

5 % Phenyl-Arylene



95 % Dimethylpolysiloxane

Recommended Applications

- Acids
- Alkaloids
- Amines
- Drugs
- Essential Oils
- Flavors
- Halo-hydrocarbons
- Pesticides
- Phenols
- Residual Solvents
- Solvent Impurities



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

Ordering Information

Zebron ZB-5MSPLUS GC Columns (cont'd)

ID(mm)	df(µm)	Temp. Limits °C	Part No.
30-Meter with 5-Meter Guardian™ Integrated Guard			
0.25	0.25	-60 to 325/350	7HG-G030-11-GGA
0.25	0.50	-60 to 325/350	7HG-G030-17-GGA
30-Meter with 10-Meter Guardian Integrated Guard			
0.25	0.25	-60 to 325/350	7HG-G030-11-GGC
0.25	0.50	-60 to 325/350	7HG-G030-17-GGC
60-Meter			
0.25	0.25	-60 to 325/350	7KG-G030-11
0.25	1.00	-60 to 325/350	7KG-G030-22
0.32	1.00	-60 to 325/350	7KM-G030-22

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G030-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

ZB-WAXPLUS™

Enhanced Aqueous Stability

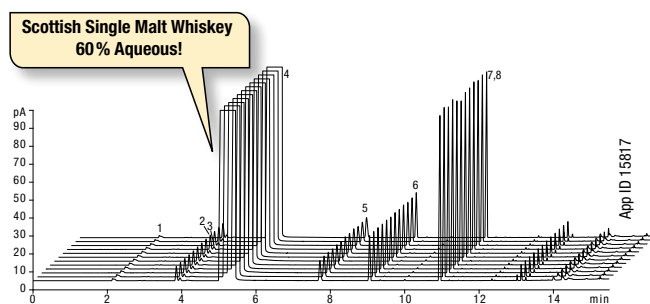
- 100% aqueous stable, excellent for aqueous samples
- Extremely inert for acidic compounds
- Enhanced selectivity for low boiling solvents
- High retention of alcohols and chlorinated solvents
- Increased efficiency at 20 °C

Upgrade to Zebron from any polyethylene glycol phase:

- | | | | |
|--|--|--|--|
| Agilent® | Restek® | SGE® | Supelco® |
| <ul style="list-style-type: none"> • DB®-WAX • CAM • HP-20M • Carbowax 20M • CP-Wax 52 CB | <ul style="list-style-type: none"> • Stabilwax® | <ul style="list-style-type: none"> • BP20 | <ul style="list-style-type: none"> • SUPELCOWAX® 10 |

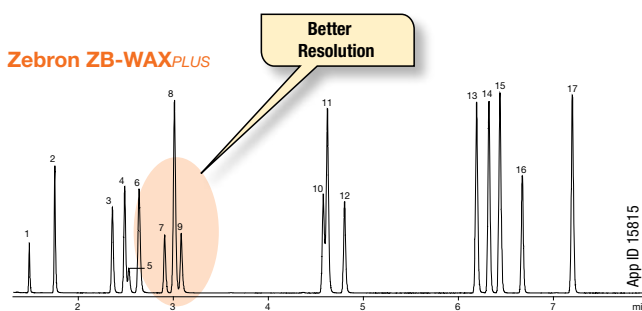
Water Reproducibility of ZB-WAXPLUS

Historically, polyethylene glycol (PEG) phases have been unstable with aqueous samples such as beverages or glycols, resulting in poor reproducibility and decreased lifetime. ZB-WAXPLUS bonding procedure results in exceptional stability to repeated injections of aqueous matrices.

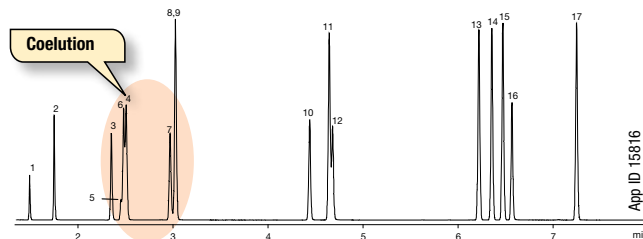


- Column:** Zebron ZB-WAXPLUS
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G013-11
Injection: Split 30:1 @ 140 °C, 0.2 µL
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 35 °C for 5 min to 85 °C @ 10 °C/min to 200 °C @ 25 °C/min for 1 min
Detector: FID @ 200 °C
Sample: 1. Acetaldehyde
 2. Ethyl Acetate
 3. Methanol
 4. Ethanol
 5. Propanol
 6. Isobutanol
 7. 2-Methylbutanol
 8. 3-Methylbutanol

Improve Resolution



Restek Stabilwax



Conditions same for both columns:

- Dimensions:** 30 meter x 0.25 mm x 0.25 µm
Injection: Split 100:1 @ 250 °C, 1 µL
Carrier Gas: Hydrogen @ 1.0 mL/min (constant flow)
Oven Program: 35 °C for 2.5 min to 85 °C @ 10 °C/min and hold until last peak elutes
Detector: FID @ 225 °C

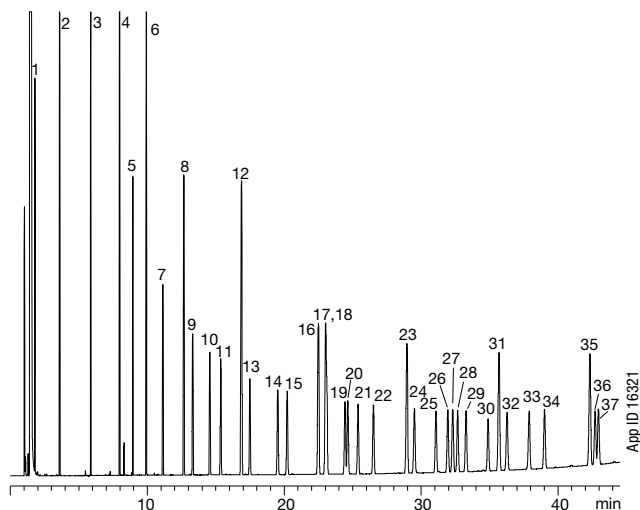
- Sample:** 1. Methyl Formate
 2. Acetone
 3. Ethyl Acetate
 4. Methyl Ethyl Ketone
 5. Methanol
 6. 2-Methyl-2-propanol
 7. Methylene Chloride
 8. Benzene
 9. Ethanol
 10. 2-Butanol
 11. Toluene
 12. n-Propanol
 13. Ethyl Benzene
 14. p-Xylene
 15. m-Xylene
 16. 1-Butanol
 17. o-Xylene

Comparative separations may not be representative of all applications.

ZB-WAXPLUS™

A Food Testing Must-Have

Food Industry FAMES



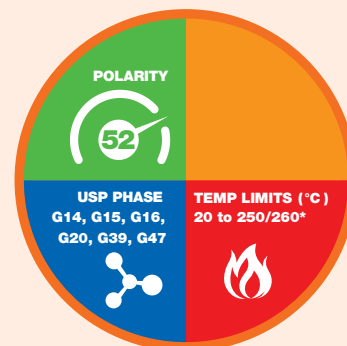
Column: Zebron ZB-WAXPLUS
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: [7HG-G013-11](#)
Injection: Split 5:1 @ 220 °C, 1 µL
Carrier Gas: Helium @ 3 mL/min (constant flow)
Oven Program: 60 °C for 2 min to 150 °C @ 13 °C/min to 240 °C @ 2 °C/min
Detector: FID @ 250 °C

Ordering Information

Zebron ZB-WAXPLUS GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.10	0.10	20 to 250/260	7CB-G013-02
15-Meter			
0.25	0.25	20 to 250/260	7EG-G013-11
0.53	1.00	20 to 230/240	7EK-G013-22
20-Meter			
0.18	0.18	20 to 250/260	7FD-G013-08
30-Meter			
0.25	0.25	20 to 250/260	7HG-G013-11
0.25	0.50	20 to 250/260	7HG-G013-17
0.32	0.25	20 to 250/260	7HM-G013-11
0.32	0.50	20 to 250/260	7HM-G013-17
0.32	1.00	20 to 230/240	7HM-G013-22
0.53	0.25	20 to 250/260	7HK-G013-11
0.53	1.00	20 to 230/240	7HK-G013-22
60-Meter			
0.25	0.15	20 to 250/260	7KG-G013-05
0.25	0.25	20 to 250/260	7KG-G013-11
0.25	0.50	20 to 250/260	7KG-G013-17
0.32	0.25	20 to 250/260	7KM-G013-11
0.32	0.50	20 to 250/260	7KM-G013-17
0.53	1.00	20 to 230/240	7KK-G013-22

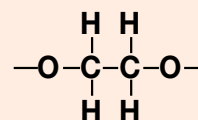
Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G013-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile



*Thicker films (≥ 1.0 µm) are rated to 230/240 °C.

Phase Chemistry



100 % Polyethylene Glycol

Recommended Applications

- Alcohols
- Aldehydes
- Aromatics
- Essential Oils
- Flavors & Fragrances
- Free Fatty Acids
- Glycols
- OVIs
- Pharmaceuticals
- Solvents / Residual Solvents
- Styrene
- Xylene Isomers



ZB-WAXPLUS Test Mix
Part No.: [AG0-7869](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-624PLUS™

- Enhanced peak shape with superior deactivation
- Increased sensitivity for high boiling solvents
- Extremely low bleed for GC-MS
- High temperature stability (300/320 °C)

Upgrade to Zebron from these similar* phases:

Agilent®

- CP-Select 624 CB
- DB-624UI Ultra Inert

Restek®

- Rxi-624Sil MS

*not exact equivalent, selectivity may differ

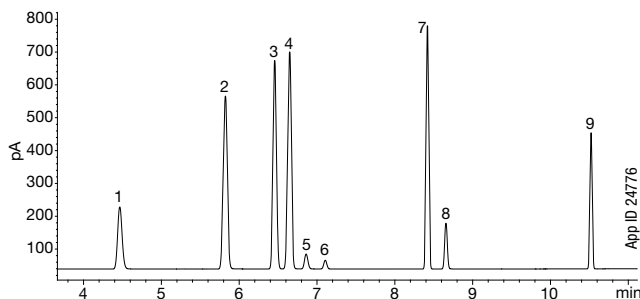
What makes the PLUS in ZB-624PLUS?

- **Enhanced Inertness**
Proprietary superior deactivation gives great peak shape for troublesome compounds.
- **High Selectivity**
A G43 phase that's highly selective for polar, non-polar, low and high boiling solvents.
- **Column-to-Column Reproducibility**
Excellent column-to-column reproducibility well suited for validated methods.
- **Temperature Limits**
Push the temperature limits of traditional 624 and elute/bake high boiling analytes at 300/320 °C.
- **MS Certified**
Low bleed characteristics makes it the right choice for GC-MS.

Shorter Residual Solvent Analysis by GC-FID

Why wait for an hour long method. Upgrade to ZB-624PLUS and get short runtime, low bleed, high temperature resistance, and the 624 selectivity, all in one column.

Separation of Residual Solvent Critical Pairs in Less than 15 min



Column: Zebron ZB-624PLUS

Dimensions: 30 meter x 0.32 mm x 1.80 µm

Part No.: 7HM-G040-31

Injection: Split 20:1 @ 200 °C, 1 µL

Recommended Liner: Zebron PLUS Straight Z-Liner™

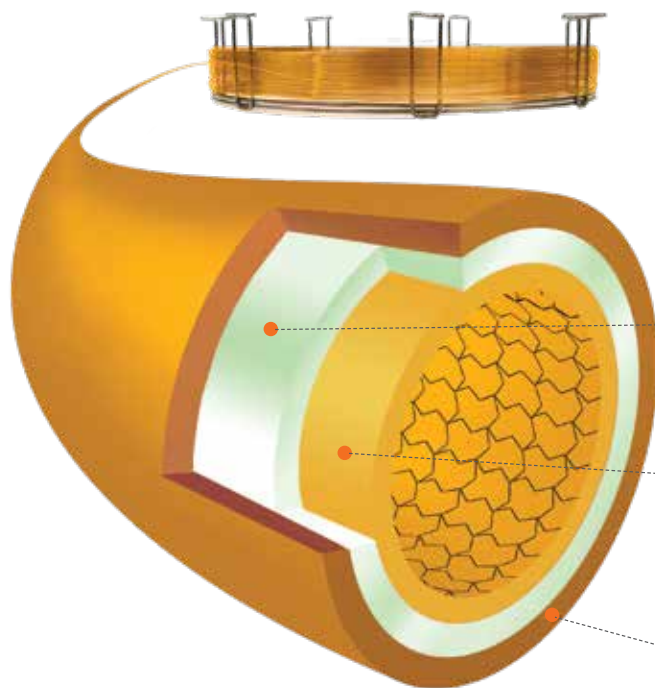
Liner Part No.: AG2-QA03-05 (for Agilent® & Thermo Scientific® systems)

Carrier Gas: Helium @ 1 mL/min (constant flow)

Oven Program: 40 °C for 5 min to 260 °C @ 25 °C/min for 3 min

Detector: FID @ 250 °C

Sample: 1. Methanol 6. DCM
2. Ethanol 7. Ethyl Acetate
3. Acetone 8. THF
4. IPA 9. Toluene
5. Acetonitrile



Superior Deactivated Fused Silica

Dramatically reduces analyte adsorption, maximizing your peak symmetry.

Highly Selective Stationary Phase

Provides excellent separation of polar, nonpolar, low and high boiling solvents, while Engineered Self Cross-linking (ESC™) results in high-thermal stability and low bleed.

Polyimide Coating

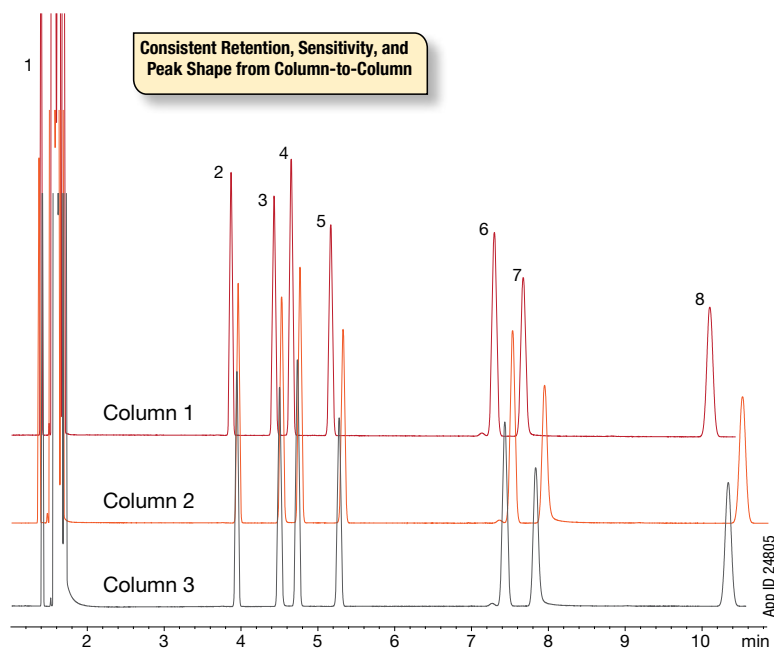
Flexibility and temperature resistance (300/320°C).

0.53 mm ID ZB-624PLUS™ columns are not MS Certified.

ZB-624PLUS™

We QC Test for the Compounds You Analyze

We added challenging and troublesome analytes to our QC test to make sure each ZB-624PLUS column has superior deactivation.

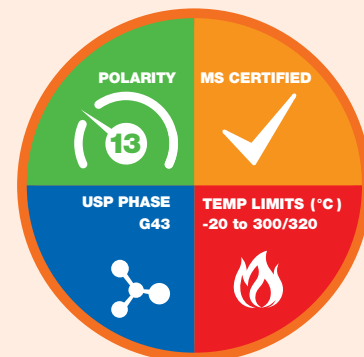


Test Probe	The Plus Advantage	Property
2,4-Dimethylphenol 2,4-Dimethylaniline	We screen challenging analytes, like acids and bases, to mimic your most challenging compounds.	Inertness

Conditions for all separations:

- Column:** Zebron ZB-624PLUS
- Dimensions:** 30 meter x 0.32 mm x 1.80 μm
- Part No.:** [7HM-G040-31](#)
- Injection:** Split 50:1 @ 250 °C, 1 μL
- Recommended Liner:** Zebron PLUS Straight Z-Liner™
- Liner Part No.:** [AG2-0A03-05](#) (for Agilent® & Thermo Scientific® systems)
- Carrier Gas:** Hydrogen @ 6 psi (constant pressure)
- Oven Program:** 85 °C for 10.5 min
- Detector:** FID @ 305 °C
- Sample:**
 1. Methane
 2. Dodecane
 3. 2,4-Dimethylphenol
 4. 2,4-Dimethylaniline
 5. Tridecane
 6. 1-Methylnaphthalene
 7. 1-Undecanol
 8. Pentadecane

Column Profile



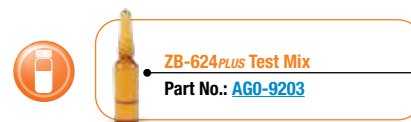
Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Cannabis
- Terpenes
- Residual Solvents
- Volatile Amines
- EPA Method 8260
- EPA Method 524
- EPA Method 624
- Food
- Flavors and Fragrances
- Solvent Purity
- Alcohols



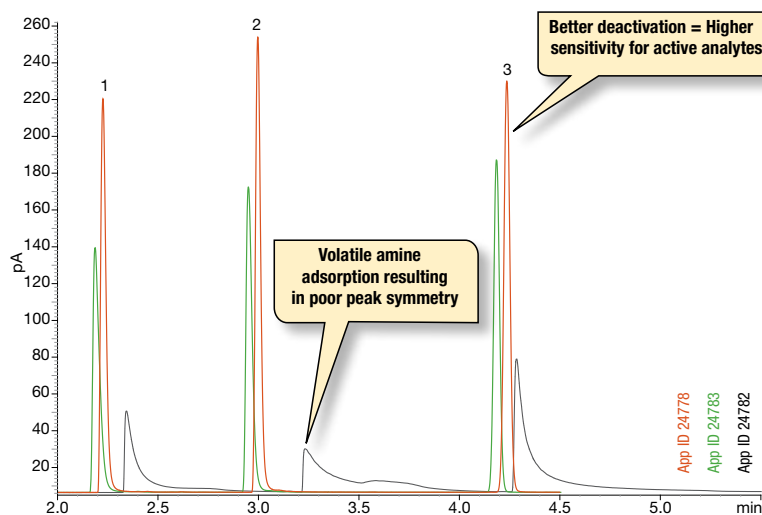
Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

ZB-624PLUS™ (cont'd)

Improved Peak Shape of Volatile Amines

Volatile amines are challenging analytes for GC analysis. They can adsorb to even the smallest imperfections in fused silica. ZB-624PLUS undergoes a superior deactivation process which minimizes active compound adsorption leading to gains in peak response and shape.

Comparison of Volatile Amines on Various 624 Columns



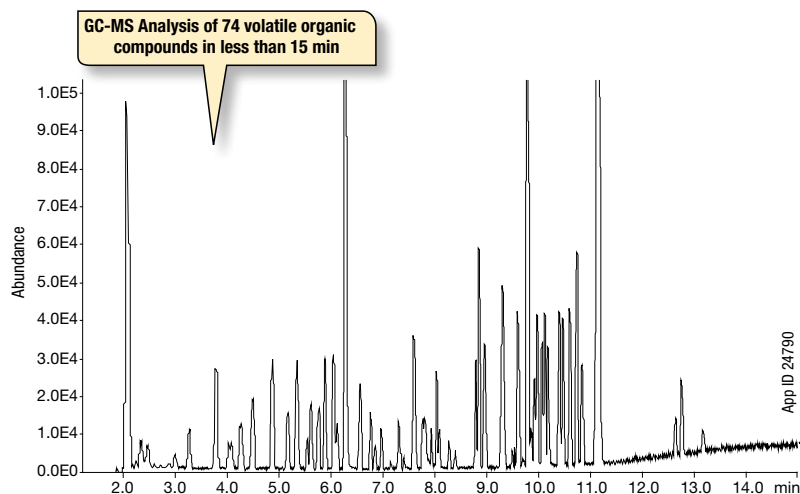
Volatile Amines on a Zebron ZB-624PLUS - 500 ppm
Volatile Amines on a Restek® Rxi®-624Sil MS - 500 ppm
Volatile Amines on a Agilent® DB®-624UI Ultra Inert - 500 ppm

Conditions for all separations:

Column: Zebron ZB-624PLUS
 Restek Rxi-624Sil MS
 Agilent DB-624UI Ultra Inert
Dimensions: 30 meter x 0.32 mm x 1.80 µm
Injection: Split 20:1 @ 200 °C, 1 µL
Recommended Liner: Zebron PLUS Straight Z-Liner™
Liner Part No.: AG2-0A03-05 (for Agilent® & Thermo Scientific® systems)
Carrier Gas: Helium @ 1.8 mL/min (constant flow)
Oven Program: 50 °C for 1 min, to 200 °C @ 20 °C/min for 5 min
Detector: FID @ 250 °C
Sample: 1. Isopropylamine
 2. Diethylamine
 3. Triethylamine

Volatile Organic Compounds in EPA Methods 8260, 524, and 624

Our high efficiency dimension and superior deactivation can stand real world samples. In addition, MS certification provides extreme low bleed to your GC-MS analysis.



Column: Zebron™ ZB-624PLUS
Dimensions: 30 meter x 0.25 mm x 1.40 µm
Part No.: ZHG-G040-27
Injection: Split 50:1 @ 230 °C, 1 µL
Recommended Liner: Zebron PLUS Straight Z-Liner™
Liner Part No.: AG2-0A03-05 (for Agilent® & Thermo Scientific® systems)
Carrier Gas: Helium @ 0.7 mL/min (constant flow)
Oven Program: 40 °C for 2 min, to 210 °C @ 17 °C/min for 3 min
Detection: Mass Spec transfer line @ 250 °C

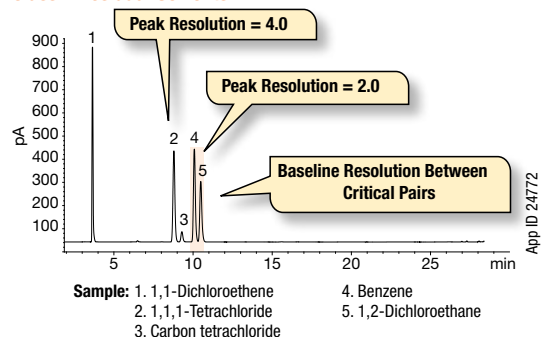
Comparative separations may not be representative of all applications.

ZB-624PLUS™ (cont'd)

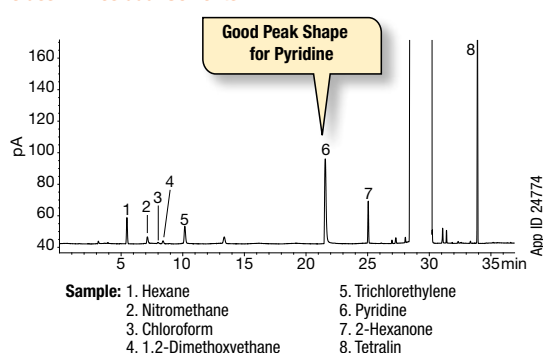
Exceeding USP <467> System Suitability

USP <467> method requires resolution of 1.5 for critical pairs. Zebron ZB-624PLUS took the challenge and succeeded with even greater resolution!

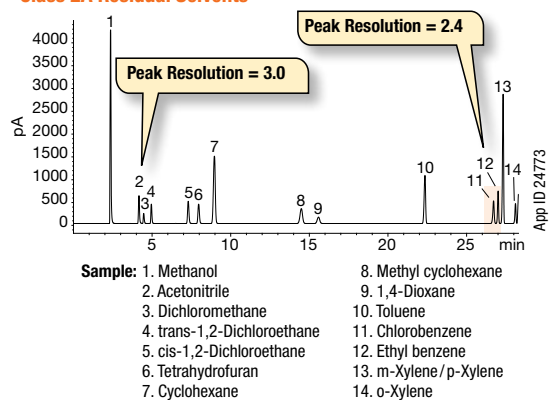
Class 1 Residual Solvents



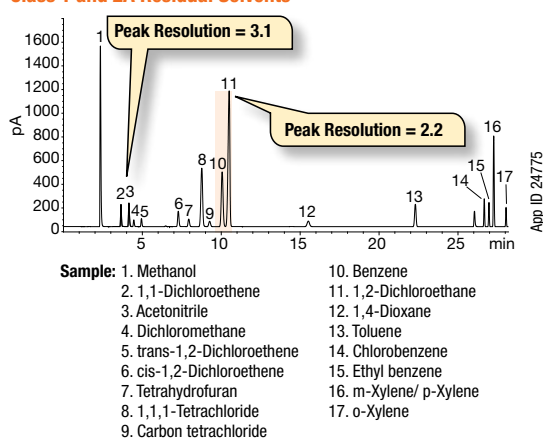
Class 2B Residual Solvents



Class 2A Residual Solvents



Class 1 and 2A Residual Solvents



Same conditions for all separations:

- Column: Zebron ZB-624PLUS
- Dimensions: 30 meter x 0.32 mm x 1.80 µm
- Part No.: [7HM-G040-31](#)
- Injection: Split 5:1 @ 140 °C, 1 µL
- Recommended Liner: Zebron PLUS Straight Z-Liner™
- Liner Part No.: [AG2-0A03-05](#) (for Agilent® & Thermo Scientific® systems)
- Carrier Gas: Helium @ 2.2 mL/min (constant flow)
- Oven Program: 40 °C for 20 min to 240 °C @ 10 °C/min
- Detector: FID @ 250 °C

Ordering Information

Zebron ZB-624PLUS GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
20-Meter			
0.18	1.00	-20 to 300/320	7FD-G040-22
0.25	1.40	-20 to 300/320	7FG-G040-27
30-Meter			
0.25	1.40	-20 to 300/320	7HG-G040-27
0.32	1.80	-20 to 300/320	7HM-G040-31
0.53	3.00	-20 to 300/320	7HK-G040-36
60-Meter			
0.25	1.40	-20 to 300/320	7KG-G040-27
0.32	1.80	-20 to 300/320	7KM-G040-31
0.53	3.00	-20 to 300/320	7KK-G040-36
75-Meter			
0.53	3.00	-20 to 300/320	7LK-G040-36

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G040-27-B](#). Some exceptions may apply, Agilent 6850 and some SRI and process GC systems use only 5 in. cages. 0.18mm, 0.25mm, and 0.32mm are MS certified.

ZB-1HT Inferno™

Robust Results Up to 430 °C

- First non-metal columns stable to 430 °C
- Provides true boiling point separation for hydrocarbon distillation methods
- Longer lifetime with rugged high temperature, polyimide coated, fused silica tubing
- Low activity, provides good peak shape for acidic and basic samples
- Provides robust column performance for high temperature bake outs

Upgrade to Zebron from any 100% dimethylpolysiloxane phase:

Agilent®

- DB®-1
- DB-1ht
- HP-1
- CP-Sil 5 CB
- CP-SimDist

Restek®

- Rtx®-1
- Rxi®-1HT

SGE®

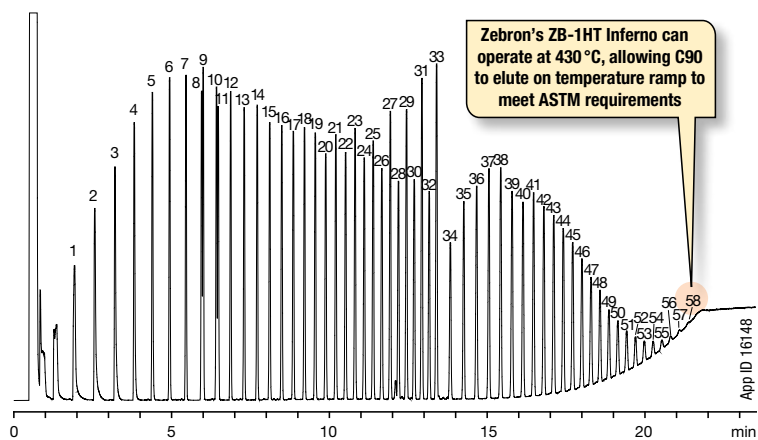
- BP1

Supelco®

- SPB®-1
- Petrocol® 2887

Rugged, High-Temperature Performance

Great Separation of High Boiling Hydrocarbons (ASTM D6352)

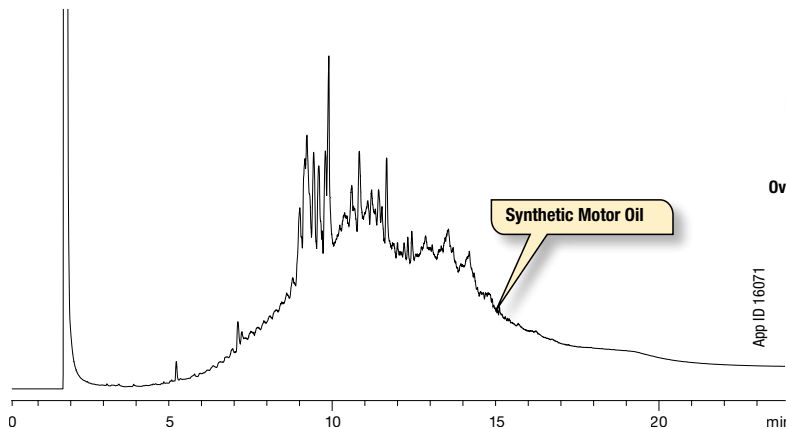


Column: Zebron ZB-1HT Inferno
Dimensions: 5 meter x 0.53 mm x 0.10 µm
Part No.: [7AK-G014-02](#)
Injection: On-Column @ 43 °C, 0.1 µL
Carrier Gas: Helium @ 4.4 mL/min (constant flow)
Oven Program: 40 °C for 0.5 min to 430 °C @ 20 °C/min for 10 min
Detector: FID @ 430 °C

Sample:	1. C10	16. C23	31. C38	46. C66
	2. C11	17. C24	32. C39	47. C68
	3. C12	18. C25	33. C40	48. C70
	4. C13	19. C26	34. C42	49. C72
	5. C14	20. C27	35. C44	50. C74
	6. C15	21. C28	36. C46	51. C76
	7. C16	22. C29	37. C48	52. C78
	8. C17	23. C30	38. C50	53. C80
	9. Pristane	24. C31	39. C52	54. C82
	10. C18	25. C32	40. C54	55. C84
	11. Phytane	26. C33	41. C56	56. C86
	12. C19	27. C34	42. C58	57. C88
	13. C20	28. C35	43. C60	58. C90
	14. C21	29. C36	44. C62	
	15. C22	30. C37	45. C64	

Note: Sample was a combination of PolyWax® 655 and retention time markers C8-C40 in CS₂/Chloroform

Bake Off Contaminants from Dirty Matrices

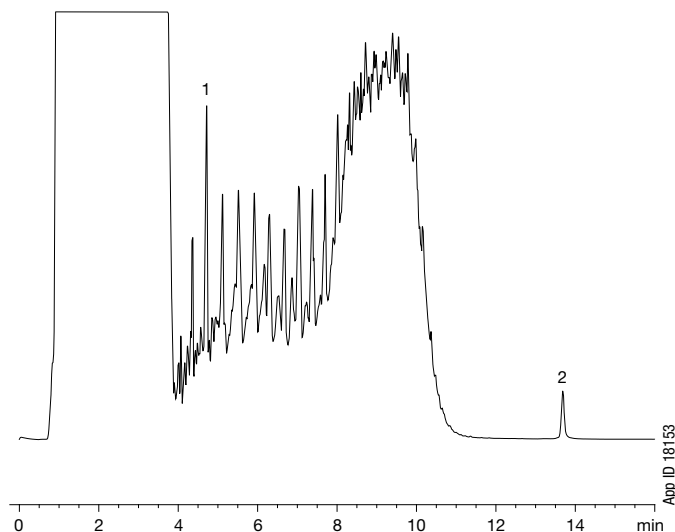


Column: Zebron ZB-1HT Inferno
Dimensions: 30 meter x 0.25 mm x 0.10 µm
Part No.: [7HG-G014-02](#)
Injection: On-Column @ 153 °C, 1 µL
Carrier Gas: Helium @ 1 mL/min (constant flow)
Oven Program: 150 °C to 400 °C @ 14 °C/min for 6 min
Detector: FID @ 400 °C
Sample: Sample was 1% in dichloromethane Mobil® 1 10W-30 Fully Synthetic Motor Oil

ZB-1HT Inferno™

Run Versatile Samples

Hydrocarbons from Water by GC-FID DIN EN ISO 9377-2 (DEV H53)



Column: Zebron ZB-1HT Inferno
Dimensions: 15 meter x 0.32 mm x 0.25 µm
Part No.: [ZEM-G014-11](#)
Injection: Splitless @ 300 °C, 20 µL
Carrier Gas: Helium @ 2.0 mL/min (constant flow)
Oven Program: 50 °C for 2 min to 320 °C @ 30 °C/min for 5 min
Detector: FID @ 330 °C
Sample: 1. Decane (C10)
 2. Tetracontane (C40)

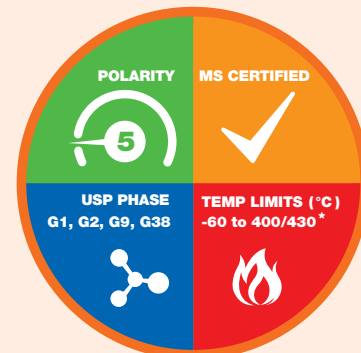
Ordering Information

Zebron ZB-1HT Inferno GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
5-Meter			
0.53	0.10	-60 to 400/430	7AK-G014-02
10-Meter			
0.32	0.25	-60 to 400/430	7CM-G014-11
15-Meter			
0.25	0.10	-60 to 400/430	7EG-G014-02
0.25	0.25	-60 to 400/430	7EG-G014-11
0.32	0.10	-60 to 400/430	7EM-G014-02
0.32	0.25	-60 to 400/430	7EM-G014-11
0.53	0.15	-60 to 400	7EK-G014-05
20-Meter			
0.18	0.18	-60 to 400/430	7FD-G014-08
30-Meter			
0.25	0.10	-60 to 400/430	7HG-G014-02
0.25	0.25	-60 to 400/430	7HG-G014-11
0.32	0.10	-60 to 400/430	7HM-G014-02
0.32	0.25	-60 to 400/430	7HM-G014-11
0.53	0.15	-60 to 400	7HK-G014-05

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G014-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

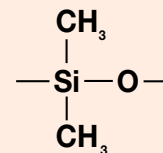
Column Profile



*0.53 mm ID columns are rated to 400 °C.

Engineered Self Cross-linking™ (ESC)

Phase Chemistry



100 % Dimethylpolysiloxane

Recommended Applications

- Diesel Fuel
- High Boiling Petroleum Products
- High Molecular Weight Waxes
- Hydrocarbons
- Motor Oils
- Polymers/Plastics
- Simulated Distillation



ZB-1HT Test Mix
 Part No.: [AGO-5155](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-5HT Inferno™

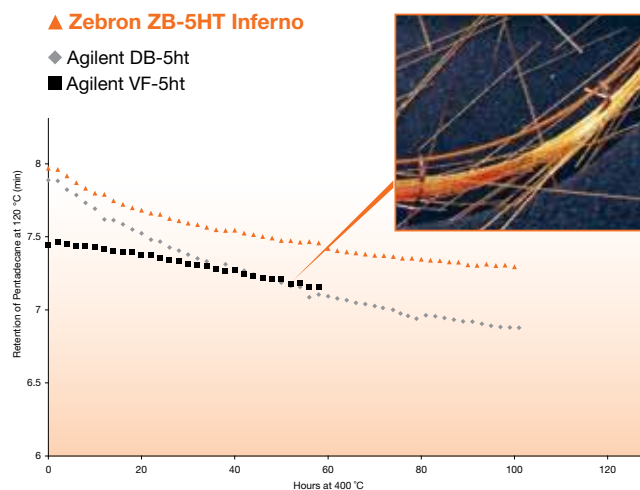
Robust Results Up to 430 °C

- First non-metal columns stable to 430 °C
- Robust column for high temperature bake outs and analysis, such as biodiesel, long-chain hydrocarbons, polymers, and high molecular weight compounds
- Provides true boiling point separation for hydrocarbon distillation methods
- Longer lifetime with rugged high temperature, polyimide coated, fused silica tubing
- Low activity, provides good peak shape for acidic and basic samples

Zebron Inferno Columns Win In The Lifetime Test

How does the lifetime test work?

All columns were held at 400 °C for 2 hours and then the oven was lowered to 120 °C for pentadecane analysis. The VF-5ht column broke just after 40 hours at 400 °C. The ZB-5HT had the same retention for pentadecane at 100 hours as the DB-5ht column at 40 hours — over 2X the lifetime!



Note that the VF-5ht column died around 40 hours at 400 °C whereas the Zebron ZB-5HT Inferno column maintained great retention of Pentadecane over 100 hours.

Conditions for all columns:

- Dimensions:** 30 meter x 0.25 mm x 0.10 μm
- Injection:** 1.0 μL of test mix [AGO-7578](#)
- Carrier Gas:** Helium @ 1.9 mL/min (constant flow)
- Oven Program:** 120 °C (Isothermal)
- Detector:** FID @ 400 °C
- Sample:** Pentadecane

Comparative separations may not be representative of all applications.

Upgrade to Zebron from any 5 % phenyl / 95 % dimethylpolysiloxane phase:

Agilent®

- DB®-5ht
- VF-5ht

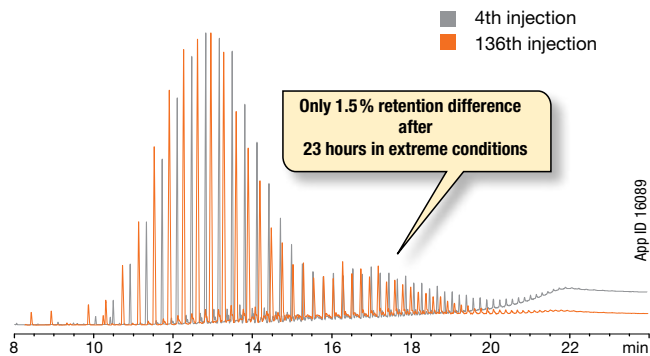
Restek®

- Rxi®-5HT
- Stx®-5HT
- XT®-5HT
- Rtx®-5HT

SGE®

- HT-5

Paraffin Wax

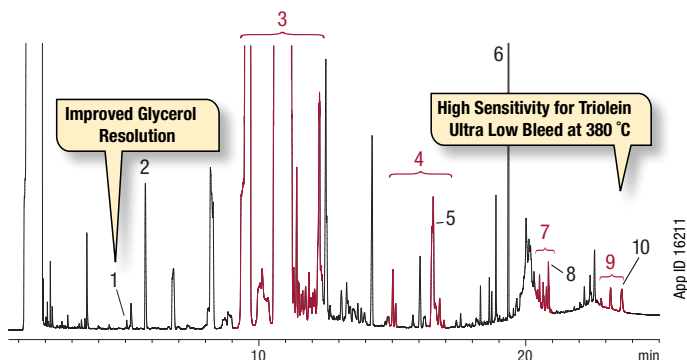


Column: Zebron ZB-5HT Inferno
Dimensions: 15 meter x 0.32 mm x 0.10 μm
Part No.: [7EM-G015-02](#)
Injection: On Column @ 43 °C, 0.1 μL
Carrier Gas: Helium @ 1.9 mL/min (constant flow)
Oven Program: 40 °C for 2 min to 430 °C @ 20 °C for 10 min
Detector: FID @ 430 °C
Sample: Paraffin Wax

ZB-5HT Inferno™

Well-Suited for Fuels Analysis

Free Total Glycerin in B100 Biodiesel by GC-FID



Column: Zebtron ZB-5HT Inferno
Dimensions: 15 meter x 0.32 mm x 0.10 μm
 + 2 meter x 0.53 mm Z-Guard™
Part No.: [ZEM-G015-02](#)
Injection: On-Column @ 53 °C, 1 μL
Carrier Gas: Helium @ 3.0 mL/min (constant flow)
Oven Program: 50 °C for 1 min to 180 °C @ 15 °C/min to 230 °C @ 7 °C/min to 380 °C @ 30 °C/min for 10 min
Detector: FID @ 380 °C
Note: A 2 m x 0.53 mm Guard Column was connected to the analytical column per ASTM method requirement
Sample:

1. Glycerol	6. Tricarpin (ISTD2)
2. Butanetriol (ISTD1)	7. Diglycerides
3. Esters	8. 1,3-Diolein
4. Monoglycerides	9. Triglycerides
5. 1-Monooleoyl-rac-glycerol	10. Triolein

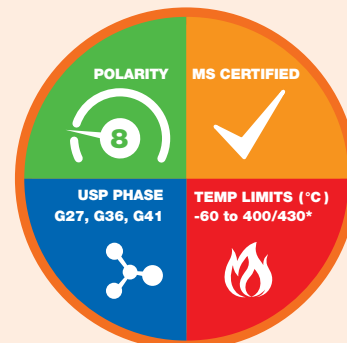
Ordering Information

Zebtron ZB-5HT Inferno GC Columns

ID(mm)	df(μm)	Temp. Limits °C	Part No.
10-Meter with 2-Meter Spliced Guard (0.53 mm ID)			
0.32	0.10	-60 to 400/430	ZCM-G015-02-GST
15-Meter			
0.25	0.10	-60 to 400/430	ZEG-G015-02
0.25	0.25	-60 to 400/430	ZEG-G015-11
0.32	0.10	-60 to 400/430	ZEM-G015-02
0.32	0.25	-60 to 400/430	ZEM-G015-11
0.53	0.15	-60 to 400	ZEK-G015-05
15-Meter with 2-Meter Spliced Guard (0.53 mm ID)			
0.32	0.10	-60 to 400/430	ZEM-G015-02-GST
20-Meter			
0.18	0.18	-60 to 400/430	ZFD-G015-08
30-Meter			
0.25	0.10	-60 to 400/430	ZHG-G015-02
0.25	0.25	-60 to 400/430	ZHG-G015-11
0.32	0.10	-60 to 400/430	ZHM-G015-02
0.32	0.25	-60 to 400/430	ZHM-G015-11
0.53	0.15	-60 to 400	ZHK-G015-05
60-Meter			
0.25	0.25	-60 to 400/430	ZKG-G015-11

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [ZHG-G015-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

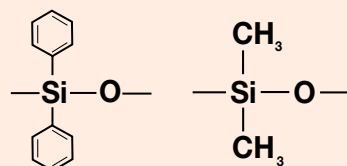
Column Profile



*0.53 mm ID columns are rated to 400 °C.

Engineered Self Cross-linking™ (ESC)

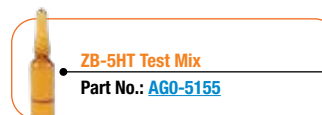
Phase Chemistry



5 % Phenyl 95 % Dimethylpolysiloxane

Recommended Applications

- Diesel Fuels
- High Boiling Petroleum Products
- High Molecular Weight Waxes
- Hydrocarbons
- Motor Oils
- Polymers/Plastics
- Simulated Distillation
- Surfactants
- Triglycerides



ZB-5HT Test Mix
 Part No.: [AGO-5155](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

ZB-35HT Inferno™

High Temperature Stability for Mid-Polarity

- First non-metal, 35% phenyl columns stable to 400 °C
- Longer lifetime with rugged high temperature, polyimide coated, fused silica tubing
- Robust column for high temperature analysis
- Great for high molecular weight compounds
- Eliminate carry-over with high temperature bake outs
- Low activity, provides good peak shape for acidic and basic samples

Upgrade to Zebron from any

35% phenyl / 65% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-35	• Rtx®-35	• BPX35	• MDN-35	• OV-11
• HP-35ms	• Rtx-35ms	• BPX608	• SPB®-35	
• HP-35			• SPB-608	

Lower Bleed Than Other Columns!

Conditions for all columns:

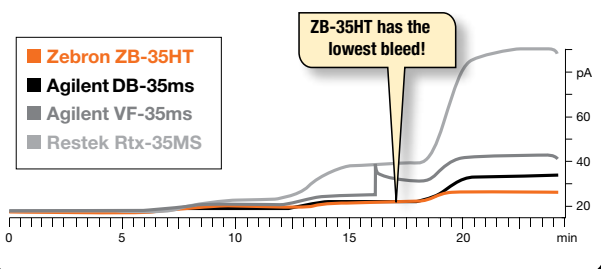
Dimensions: 30 meter x 0.25 mm x 0.25 µm

Injection: Split 20:1 @ 200 °C, 1 µL

Carrier Gas: Helium @ 1.7 mL/min (constant flow)

Oven Program: 100 °C to 320 °C @ 30 °C/min for 5 min to 340 °C @ 20 °C/min for 5 min to 360 °C @ 20 °C/min for 5 min to 380 °C @ 20 °C/min for 5 min to 400 °C @ 20 °C/min for 5 min to 100 °C @ 30 °C/min for 8 min

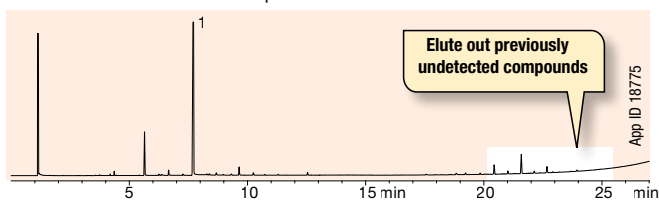
Detector: FID @ 405 °C



See What You've Been Missing

A) ZB-35HT Inferno

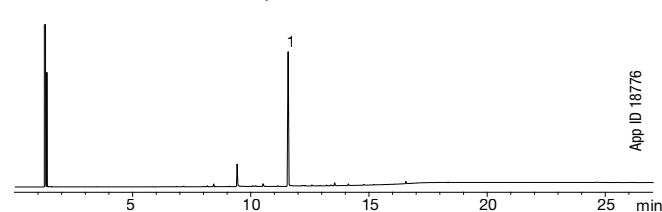
30 meter x 0.25 mm x 0.25 µm



VS.

B) Restek Rtx-35

30 meter x 0.25 mm x 1.00 µm



Column: As listed

Dimensions: As listed

Part No.: 7HG-G025-11 (ZB-35HT Inferno)

Injection: A) Split 50:1 @ 350 °C, 1 µL

B) Split 50:1 @ 300 °C, 1 µL

Carrier Gas: Helium @ 2.1 mL/min (constant flow)

Oven Program: A) 140 °C to 400 °C @ 10 °C/min

B) 140 °C to 300 °C @ 10 °C/min

Detector: A) FID @ 400 °C

B) FID @ 320 °C

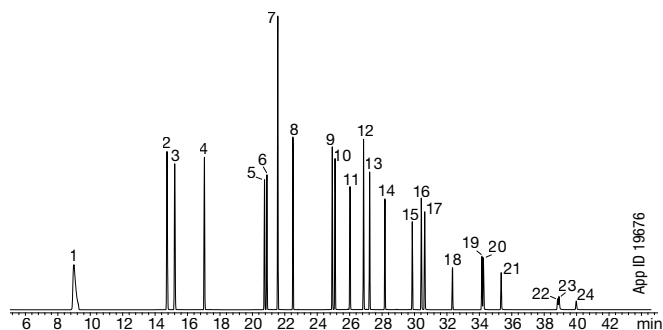
Sample: 1. Hexadecylamine

Note: Chromatogram is courtesy of Northeastern Chemical Company.

ZB-35HT Inferno™

Well-Suited for Environmental Contaminants

PAHs and PCBs In A Single Run



Column: Zebron ZB-35HT Inferno
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: [7HG-G025-11](#)
Injection: Splitless @ 265 °C, 2 µL
Carrier Gas: Helium @ 1 mL/min (constant flow)
Oven Program: 85 °C for 3 min to 320 °C @ 7 °C /min for 8 min
Detector: MSD @ 280 °C
Sample: Compounds are 5 ppm

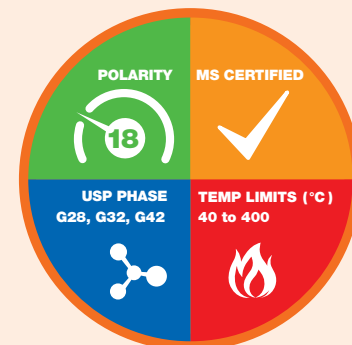
1. Naphthalene	9. PCB 101	17. Chrysene
2. Acenaphthylene	10. Fluoranthene	18. PCB 194
3. Acenaphthene	11. Pyrene	19. Benzo[b]fluoranthene
4. Fluorene	12. PCB 118	20. Benzo[k]fluoranthene
5. Phenanthrene	13. PCB 153	21. Benzo[a]pyrene
6. Anthracene	14. PCB 138	22. Indeno[1,2,3-cd]pyrene
7. PCB 28	15. PCB 180	23. Dibenzo[a,h]anthracene
8. PCB 52	16. Benz[a]anthracene	24. Benzo[g,h,i]perylene

Ordering Information

Zebron ZB-35HT Inferno GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.10	40 to 400	7EG-G025-02
0.25	0.25	40 to 400	7EG-G025-11
0.32	0.25	40 to 400	7EM-G025-11
20-Meter			
0.18	0.18	40 to 400	7FD-G025-08
30-Meter			
0.25	0.10	40 to 400	7HG-G025-02
0.25	0.25	40 to 400	7HG-G025-11
0.32	0.25	40 to 400	7HM-G025-11

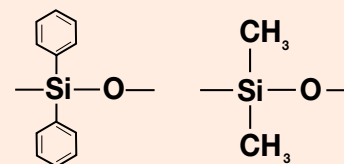
Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G025-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile



Engineered Self Cross-linking™ (ESC)

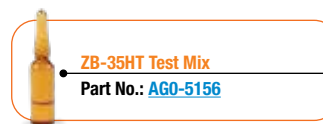
Phase Chemistry



35 % Phenyl 65 % Dimethylpolysiloxane

Recommended Applications

- Amines
- Chemicals
- Drugs
- EPA Methods (508, 608, 8081, 8141, 8151)
- PCBs / Aroclors
- Pesticides
- Pharmaceuticals
- Steroids



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-XLB-HT Inferno™

High Temp Stability, Low Bleed

- Rugged, non-metal si-arylene GC column stable to 400 °C
- Robust column for high temperature bake outs and analysis, such as high molecular weight compounds
- Provides unique selectivity for conformational analyses
- Longer lifetime with high temperature, polyimide coated, fused silica tubing
- Low activity, provides good peak shape for acidic and basic samples
- Good tool for general screening to identify unknown samples

Upgrade to Zebron from these similar* phases:

Agilent®

- DB®-XLB
- VF-XMS

Restek®

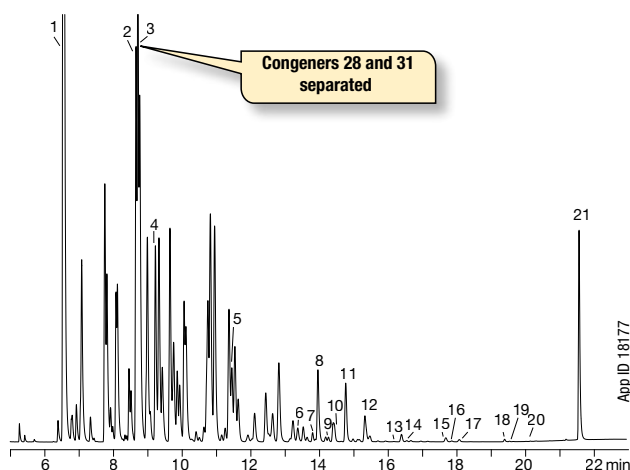
- DB®-XLB

Supelco®

- MDN-12

*not exact equivalent, selectivity may differ

Aroclor 1242: DIN Method 51527



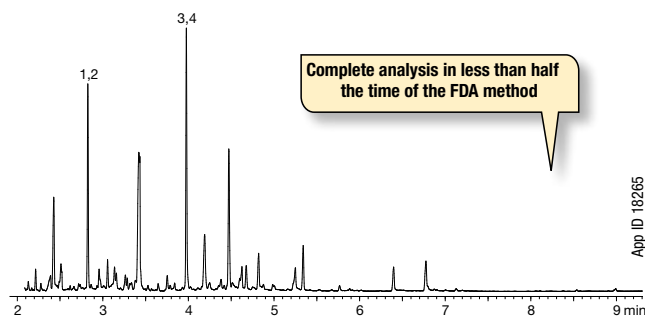
Column: Zebron ZB-XLB-HT Inferno
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G024-11
Injection: Split 2:1 @ 250 °C, 1 µL, pressure pulse @ 40 psi for first 0.25 min
Carrier Gas: Helium @ 1.5 mL/min (constant flow)
Oven Program: 50 °C for 0.5 min to 210 °C @ 40 °C/min for 3 min to 230 °C @ 30 °C/min for 5 min to 250 °C @ 30 °C/min for 5 min to 320 °C @ 40 °C/min for 2 min

Detector: ECD @ 350 °C

Sample: Total concentration of aroclors was 90 ppm in isoctane

- | | |
|-------------|-------------|
| 1. TCMX | 12. BZ# 138 |
| 2. BZ# 31 | 13. BZ# 126 |
| 3. BZ# 28 | 14. BZ# 167 |
| 4. BZ# 52 | 15. BZ# 156 |
| 5. BZ# 101 | 16. BZ# 180 |
| 6. BZ# 77 | 17. BZ# 157 |
| 7. BZ# 123 | 18. BZ# 170 |
| 8. BZ# 118 | 19. BZ# 169 |
| 9. BZ# 153 | 20. BZ# 189 |
| 10. BZ# 114 | 21. DCB |
| 11. BZ# 105 | |

Melamine and Cyanuric Acid by GC-MS

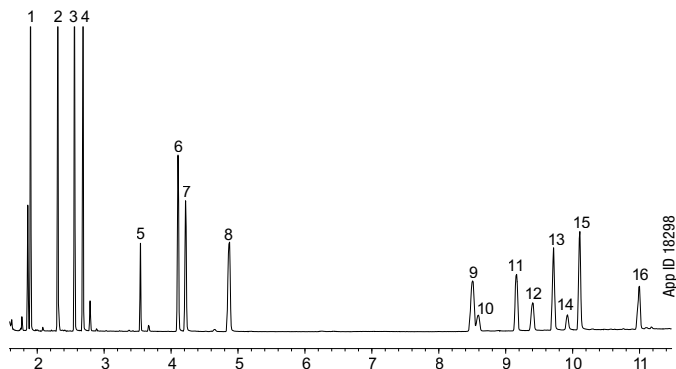


Column: Zebron ZB-XLB-HT Inferno
Dimensions: 15 meter x 0.25 mm x 0.25 µm
Part No.: 7EG-G024-11
Injection: On-Column @ 103 °C, 1 µL
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 100 °C for 0.5 min to 320 °C @ 25 °C/min
Detector: MSD @ 325 °C
Sample: Analytes are 200 ng / 100 µL in BSTFA / Pyridine (1:1)
 1. Cyanuric Acid 13C3 (IS)
 2. Cyanuric Acid
 3. Melamine 13C3 15N3 (IS)
 4. Melamine

ZB-XLB-HT Inferno™

Good Results for Difficult Samples

Explosives by GC-MS



Column: Zebron ZB-XLB-HT Inferno
Dimensions: 15 meter x 0.25 mm x 0.25 µm
Part No.: [7EG-G024-11](#)
Injection: On-Column @ 73 °C, 0.5 µL
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 70 °C for 1 min to 140 °C @ 25 °C/min for 4 min to 280 °C @ 25 °C/min
Detector: MSD @ 300 °C, 40-400 amu
Sample: Analytes are 10 ppm in dichloromethane

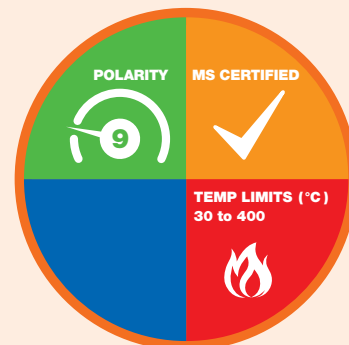
- | | |
|---------------------------------|---------------------------------------|
| 1. Nitrobenzene | 9. 2,4,6-Trinitrotoluene (2,4,6-TNT) |
| 2. 2-Nitrotoluene | 10. PETN |
| 3. 3-Nitrotoluene | 11. 1,3,5-Trinitrobenzene (1,3,5-TNB) |
| 4. 4-Nitrotoluene | 12. RDX |
| 5. Nitroglycerin | 13. 4-Amino-2,6-dinitrotoluene |
| 6. 2,6-Dinitrotoluene (2,6-DNT) | 14. 3,5-Nitroaniline |
| 7. 1,3-Dinitrobenzene (1,3-DNB) | 15. 2-Amino-4,6-dinitrotoluene |
| 8. 2,4-Dinitrotoluene | 16. Tetryl |

Ordering Information

Zebron ZB-XLB-HT Inferno GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.10	30 to 400	7EG-G024-02
0.25	0.25	30 to 400	7EG-G024-11
0.32	0.10	30 to 400	7EM-G024-02
20-Meter			
0.18	0.18	30 to 400	7FD-G024-08
30-Meter			
0.25	0.10	30 to 400	7HG-G024-02
0.25	0.25	30 to 400	7HG-G024-11
0.32	0.25	30 to 400	7HM-G024-11
60-Meter			
0.25	0.25	30 to 400	7KG-G024-11

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G024-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Herbicides / Insecticides
- PCBs
- Pesticides
- Unknown Samples



ZB-XLB-HT Test Mix
Part No.: [AGO-7578](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-1

Low Polarity for Versatile Applications

- Low polarity phase suited for true boiling point compounds
- Low bleed (MS Certified), low activity, and high efficiency
- Excellent resolving power of critical pairs in complex petrochemical samples
- Used for “fingerprinting” and routine quality control analyses

Upgrade to Zebron from any 100% dimethylpolysiloxane phase:

Agilent®

- DB®-1
- DB-2887
- DB-1 EVDX
- HP-1
- HP-101
- HP-PONA
- Ultra 1
- CP-Sil 5 CB

Restek®

- Rtx®-1
- Rtx-1PONA
- Rtx-1 F&F

SGE®

- BP1
- BP1-PONA
- BPX1-SimD

Supelco®

- SPB®-1
- SPB-1 TG
- SE-30
- MET-1
- SPB-1 Sulfur
- SPB-HAP

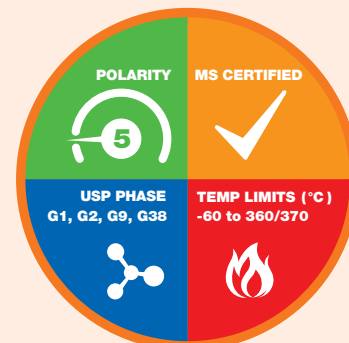
Ordering Information

Zebron ZB-1 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.53	2.65	-60 to 340/360	7CK-G001-35
15-Meter			
0.25	0.10	-60 to 360/370	7EG-G001-02
0.25	0.25	-60 to 360/370	7EG-G001-11
0.25	1.00	-60 to 340/360	7EG-G001-22
0.32	0.25	-60 to 360/370	7EM-G001-11
0.32	1.00	-60 to 340/360	7EM-G001-22
0.53	0.15	-60 to 360/370	7EK-G001-05
0.53	0.50	-60 to 360/370	7EK-G001-17
0.53	1.50	-60 to 340/360	7EK-G001-28
30-Meter			
0.25	0.10	-60 to 360/370	7HG-G001-02
0.25	0.25	-60 to 360/370	7HG-G001-11
0.25	0.50	-60 to 360/370	7HG-G001-17
0.25	1.00	-60 to 340/360	7HG-G001-22
0.32	0.25	-60 to 360/370	7HM-G001-11
0.32	0.50	-60 to 360/370	7HM-G001-17
0.32	1.00	-60 to 340/360	7HM-G001-22
0.32	3.00	-60 to 340/360	7HM-G001-36
0.32	5.00	-60 to 340/360	7HM-G001-39
0.53	0.50	-60 to 360/370	7HK-G001-17
0.53	1.50	-60 to 340/360	7HK-G001-28
0.53	3.00	-60 to 340/360	7HK-G001-36
0.53	5.00	-60 to 340/360	7HK-G001-39
50-Meter			
0.25	0.50	-60 to 360/370	7JG-G001-17
60-Meter			
0.25	0.25	-60 to 360/370	7KG-G001-11
0.25	1.00	-60 to 340/360	7KG-G001-22
0.32	0.25	-60 to 360/370	7KM-G001-11
0.32	1.00	-60 to 340/360	7KM-G001-22
0.32	3.00	-60 to 340/360	7KM-G001-36
0.53	1.50	-60 to 340/360	7KK-G001-28
100-Meter			
0.25	0.50	-60 to 360/370	7MG-G001-17

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G001-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

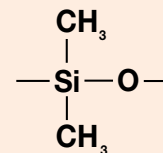
Column Profile



*Thicker films (≥ 1.0 µm) are rated to 340/360 °C.

Engineered Self Cross-linking™ (ESC)

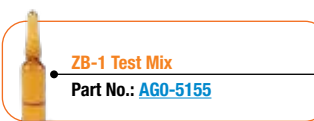
Phase Chemistry



100% Dimethylpolysiloxane

Recommended Applications

- Ethanol
- Hydrocarbons
- Mercaptans
- MTBE
- Natural Gas Odorants
- Oxygenates and GROs
- Solvent Impurities
- Sulfur Compounds (Light)



ZB-1 Test Mix

Part No.: [AGO-5155](#)



Engineered Self Cross-linking™ (ESC) . Zebron GC Columns MS Certification, see p. 411



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-5

Low Polarity For A Wide Application Range

- Rugged, versatile low polarity column for general lab purpose
- Resilient to dirty samples—long column life
- Low bleed (MS Certified) especially suited to high sensitivity work using GC-MS
- Extremely inert for active compounds such as drugs or pesticides
- Great column for unknown samples

Upgrade to Zebron from any 5% phenyl / 95% dimethylpolysiloxane phase:

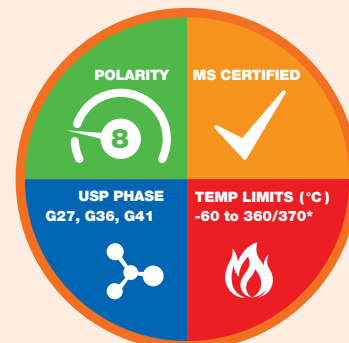
Agilent®	Restek®	SGE®	Supelco®	OV®
<ul style="list-style-type: none"> • DB®-5 • HP-5 • HP-PAS-5 • CP-Sil 8 CB • Ultra 2 	<ul style="list-style-type: none"> • Rtx®-5 	<ul style="list-style-type: none"> • BP5 • BPX5 	<ul style="list-style-type: none"> • MDN-5 • SPB®-5 • PTE-5 • SE-54 • PTA-5 • Equity®-5 • Sac-5 	<ul style="list-style-type: none"> • OV-5

Ordering Information

Zebron ZB-5 GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.10	-60 to 360/370	7EG-G002-02
0.25	0.25	-60 to 360/370	7EG-G002-11
0.25	0.50	-60 to 360/370	7EG-G002-17
0.25	1.00	-60 to 340/360	7EG-G002-22
0.32	0.10	-60 to 360/370	7EM-G002-02
0.32	0.25	-60 to 360/370	7EM-G002-11
0.32	1.00	-60 to 340/360	7EM-G002-22
0.53	0.50	-60 to 360/370	7EK-G002-17
0.53	1.50	-60 to 340/360	7EK-G002-28
0.53	3.00	-60 to 340/360	7EK-G002-36
20-Meter			
0.18	0.18	-60 to 360/370	7FD-G002-08
30-Meter			
0.25	0.10	-60 to 360/370	7HG-G002-02
0.25	0.25	-60 to 360/370	7HG-G002-11
0.25	0.50	-60 to 360/370	7HG-G002-17
0.25	1.00	-60 to 340/360	7HG-G002-22
0.32	0.25	-60 to 360/370	7HM-G002-11
0.32	0.50	-60 to 360/370	7HM-G002-17
0.32	1.00	-60 to 340/360	7HM-G002-22
0.53	0.50	-60 to 360/370	7HK-G002-17
0.53	1.50	-60 to 340/360	7HK-G002-28
0.53	3.00	-60 to 340/360	7HK-G002-36
0.53	5.00	-60 to 340/360	7HK-G002-39
60-Meter			
0.25	0.10	-60 to 360/370	7KG-G002-02
0.25	0.25	-60 to 360/370	7KG-G002-11
0.25	0.50	-60 to 360/370	7KG-G002-17
0.25	1.00	-60 to 340/360	7KG-G002-22
0.32	0.25	-60 to 360/370	7KM-G002-11
0.32	1.00	-60 to 340/360	7KM-G002-22
0.53	1.50	-60 to 340/360	7KK-G002-28

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G002-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

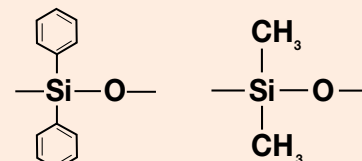
Column Profile



*Thicker films (≥ 1.0 µm) are rated to 340/360 °C.

Engineered Self Cross-linking™ (ESC)

Phase Chemistry



5 % Phenyl 95 % Dimethylpolysiloxane

Recommended Applications

- Alkaloids
- Dioxins
- Drugs
- Essential Oils
- Flavors
- FAMES
- Halo-Hydrocarbons
- Herbicides
- PCBs / Aroclors
- Pesticides
- Phenols
- Residual Solvents



For ultra low bleed, consider using a ZB-5ms, see p. 144
For high temperature analysis, consider using a ZB-5HT, see p. 136



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-5ms

Robust Results, Versatile Performance

- Popular rugged column for general purpose use
- Fully conditioned within 35 minutes
- High response for acids and bases
- Enhanced resolution of polyaromatic hydrocarbons (PAHs) and other multi-ring aromatic compounds

Upgrade to Zebron from any 5% phenyl-arylene / 95% dimethylpolysiloxane phase:

Agilent®

- DB®-5ms
- DB-5.625
- DB-5ms EVDX
- CP-Sil 8 CB MS
- VF-5ms

Restek®

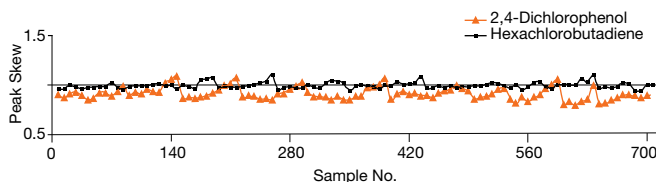
- Rtx®-5Sil MS
- Rxi®-5Sil MS

Supelco®

- SLB®-5ms

Long Lifetime

Consistent response after more than 700 samples at pH 2!



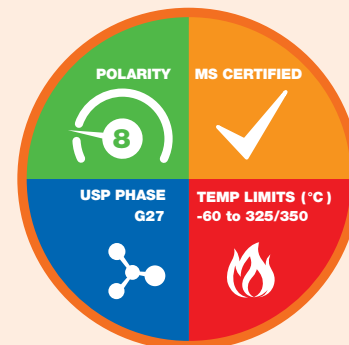
Ordering Information

Zebron ZB-5ms GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
10-Meter			
0.10	0.10	-60 to 325/350	7CB-G010-02
0.18	0.18	-60 to 325/350	7CD-G010-08
12-Meter			
0.20	0.33	-60 to 325/350	7DE-G010-14
15-Meter			
0.25	0.25	-60 to 325/350	7EG-G010-11
20-Meter			
0.18	0.18	-60 to 325/350	7FD-G010-08
0.18	0.32	-60 to 325/350	7FD-G010-51
0.18	0.36	-60 to 325/350	7FD-G010-53
25-Meter			
0.20	0.33	-60 to 325/350	7GE-G010-14
30-Meter			
0.25	0.25	-60 to 325/350	7HG-G010-11
0.25	0.50	-60 to 325/350	7HG-G010-17
0.25	1.00	-60 to 325/350	7HG-G010-22
0.32	0.25	-60 to 325/350	7HM-G010-11
0.32	0.50	-60 to 325/350	7HM-G010-17
0.32	1.00	-60 to 325/350	7HM-G010-22
60-Meter			
0.25	0.10	-60 to 325/350	7KG-G010-02
0.25	0.25	-60 to 325/350	7KG-G010-11
0.32	0.25	-60 to 325/350	7KM-G010-11

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G010-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

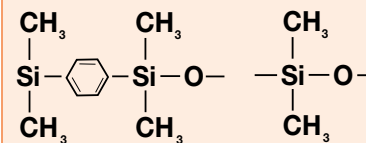
Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry

5 % Phenyl-Arylene



95 % Dimethylpolysiloxane

Recommended Applications

- Acids
- Alkaloids
- Amines
- Dioxins
- Drugs
- Essential Oils
- Flavors
- FAMES
- Halo-hydrocarbons
- Herbicides
- PCBs/Aroclors
- Pesticides
- Phenols
- Residual Solvents
- Solvent Impurities



ZB-5ms Test Mix
Part No.: [AGO-7578](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-35

Intermediate Polarity for GC-MS

- Intermediate polarity column with temperature limits up to 360 °C allows high molecular weight analysis
- Excellent inertness to minimize analyte adsorption, improve efficiency, and reproducibility
- More rugged (longer column life) than other polar phases
- Excellent for trace analysis with bleed-sensitive detectors (MS, FID, ECD, NPD)

Upgrade to Zebron from any

35 % phenyl / 65 % dimethylpolysiloxane phase:

Agilent®

- DB®-35
- DB-35ms
- HP-35
- HP-35ms

Restek®

- Rtx®-35
- Rtx-35ms

SGE®

- BPX35
- BPX608

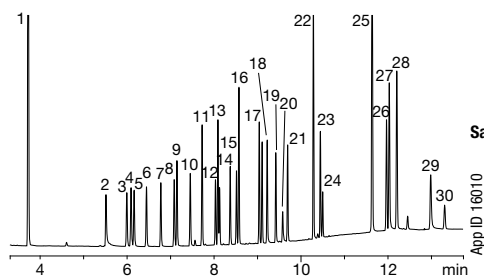
Supelco®

- MDN-35
- SPB®-35
- SPB-608

OV®

- OV-11

Common Drug Screen by GC-FID



Sample: All analytes are 25 ppm except nicotine at 100 ppm

- Nicotine
- Ibuprofen
- Allobarbitol
- Acetaminophen
- Aprobarbitol
- Butalbarbitol
- Amobarbitol
- Pentobarbitol
- Phenacetin
- Secobarbitol
- Benzphetamine
- Meprobamate
- Dimenhydrinate
- Hexobarbitol
- Doxylamine
- Caffeine
- Chlorpheniramine
- Methapyrilene
- Phenobarbitol
- Procaine
- Bromopheniramine
- Chlorcyclizine
- Cocaine
- Benactyzine
- Codeine
- Diazepam
- Morphine
- Hydrocodone
- Oxymorphone
- Heroin

Column: Zebron ZB-35
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: [7HG-G003-11](#)
Injection: Split 10:1 @ 225 °C, 1.5 µL
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 120 °C to 180 °C @ 25 °C/min to 200 °C @ 6 °C/min to 300 °C @ 20 °C/min for 3 min
Detector: FID @ 300 °C

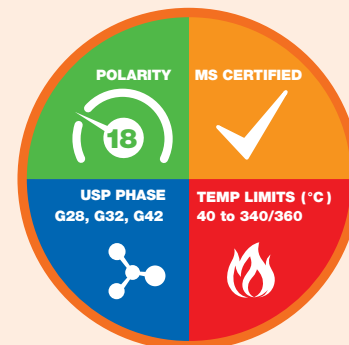
Ordering Information

Zebron ZB-35 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.10	0.10	40 to 340/360	7CB-G003-02
15-Meter			
0.25	0.25	40 to 340/360	7EG-G003-11
0.25	0.50	40 to 340/360	7EG-G003-17
0.53	1.00	40 to 340/360	7EK-G003-22
30-Meter			
0.25	0.25	40 to 340/360	7HG-G003-11
0.25	0.50	40 to 340/360	7HG-G003-17
0.32	0.25	40 to 340/360	7HM-G003-11
0.32	0.50	40 to 340/360	7HM-G003-17
0.53	0.50	40 to 340/360	7HK-G003-17
0.53	1.00	40 to 340/360	7HK-G003-22
60-Meter			
0.25	0.25	40 to 340/360	7KG-G003-11
0.32	0.25	40 to 340/360	7KM-G003-11

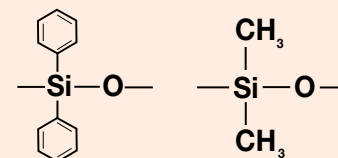
Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G003-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry



35 % Phenyl 65 % Dimethylpolysiloxane

Recommended Applications

- Amines
- Drugs
- EPA Methods (508, 608, 8081, 8141, 8151)
- PCBs / Aroclors
- Pesticides
- Pharmaceuticals



ZB-35 Test Mix
 Part No.: [AGO-5156](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-50

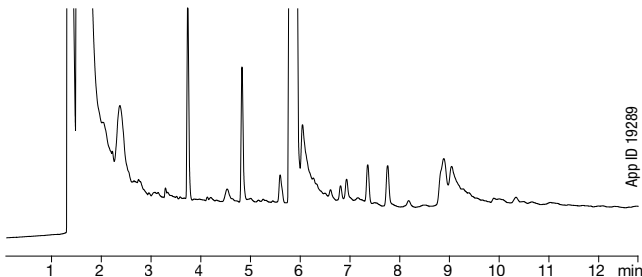
Robust Results, Rugged Performance

- High polarity column with temperature limits up to 340 °C allows high temperature bake out to remove contaminants
- Excellent inertness to minimize analyte adsorption, improve efficiency, and reproducibility
- More rugged (longer column life) than other polar phases
- Excellent for trace analysis with bleed-sensitive detectors
- Great for drug screening and environmental compounds

Upgrade to Zebron from any 50% phenyl / 50% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®
<ul style="list-style-type: none"> • DB®-17 • DB-17ht • DB-17ms • DB-17 EVDX 	<ul style="list-style-type: none"> • Rtx®-50 	<ul style="list-style-type: none"> • BPX50 	<ul style="list-style-type: none"> • SP®-2250 • SPB®-17 • SPB-50

Antihistamine by GC-FID



Column: Zebron ZB-50
Dimensions: 30 meter x 0.32 mm x 0.50 µm
Part No.: [7HM-G004-17](#)
Injection: Split 20:1 @ 250 °C, 1 µL
Carrier Gas: Helium @ 40 cm/sec (constant flow)
Oven Program: 190 °C to 260 °C @ 25 °C/min for 10 min
Detector: FID @ 270 °C
Sample: Brompheniramine

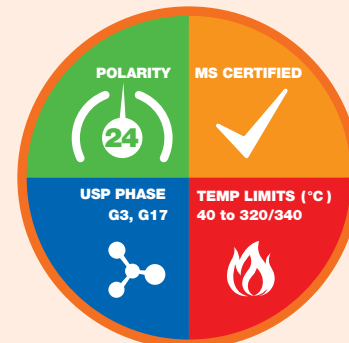
Ordering Information

Zebron ZB-50 GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
10-Meter			
0.10	0.10	40 to 320/340	7CB-G004-02
0.53	2.00	40 to 320/340	7CK-G004-32
15-Meter			
0.25	0.15	40 to 320/340	7EG-G004-05
0.25	0.25	40 to 320/340	7EG-G004-11
0.32	0.25	40 to 320/340	7EM-G004-11
0.32	0.50	40 to 320/340	7EM-G004-17
0.53	1.00	40 to 320/340	7EK-G004-22
30-Meter			
0.25	0.25	40 to 320/340	7HG-G004-11
0.25	0.50	40 to 320/340	7HG-G004-17
0.32	0.25	40 to 320/340	7HM-G004-11
0.32	0.50	40 to 320/340	7HM-G004-17
0.53	1.00	40 to 320/340	7HK-G004-22
60-Meter			
0.25	0.25	40 to 320/340	7KG-G004-11
0.25	0.50	40 to 320/340	7KG-G004-17

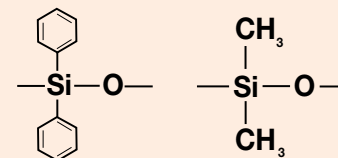
Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G004-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry



50 % Phenyl 50 % Dimethylpolysiloxane

Recommended Applications

- Antidepressants
- Cholesterols
- Drugs of Abuse
- EPA Methods (508, 608, 8081, 8141, 8151)
- Glycols
- Herbicides
- Pesticides
- Steroids
- Triglycerides



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-624

Robust Results for VOCs and Residual Solvents

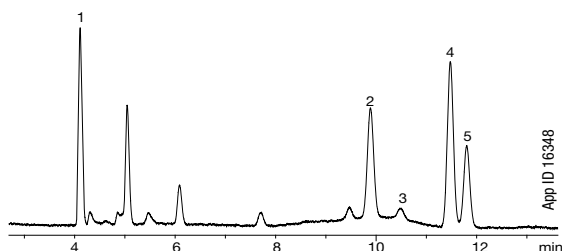
- Widely used phase to separate volatile organic flavor and fragrance additives and residual solvents in industrial or pharmaceutical products (OVIs)
- Popular choice for residual solvent testing
- Excellent for US EPA Methods 501.3, 502.2, 503.1, 524.2, 601, 602, 624, 8010, 8015, 8020, 8021, 8240, 8260
- Specifically designed for the separation of volatile organic compounds (VOCs)
- Increased temperature limit speeds run times and re-equilibration

Upgrade to Zebron from any 6% cyanopropylphenyl / 94% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-624	• Rtx®-624	• BPX624	• SPB®-624	• OV-624
• DB-1301	• Rtx-1301		• SPB-1301	
• DB-VRX	• Rtx-VMS			
• HP-VOC				
• CP-1301				
• CP-Select 624 CB				

Good Performance for Pharmaceuticals

USP <467> Residual Solvents Procedure A – Class 1



Column: Zebron ZB-624
Dimensions: 30 meter x 0.32 mm x 1.80 µm
Part No.: [7HM-G005-31](#)
Injection: Split 5:1 @ 140 °C, 1 mL
Carrier Gas: Helium @ 35 cm/sec (constant flow)
Oven Program: 40 °C for 20 min to 240 °C @ 10 °C/min for 20 min
Detector: FID @ 250 °C

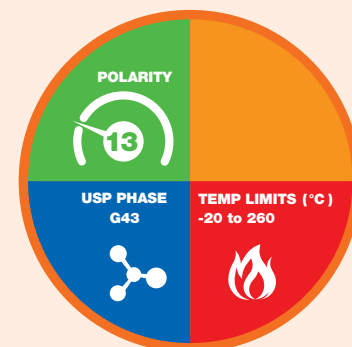
Sample: 1. 1,1-Dichloroethene
 2. 1,1,1-Trichloroethane
 3. Carbon tetrachloride
 4. Benzene
 5. 1,2-Dichloroethane

Ordering Information

Zebron ZB-624 GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
20-Meter			
0.18	1.00	-20 to 260	7FD-G005-22
30-Meter			
0.25	1.40	-20 to 260	7HG-G005-27
0.32	1.80	-20 to 260	7HM-G005-31
0.53	3.00	-20 to 260	7HK-G005-36
60-Meter			
0.25	1.40	-20 to 260	7KG-G005-27
0.32	1.80	-20 to 260	7KM-G005-31
0.53	3.00	-20 to 260	7KK-G005-36
75-Meter			
0.53	3.00	-20 to 260	7LK-G005-36
105-Meter			
0.53	3.00	-20 to 260	7NK-G005-36

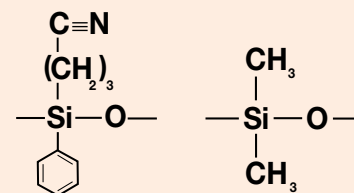
Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G005-27-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile



Phase Chemistry

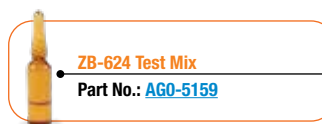
6% Cyanopropylphenyl



94% Dimethylpolysiloxane

Recommended Applications

- Pharmaceuticals
- Residual Solvents
- Volatile Organic Compounds (VOCs)
- EPA Methods (501.3, 502.2, 503.1, 524.2, 601, 602, 624, 8010, 8015, 8020, 8021, 8240, 8260)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-1701

Alternate Selectivity for Mid-Polarity Analyses

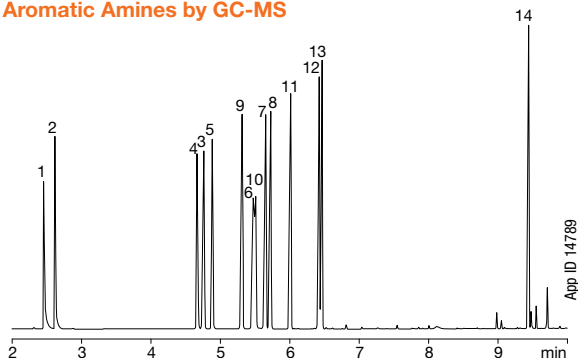
- Fast run and re-equilibration times for enhanced sample throughput and productivity
- Provides alternate selectivity to phenyl phases with similar polarity

Upgrade to Zebron from any 14% cyanopropylphenyl / 86% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-1701	• Rtx®-1701	• BP10	• SPB®-1701	• OV-1701
• CP-Sil 19 CB	• Rtx-VMS		• Equity®-1701	

Good Peak Shape for Active Analytes

Aromatic Amines by GC-MS



Column: Zebron ZB-1701
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: [7HG-G006-11](#)
Injection: Split 15:1 @ 220 °C, 1 µL
Carrier Gas: Helium @ 1.0 mL/min (constant flow)
Oven Program: 60 °C for 1 min to 110 °C @ 30 °C/min to 135 °C @ 9 °C/min to 260 °C @ 30 °C/min for 2 min
Detector: MSD @ 180 °C
Sample: Analytes are at 1.58 mg/mL each

1. Piperidine	8. o-Toluidine
2. 2-Methylpiperidine	9. N,N-Dimethylaniline
3. Aniline	10. β-Phenylethylamine
4. Benzylamine	11. N-Ethylaniline
5. α-Phenylethylamine	12. 2,4-Dimethylaniline
6. N-Methylaniline	13. N,N-Diethylaniline
7. m-Toluidine	14. Dibenzylamine

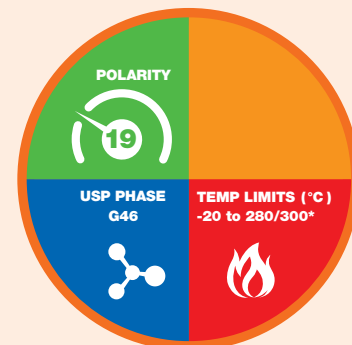
Ordering Information

Zebron ZB-1701 GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.25	-20 to 280/300	7EG-G006-11
0.32	0.25	-20 to 280/300	7EM-G006-11
30-Meter			
0.25	0.25	-20 to 280/300	7HG-G006-11
0.25	1.00	-20 to 260/280	7HG-G006-22
0.32	0.25	-20 to 280/300	7HM-G006-11
0.32	1.00	-20 to 260/280	7HM-G006-22
0.53	1.00	-20 to 260/280	7HK-G006-22
60-Meter			
0.25	0.25	-20 to 280/300	7KG-G006-11
0.32	0.25	-20 to 280/300	7KM-G006-11

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G006-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

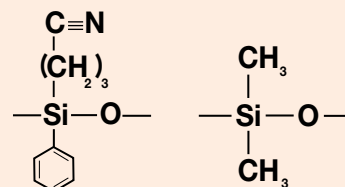
Column Profile



*Thicker films (≥ 1.0 µm) are rated to 260/280 °C.

Phase Chemistry

14% Cyanopropylphenyl



86% Dimethylpolysiloxane

Recommended Applications

- Alcohols
- Amines
- Aromatic Hydrocarbons
- Drugs
- Esters
- PAHs
- PCBs
- Pharmaceutical Intermediates
- Phenols
- Solvents
- Steroids
- TMS Sugars
- Tranquilizers



ZB-1701 Test Mix
Part No.: [AGO-5156](#)



For enhanced response to Endrin and DDT, consider using [ZB-1701P](#), See p. 149
 Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime.
 Add a Z-guard to your next Zebron GC order.

ZB-1701P

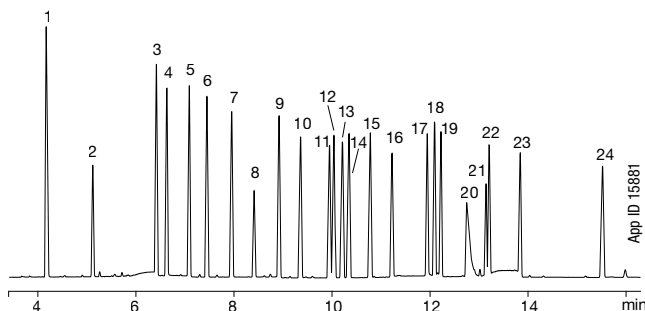
Enhanced Response for DDT and Endrin

- Specially tested to ensure response of DDT, Endrin, Endrin Aldehyde, and Endrin Ketone
- Fast run and re-equilibration times for enhanced sample throughput and productivity
- Guaranteed column for pesticide analysis

Upgrade to Zebron from any 14% cyanopropylphenyl / 86% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-1701	• Rtx®-1701	• BP10	• SPB®-1701	• OV-1701
• DB-1701P	• Rtx-VMS		• Equity®-1701	
• CP-Sil 19 CB				

Chlorinated Pesticides by GC-ECD: EPA Method 8081



Column: Zebron ZB-1701P
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G012-11
Injection: Splitless @ 240 °C, 1 µL
Carrier Gas: Helium @ 1.6 mL/min (constant flow)
Oven Program: 100 °C to 200 °C @ 25 °C/min to 240 °C @ 6 °C/min to 265 °C @ 20 °C/min for 5 min
Detector: ECD @ 300 °C
Sample: All compounds are 20 ppm

1. 1-Bromo-2-Nitrobenzene (IS)	9. δ-BHC	17. DDD
2. Tetrachloro-m-xylene (Surr)	10. Heptachlor Epoxide	18. Endosulfan II
3. α-BHC	11. Endosulfan I	19. DDT
4. Pentachloronitrobenzene (IS)	12. γ-Chlordane	20. Endrin Aldehyde
5. γ-BHC (Lindane)	13. α-Chlordane	21. Methoxychlor
6. Heptachlor	14. DDE	22. Endosulfan Sulfate
7. Aldrin	15. Dieldrin	23. Endrin Ketone
8. β-BHC	16. Endrin	24. Decachlorobiphenyl (Surr)

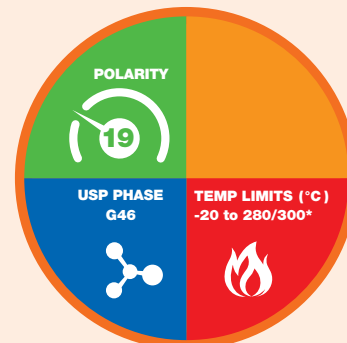
Ordering Information

Zebbron ZB-1701P GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
30-Meter			
0.25	0.25	-20 to 280/300	7HG-G012-11
0.32	0.25	-20 to 280/300	7HM-G012-11
0.53	1.00	-20 to 260/280	7HK-G012-22

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G012-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

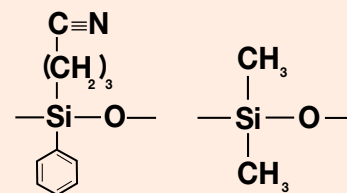
Column Profile



*Thicker films (≥ 1.0 µm) are rated to 260/280 °C.

Phase Chemistry

14 % Cyanopropylphenyl



86 % Dimethylpolysiloxane

Recommended Applications

- Nitrogen Containing Pesticides
- Organochlorine Pesticides
- Organophosphorous Pesticides
- PCBs / Aroclors



ZB-1701 Test Mix
Part No.: [AGO-5156](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-WAX

PEG Versatility for Solvents, Acids, and Amines

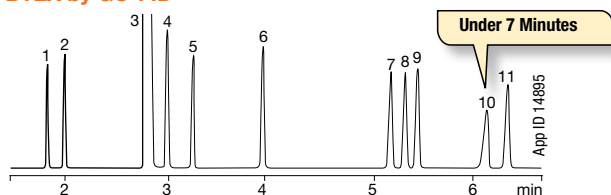
- High polarity column with low bleed (MS certified) for improved results
- Highly stable, long lifetime
- Low activity for amines
- Bonded, solvent rinsible
- Excellent chromatography of polar complex mixtures
- Widely used for profiling and “fingerprinting”

Upgrade to Zebron from any polyethylene glycol phase:

Agilent®	Restek®	SGE®	Supelco®
<ul style="list-style-type: none"> • DB®-WAXetr • HP-INNOWax • CP-Wax 57 CB 	<ul style="list-style-type: none"> • Rtx®-WAX • Flamewax • Stabilwax®-DB 	<ul style="list-style-type: none"> • SolGel-WAX™ 	<ul style="list-style-type: none"> • Met-Wax • Omegawax

Performs for Industrial Chemicals

BTEX by GC-FID



Column: Zebron ZB-WAX
Dimensions: 30 meter x 0.32 mm x 0.50 µm
Part No.: 7HM-G007-17
Injection: Split 20:1 @ 250 °C, 0.2 µL
Carrier Gas: Helium @ 2 mL/min (constant flow)
Oven Program: 60 °C to 75 °C @ 15 °C/min to 90 °C @ 3 °C/min (hold 3 min)
Detector: FID @ 300 °C

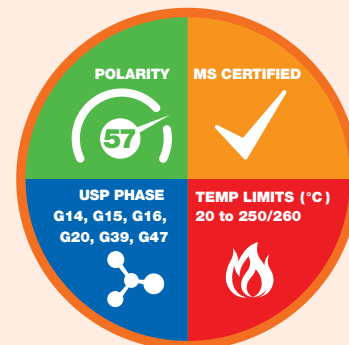
Sample: 1. Pentane
 2. Heptane
 3. Solvent (methylene chloride)
 4. Benzene
 5. Decane
 6. Toluene
 7. Ethylbenzene
 8. p-Xylene
 9. m-Xylene
 10. Dodecane
 11. o-Xylene

Ordering Information

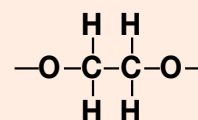
Zebron ZB-WAX GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.10	0.10	20 to 250/260	7CB-G007-02
15-Meter			
0.25	0.25	20 to 250/260	7EG-G007-11
0.32	0.25	20 to 250/260	7EM-G007-11
0.32	0.50	20 to 250/260	7EM-G007-17
0.53	1.00	20 to 250/260	7EK-G007-22
20-Meter			
0.18	0.18	20 to 250/260	7FD-G007-08
30-Meter			
0.25	0.15	20 to 250/260	7HG-G007-05
0.25	0.25	20 to 250/260	7HG-G007-11
0.25	0.50	20 to 250/260	7HG-G007-17
0.25	1.00	20 to 250/260	7HG-G007-22
0.32	0.15	20 to 250/260	7HM-G007-05
0.32	0.25	20 to 250/260	7HM-G007-11
0.32	0.50	20 to 250/260	7HM-G007-17
0.53	0.50	20 to 250/260	7HK-G007-17
0.53	1.00	20 to 250/260	7HK-G007-22
60-Meter			
0.25	0.15	20 to 250/260	7KG-G007-05
0.25	0.25	20 to 250/260	7KG-G007-11
0.25	0.50	20 to 250/260	7KG-G007-17
0.32	0.25	20 to 250/260	7KM-G007-11
0.32	0.50	20 to 250/260	7KM-G007-17
0.53	1.00	20 to 250/260	7KK-G007-22

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G007-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile



Phase Chemistry



100 % Polyethylene Glycol

Recommended Applications

- Alcohols
- Aldehydes
- Aromatics
- Basic Compounds
- Essential Oils
- Flavors & Fragrances
- Glycols
- Pharmaceuticals
- Solvents
- Styrene
- Xylene Isomers



ZB-WAX Test Mix
 Part No.: [AGO-5158](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-FFAP

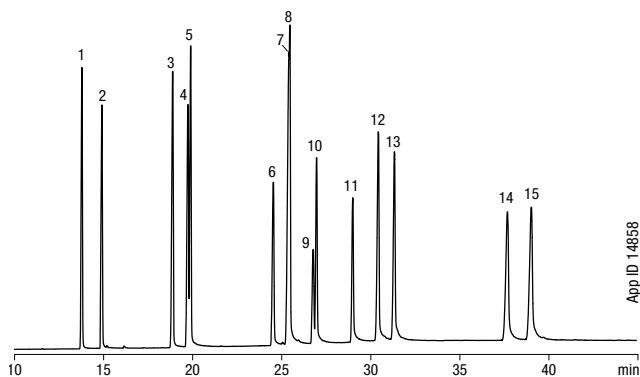
Improve Resolution for Free Fatty Acids

- High polarity column; excellent thermal and chemical stability
- Provides better peak shape for underivatized acids
- Especially suited for organic acids, free fatty acids, and alcohols
- Bonded, solvent rinsable FFAP phase

Upgrade to Zebron from any nitroterephthalic acid modified polyethylene glycol phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
<ul style="list-style-type: none"> • DB®-FFAP • HP-FFAP • CP-Wax 58 FFAP CB • CP-FFAP CB 	<ul style="list-style-type: none"> • Stabilwax®-DA 	<ul style="list-style-type: none"> • BP21 	<ul style="list-style-type: none"> • Nukol • SPB®-1000 	<ul style="list-style-type: none"> • OV-351

Unsaturated Free Fatty Acids by GC-FID



Column: Zebron ZB-FFAP
Dimensions: 60 meter x 0.25 mm x 0.25 µm
Part No.: [7KG-G009-11](#)
Injection: Split 40:1 @ 220 °C, 0.2 µL
Carrier Gas: Helium @ 2.4 mL/min (constant flow)
Oven Program: 200 °C to 260 °C @ 2 °C/min for 30 min
Detector: FID @ 250 °C

Sample:

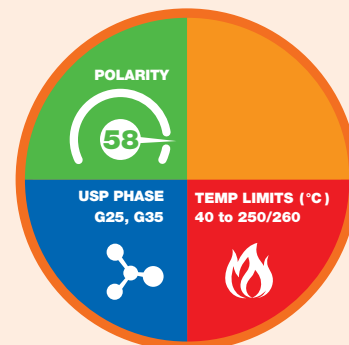
1. Myristic Acid (C14:0)	9. Linolelaidic Acid (C18:2t)
2. Myristoleic Acid (C14:1c)	10. Linoleic Acid (C18:2c)
3. Palmitic Acid (C16:0)	11. Linolenic Acid (C18:3c)
4. Palmitoleic Acid (C16:1t)	12. Arachidic Acid (C20:0)
5. Palmitoleic Acid (C16:1c)	13. Gondoic Acid (C20:1c)
6. Stearic Acid (C18:0)	14. Behenic Acid (C22:0)
7. Elaidic Acid (C18:1t)	15. Erucic Acid (C22:1c)
8. Oleic Acid (C18:1c)	

Ordering Information

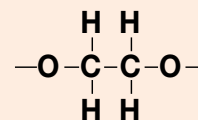
Zebron ZB-FFAP GC Columns			
ID (mm)	df (µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.25	40 to 250/260	7EG-G009-11
0.32	0.25	40 to 250/260	7EM-G009-11
0.32	0.50	40 to 250/260	7EM-G009-17
0.53	1.00	40 to 250/260	7EK-G009-22
30-Meter			
0.25	0.25	40 to 250/260	7HG-G009-11
0.32	0.25	40 to 250/260	7HM-G009-11
0.32	0.50	40 to 250/260	7HM-G009-17
0.32	1.00	40 to 250/260	7HM-G009-22
0.53	1.00	40 to 250/260	7HK-G009-22
50-Meter			
0.32	0.50	40 to 250/260	7JM-G009-17
60-Meter			
0.25	0.25	40 to 250/260	7KG-G009-11

Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G009-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Column Profile



Phase Chemistry



Nitroterephthalic Acid Modified Polyethylene Glycol

Recommended Applications

- | | |
|--------------------|-----------------------|
| • Acrylates | • Ketones |
| • Alcohols | • Organic Acids |
| • Aldehydes | • Phenols |
| • Free Fatty Acids | • Volatile Free Acids |



ZB-FFAP Test Mix
Part No.: [AGO-5158](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

ZB-XLB

Extra Low Bleed

- Unique, low polarity si-arylene column
- Engineered specifically for use with bleed sensitive detectors such as MS
- Provides alternate selectivity to standard 5-type phases
- Often used for confirmation of pesticides, PCBs, or other environmental samples
- Good tool for sample screening to identify unknown contaminants

Upgrade to Zebron from these similar* phases:

Agilent®

- DB®-XLB
- VF-XMS

Restek®

- Rtx®-XLB
- Rxi®-XLB

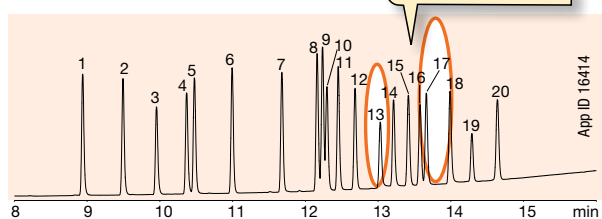
Supelco®

- MDN-12

*not exact equivalent, selectivity may differ

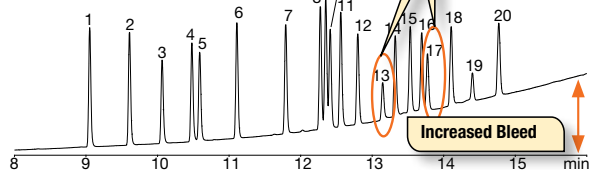
Better Performance for Chlorinated Pesticides EPA Method 8081A

Zebron ZB-XLB



VS.

Restek Rxi-XLB



Conditions for both columns:

Columns: As listed
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Injection: Split 111:1 @ 250 °C, 1.5 µL
Carrier Gas: Helium @ 0.9 mL/min (constant flow)
Oven Program: 110 °C to 320 °C @ 15 °C/min and hold until last peak elutes
Detector: ECD @ 350 °C

Sample: 1. α-BHC 11. 4,4'-DDE
 2. γ-BHC 12. Dieldrin
 3. β-BHC 13. Endrin
 4. δ-BHC 14. 4,4'-DDD
 5. Heptachlor 15. Endosulfan II
 6. Aldrin 16. Endrin aldehyde
 7. Heptachlor epoxide 17. 4,4'-DDT
 8. γ-Chlordane 18. Endosulfan sulfate
 9. α-Chlordane 19. Methoxychlor
 10. Endosulfan I 20. Endrin ketone

Comparative separations may not be representative of all applications.

Ordering Information

Zebron ZB-XLB GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.18	0.18	30 to 340/360	7CD-G019-08
15-Meter			
0.25	0.25	30 to 340/360	7EG-G019-11
20-Meter			
0.18	0.18	30 to 340/360	7FD-G019-08

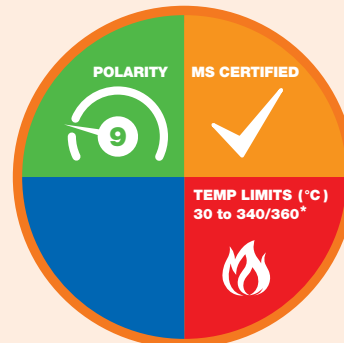
Note: If you need a 5 in. cage, simply add a (-B) after the part number, e.g., [7HG-G019-11-B](#). Some exceptions may apply. Agilent 6850 and some SRI and process GC systems use only 5 in. cages.

Ordering Information

Zebron ZB-XLB GC Columns (cont'd)

ID(mm)	df(µm)	Temp. Limits °C	Part No.
30-Meter			
0.25	0.25	30 to 340/360	7HG-G019-11
0.25	0.50	30 to 340/360	7HG-G019-17
0.32	0.25	30 to 340/360	7HM-G019-11
0.32	0.50	30 to 340/360	7HM-G019-17
0.53	1.50	30 to 320/340	7HK-G019-28
60-Meter			
0.25	0.25	30 to 340/360	7KG-G019-11

Column Profile



*Thicker films (≥ 1.0 µm) are rated to 320/340 °C.

Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Herbicides / Insecticides
- PCBs
- Pesticides
- Unknown Samples



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-guard to your next Zebron GC order.

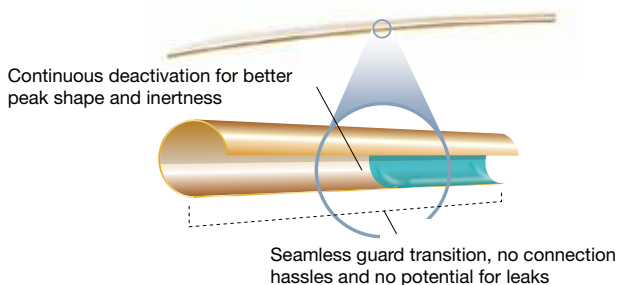
Guardian Integrated Guard Columns

Built-In Column Protection: No Leaks, No Worries!

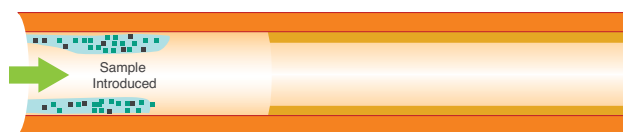
Why Choose Zebron With Guardian?

Guardian columns have the 2 m, 5 m or 10 m guard built directly into the analytical column in one continuous length of tubing. Unlike traditional guard columns, which are known to be difficult to seal and prone to leaking after normal column maintenance, the Guardian system provides the same inert column protection, but eliminates the possibility of leaks.

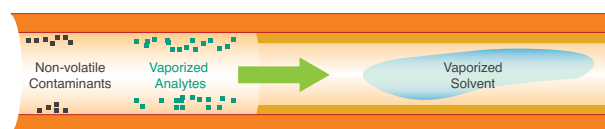
- Eliminate the potential for leaks
- Extend column life
- Improve analyte focusing for low boiling compounds
- Aggressively tested to ensure deactivation



How It Works



The sample is introduced onto the Guardian section of the column.



As temperature increases (oven ramp program), the sample is vaporized and moves unretained through the Guardian section of the column. Non-volatile contaminants are deposited on the Guardian section, better preserving the stationary phase and making it easier to trim contaminants off the front of the column.



When the analytes reach the stationary phase (analytical portion of the column), they are refocused, resulting in a narrower initial peak width. This can help improve resolution.

Ordering Information

Guardian: Integrated Guard Columns

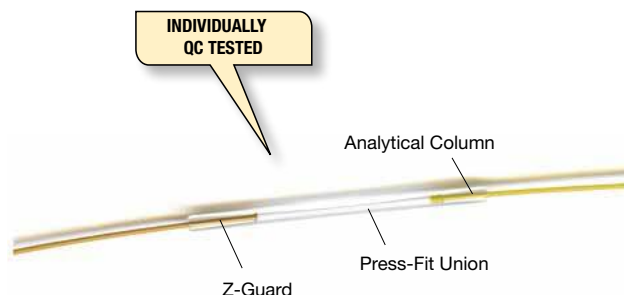
Zebron GC Column Phase	Dimensions	2m Guardian Part No.	5m Guardian Part No.	10m Guardian Part No.
ZB-1PLUS™	15 meter x 0.25 mm x 0.25 µm	—	—	7EG-G031-11-GGC
ZB-1PLUS	30 meter x 0.25 mm x 0.25 µm	—	7HG-G031-11-GGA	7HG-G031-11-GGC
ZB-1HT Inferno™	30 meter x 0.25 mm x 0.10 µm	—	7HG-G014-02-GGA	—
ZB-5ms	15 meter x 0.25 mm x 0.25 µm	—	—	7EG-G010-11-GGC
ZB-5ms	30 meter x 0.25 mm x 0.25 µm	—	7HG-G010-11-GGA	7HG-G010-11-GGC
ZB-5ms	30 meter x 0.25 mm x 0.50 µm	—	7HG-G010-17-GGA	7HG-G010-17-GGC
ZB-5ms	30 meter x 0.32 mm x 0.25 µm	—	7HM-G010-11-GGA	—
ZB-5ms	30 meter x 0.32 mm x 1.00 µm	—	7HM-G010-22-GGA	—
ZB-5MSPLUS™	30 meter x 0.25 mm x 0.25 µm	—	7HG-G030-11-GGA	7HG-G030-11-GGC
ZB-5MSPLUS	30 meter x 0.25 mm x 0.50 µm	—	—	7HG-G030-17-GGC
ZB-5	30 meter x 0.25 mm x 0.25 µm	—	7HG-G002-11-GGA	7HG-G002-11-GGC
ZB-5	30 meter x 0.25 mm x 0.50 µm	—	7HG-G002-17-GGA	7HG-G002-17-GGC
ZB-5	60 meter x 0.25 mm x 0.25 µm	—	7KG-G002-11-GGA	—
ZB-5HT Inferno	30 meter x 0.25 mm x 0.10 µm	—	7HG-G015-02-GGA	—
ZB-5HT Inferno	30 meter x 0.25 mm x 0.25 µm	—	7HG-G015-11-GGA	—
ZB-5PLUS™	20 meter x 0.18 mm x 0.18 µm	—	7FD-G032-08-GGA	—
ZB-5PLUS	30 meter x 0.25 mm x 0.10 µm	—	7HG-G032-02-GGA	—
ZB-5PLUS	30 meter x 0.25 mm x 0.25 µm	—	7HG-G032-11-GGA	—
ZB-50	10 meter x 0.18 mm x 0.18 µm	7CD-G004-08-GGT	—	—
ZB-MultiResidue™-1	30 meter x 0.25 mm x 0.25 µm	—	—	7HG-G016-11-GGC
ZB-SemiVolatiles	30 meter x 0.25 mm x 0.25 µm	—	7HG-G027-11-GGA	7HG-G027-11-GGC

Z-Guard™ Columns

Protect and Extend Column Lifetime

- Individually QC tested to ensure the highest level of quality
- Extend column lifetime by preventing stationary phase damage
- Improve separation and peak shapes (especially early elutors)
- Improve sensitivity and accuracy of quantitative results
- Available as individual guard columns or as complete kits with connectors

To ensure that all Z-Guards are the highest possible quality, we individually test each one! The columns are attached to a reference Zebron ZB-5 column and are tested using our specially designed QC mix. We carefully monitor activity, bleed, and stability. This way, we are able to say with confidence that Z-Guards will provide the low activity and high quality your methods require.



Ordering Information

Metal Z-Guard Column			
ID (mm)	Description	Part No.	
5-Meter			
0.53	Guard Column	7AK-G000-00-GMO	

High Temperature Z-Guard Columns and Kits				
ID (mm)	Description	Part No.		Part No.
		5-Meter		10-Meter
0.25	Guard Column	7AG-G000-00-GHO		7CG-G000-00-GHO
	Guard Column Kit	7AG-G000-00-GHK		7CG-G000-00-GHK
0.32	Guard Column	7AM-G000-00-GHO		7CM-G000-00-GHO
	Guard Column Kit	7AM-G000-00-GHK		7CM-G000-00-GHK
0.53	Guard Column	7AK-G000-00-GHO		7CK-G000-00-GHO
	Guard Column Kit	7AK-G000-00-GHK		7CK-G000-00-GHK

Standard Z-Guard Columns and Kits				
ID (mm)	Description	Part No.		Part No.
		5-Meter		10-Meter
0.10	Guard Column	7AB-G000-00-GZO		7CB-G000-00-GZO
	Guard Column Kit	7AB-G000-00-GZK		—
0.18	Guard Column	7AD-G000-00-GZO		7CD-G000-00-GZO
	Guard Column Kit	7AD-G000-00-GZK		7CD-G000-00-GZK
0.20	Guard Column	7AE-G000-00-GZO		—
0.25	Guard Column	7AG-G000-00-GZO		7CG-G000-00-GZO
	Guard Column Kit	7AG-G000-00-GZK		7CG-G000-00-GZK
0.32	Guard Column	7AM-G000-00-GZO		7CM-G000-00-GZO
	Guard Column Kit	7AM-G000-00-GZK		7CM-G000-00-GZK
0.53	Guard Column	7AK-G000-00-GZO		7CK-G000-00-GZO
	Guard Column Kit	7AK-G000-00-GZK		7CK-G000-00-GZK

Bulk Z-Guard Columns				
ID (mm)	Description	Part No.		Unit
50-Meter				
0.25	Guard Column	7JG-G000-00-GZO		ea
0.32	Guard Column	7JM-G000-00-GZO		ea
0.53	Guard Column	7JK-G000-00-GZO		ea
5-Meter				
0.53	Guard Column	7AK-G000-00-GZ1		10/pk

ZB-5 Z-Guard Column Multi-Pak			
ID (mm)	Description	Part No.	Unit
2-Meter			
0.25	Zebron ZB-5 Z-Guard Column	KG0-7868	25/pk

i Universal GC Guard Column. Designed for use with virtually any GC Capillary column from virtually any manufacturer. Alternative to: Restek, Supelco, Agilent Technologies, and many more.

i Z-Guard Column Kits include 5 or 10 meters of deactivated fused silica tubing, 5 universal connectors and 0.5 mL of high-temperature polyimide resin.

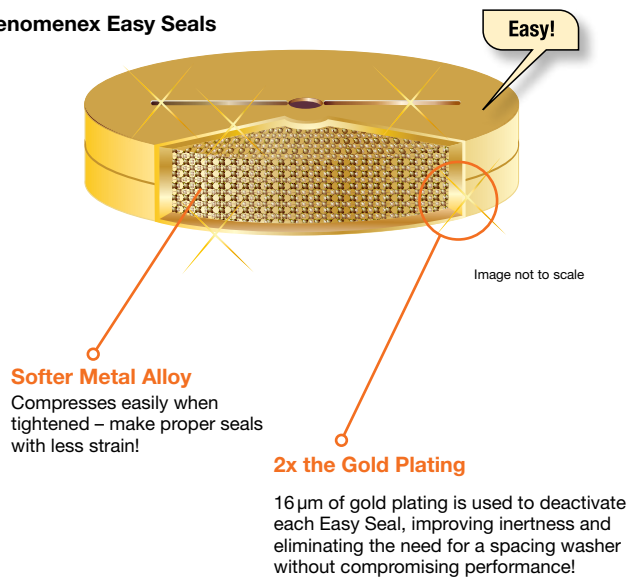
Replacement Parts for Z-Guard Kits			
Description	Part No.		Unit
Universal Capillary Column Union, Borosilicate	AG0-4716		5/pk
High Temperature Polyimide Resin, 0.5 mL	AG0-8514		ea

GC Accessories

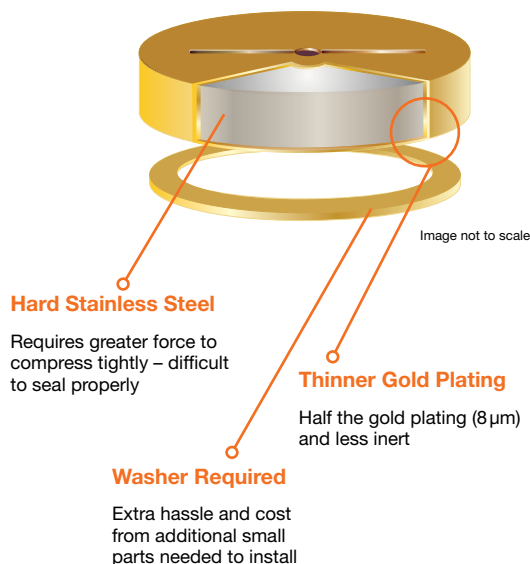
Inlet Base Seals

Easy Seals™ for Agilent® GCs

Phenomenex Easy Seals



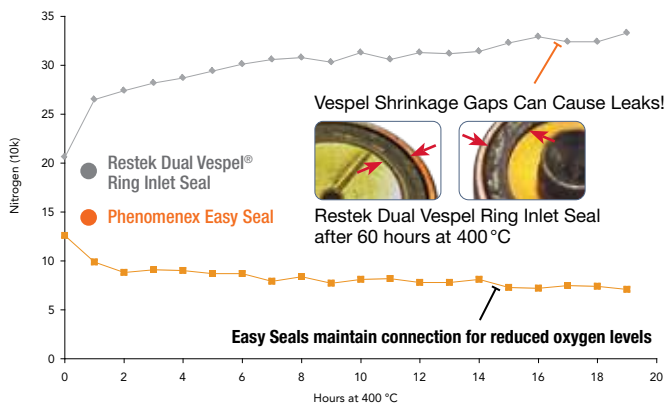
Traditional Gold Plated Seals



The Oxygen Test: 20 Hours at 400 °C

Easy Seals are designed to create leak-tight connections that reduce the amount of oxygen entering the GC system, even up to 400 °C! Our testing showed that the Easy Seal maintained a good connection while the Restek® Dual Vespel® Ring Inlet Seal showed increasing levels of oxygen in the system – increased potential for contamination!

Test Conditions: Both inlet base seals were new and unused prior to testing. Seals were installed in an Agilent 6890 Series instrument with a 5973 MS with a Zebtron ZB-5ms GC column (15 meter x 0.25 mm x 0.25 µm). An initial air and water check was performed upon installation to ensure there was no error in installation. The inlet temperature was set to 400 °C and counts of oxygen were measured over time.



Ordering Information

Easy Seals Inlet Base Seals				2/pk	10/pk
Description	Injection Type	Groove Style	Inlet Hole Diameter (mm)	Part No.	Part No.
Easy Seals Gold Inlet Seal	Splitless	Single	0.8	AG0-8619	AG0-8620



GC Accessories

Inlet Base Seals (cont'd)

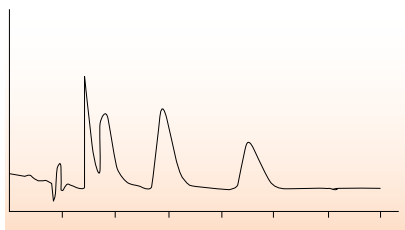
Standard Inlet Base Seals & Washers

- Prevent leaks and reduce oxygen damage
- Trap non-volatile residues, septum fragments, and other contaminants
- Gold plated Easy Seals™ provide the best performance, inertness, and ease of use

An inert flow path through the entire GC system is critical to achieving the best results for your analysis – and that includes the seal at the base of the inlet! Leaks can allow air into the system and cause oxygen contamination, leading to:

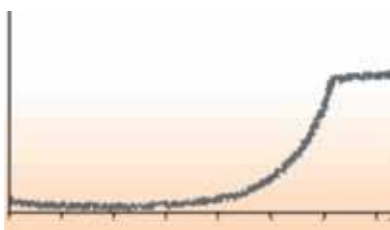
Difficult Quantitation

Stationary phase damage can distort peak shape



Low Sensitivity

Excessive bleed can lower signal-to-noise






Expensive Column Replacement

Oxygen damage is irreversible and can only be fixed by replacing your column



Ordering Information

Standard Inlet Base Seals

					2/pk		10/pk	
Description	Injection Type	Groove Style	Inlet Hole Diameter (mm)	Similar to Mfr No.*	Part No.	Similar to Mfr No.*	Part No.	
Standard Gold Inlet Seal		Splitless	Single	0.8	18740-20885	AG0-7518	18740-20885	AG0-7519
		Splitless	Single	1.2	21305	AG0-8581	21306	AG0-8582
		Split	Cross	0.8	5182-9652	AG0-7520	5182-9652	AG0-7521
		Split	Cross	1.2	21009	AG0-8583	21010	AG0-8584
Standard Stainless Steel Inlet Seal		Splitless	Single	0.8	18740-20880	AG0-8393	18740-20880	AG0-8394
		Split	Cross	0.8	—	AG0-8395	—	AG0-8396

Ordering Information

Standard Inlet Base Seal Replacement Washers

		12/pk
Description	Similar to Mfr No.*	Part No.
Standard Gold Inlet Seal Washer	—	AG0-8397
Stainless Steel Inlet Seal Washer	5061-5869	AG0-7522



Due to different replacement frequencies, inlet seal washers are sold separately from inlet base seals.



*Similar to but not always an exact equivalent to the original manufacturer's product.



For Sealing O-Rings, see p. 161

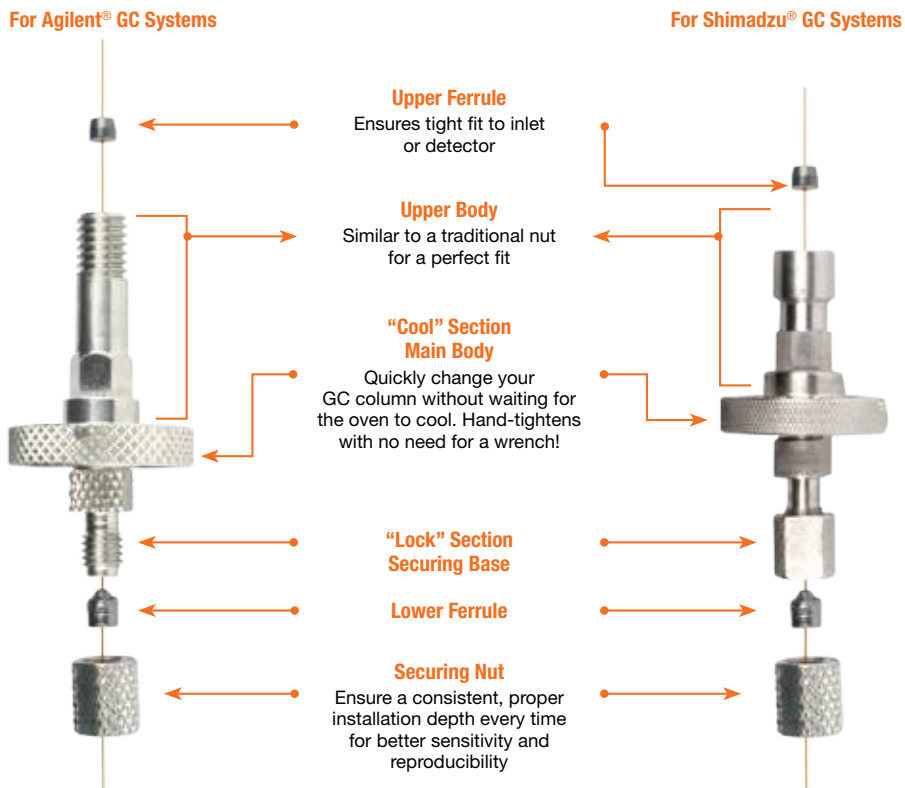
GC Accessories

Installation Nuts

Cool-Lock™ Nut

U.S. Patent No. 8, 062, 516

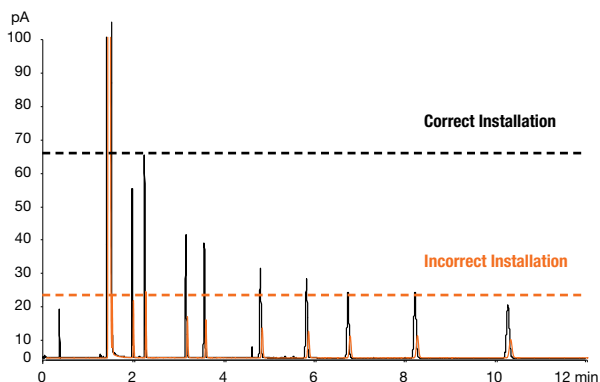
Fast GC Column Installation Without The Burn



Consistent, Accurate Installation Every Time

The red trace below is installed at 2mm, rather than the manufacturer’s recommended 6mm past the column on the injector side of the system. Correct installation noticeably increases sensitivity for all peaks; Cool-Lock Nut allows for locking of the proper insertion depth every time to improve run-to-run response reproducibility.

Correct Installation = 165% Better Signal



Conditions for both chromatograms:

- Column:** Zebron ZB-WAX
- Dimensions:** 30 meter x 0.25 mm x 0.25 µm
- Part No.:** 7HG-G007-11
- Injection:** Split 1:100 @ 250 °C, 1.4 µL
- Carrier Gas:** Helium @ 40 cm/sec (constant flow)
- Oven Program:** 140 °C for 10 minutes
- Detector:** FID @ 250 °C
- Sample:**
 - 1. 2-Octanone
 - 2. Tetradecane
 - 3. 1-Octanol
 - 4. Methyl decanoate
 - 5. Methyl undecanoate
 - 6. 1-Decanol
 - 7. Methyl dodecanoate
 - 8. 2,6-Dimethylaniline
 - 9. 2,6-Dimethylphenol

GC Accessories





Installation Nuts (cont'd)

Cool-Lock™ Nut Selection Guide

Shimadzu® Systems	Agilent® Systems			
1 Use Part No.	1 Decide On The Style of Cool-Lock Nut Needed		2 Determine How Many Cool-Lock Nuts Needed Per System	
AGO-8419	Short Style (AGO-8319) Recommended for use with standard short style ferrules. Also, use for both the inlet and detector configurations on Agilent 6890, 5890, and 7890 GC systems	Long Style (AGO-8320) Recommend for use with standard long style ferrules.	Detector MS	Number of Nuts 1
			FID, ECD, Other	2

Ordering Information

Cool-Lock Installation Nuts and Gauges

Description	Fits Model No.	For Use With Ferrule Style	Part No.	Unit	
For Agilent Systems					
Cool-Lock Installation Nut		Short (1.65 mm)	AGO-8319	ea	
		Long (2.4 mm)	AGO-8320	ea	
Cool-Lock Installation Gauge		5850, 5890, 6850, 6890, 7890	—	AGO-8349	ea
For Shimadzu Systems					
Cool-Lock Installation Nut		2010, 2014, 2025	—	AGO-8419	ea
Cool-Lock Installation Gauge		2010, 2014, 2025	—	AGO-8420	ea




For Ferrule Selection Guide for Cool-Lock Nuts, see p. 159



Ordering Information

Standard Installation Nut

Description	Similar to Mfr No.*	For Use With Ferrule Style	Part No.	Unit	
For GC-MS Systems					
Brass Installation Nut, Nickel Plated	—	—	AGO-9076	5/pk	
For Other Systems					
Agilent Installation Nut, Standard (1/16 in. Hex Stainless Steel)		5181-8830	Short (1.65 mm)	AGO-5152	2/pk
Agilent Installation Nut, Deep Well (1/16 in. Hex Stainless Steel)		5020-8292	Long (2.4 mm)	AGO-5153	2/pk

* Similar to but not always an exact equivalent to the original manufacturer's product.



Caution: For safety, please use common sense when handling metal surfaces within the GC oven, including the Cool-Lock Nut. The Cool-Lock Nut is designed to track the GC oven temperature as close as possible, therefore, when you cool down your GC oven, the Cool-Lock Nut will follow suit because it is related to oven temperature with the fan on. So if the oven is hot enough to cause severe burns, the Cool-Lock Nut will also be hot enough to cause severe burns. If the GC oven fan has turned off and the injection port temperature is still hot, the Cool-Lock Nut will begin to heat up causing it to be too hot to touch with the bare hand. For any questions regarding use of the Cool-Lock Nut, please contact your local Phenomenex representative.

GC Accessories

Ferrules

Ferrule Selection Guide by Material

Material	Advantage	Disadvantage	Recommended for
100% Graphite	<ul style="list-style-type: none"> • Easy to use • Tight, stable seal • Rated to 450 °C 	<ul style="list-style-type: none"> • Porous to oxygen • Not for MS or other oxygen sensitive detectors • Easily deformed • Potential to contaminate system 	<ul style="list-style-type: none"> • General use • FID and NPD • High temperature analysis • Cool on-column
85/15% Vespel®/Graphite	<ul style="list-style-type: none"> • Durable for long lifetime • Not porous to oxygen • Rated to 350 °C 	<ul style="list-style-type: none"> • Non-reusable • Need to re-tighten frequently • Flows at high temperatures 	<ul style="list-style-type: none"> • Good for MS or other oxygen sensitive detectors • Most leak free
60/40% Vespel/Graphite	<ul style="list-style-type: none"> • Easier to use than 85/15 • Not porous to oxygen • Rated to 400 °C 	<ul style="list-style-type: none"> • Non-reusable • Easier to deform than 85/15 	<ul style="list-style-type: none"> • Good for MS or other oxygen sensitive detectors • Best balance between tight seal and ease of use
SilTite™	<ul style="list-style-type: none"> • No need to re-tighten • Reliable seal • No contamination • Rated > 450 °C 	<ul style="list-style-type: none"> • Easily deforms 	<ul style="list-style-type: none"> • High temperature MS analysis

Ferrule Selection Guide by Length

Length	Advantage	Disadvantage	Recommended for
Short	<ul style="list-style-type: none"> • Robust seal 	<ul style="list-style-type: none"> • Not recommended for MS detector connection 	<ul style="list-style-type: none"> • Standard detectors and inlet
Long	<ul style="list-style-type: none"> • Good nut and interface design 	<ul style="list-style-type: none"> • Not recommended for inlet connection 	<ul style="list-style-type: none"> • MS detector connection

Ferrule Selection Guide for Cool-Lock™ Nuts

Column ID (mm)	Ferrule ID (mm)	Agilent Systems				Shimadzu Systems	
		Long Style Nut		Short Style Nut		Top Ferrule	Bottom Ferrule
		Top Ferrule	Bottom Ferrule	Top Ferrule	Bottom Ferrule		
0.10-0.25	0.4	AGO-4698	AGO-4698	AGO-8929	AGO-4698	AGO-8881	AGO-4698
0.28-0.35	0.5	AGO-4701	AGO-4701	AGO-7513	AGO-4701	AGO-8881	AGO-4701
0.45-0.53	0.8	AGO-4704	AGO-4704	AGO-8676	AGO-4704	AGO-8882	AGO-4704



Ferrule ordering information on next page.



All ferrules are 1/16 in. (except SilTite™)
Preconditioned for lower bleed.








All Vespel containing ferrules should be pre-shrunk
in an oven at 250 °C for at least 4 hours prior to use.

GC Accessories

Ferrules (cont'd)

Ordering Information

Composition	GC Column ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Preconditioned	Part No.	Unit	
Short 	100% Graphite	0.10-0.25	500-2114	N	AGO-8929	10/pk	
		0.28-0.35	072635 5080-8853	Y	AGO-7513	10/pk	
		0.45-0.53	072636 500-2118	Y	AGO-8676	10/pk	
	85% Vespel® / 15% Graphite	0.10-0.25	5181-3323 5181-3322	N Y	AGO-7318 AGO-7321	10/pk 10/pk	
		0.28-0.35	5062-3514 5062-3513	N Y	AGO-7319 AGO-7322	10/pk 10/pk	
		0.40-0.53	5062-3512 5062-3511	N Y	AGO-7320 AGO-7323	10/pk 10/pk	
Long 	100% Graphite	0.10-0.25	20200 20227	N	AGO-4698 AGO-4699	10/pk 50/pk	
		0.28-0.35	72635	N	AGO-4701 AGO-4702	10/pk 50/pk	
		0.45-0.53	82636	N	AGO-4704 AGO-4705	10/pk 50/pk	
	85% Vespel / 15% Graphite	0.10-0.25	072663 5062-3508	Y	AGO-8677	10/pk	
		0.28-0.35	072654 5062-3506	Y	AGO-8678	10/pk	
		0.45-0.53	072655 5062-3538	Y	AGO-8679	10/pk	
	60% Vespel / 40% Graphite	0.10-0.25	20211 20229	Y	AGO-4707 AGO-4708	10/pk 50/pk	
		0.28-0.35	20212 20231	Y	AGO-4710 AGO-4711	10/pk 50/pk	
		0.45-0.53	20213 20230	Y	AGO-4713 AGO-4714	10/pk 50/pk	
	Two Hole 	85% Vespel / 15% Graphite	0.10-0.25	072662 5062-3580	Y	AGO-8680	10/pk
			0.28-0.35	212222 5062-3581	N	AGO-8681**	10/pk
			0.45-0.53	072674	Y	AGO-8682**	10/pk
	SiTite 	SiTite™	0.10-0.25	073220	Y	AGO-8762	10/pk
			0.28-0.35	073221	Y	AGO-8757	10/pk
			0.45-0.53	073222	Y	AGO-8758	10/pk
Metal Encapsulated 	100% Graphite for Shimadzu GCs	0.10-0.25	221-32126-05	Y	AGO-8881	10/pk	
		0.25-0.35	221-32126-05	Y	AGO-8881	10/pk	
		0.45-0.53	221-32126-08	Y	AGO-8882	10/pk	

* Similar to but not always an exact equivalent to the original manufacturer's product.

Note: SiTite ferrules are to be used with SiTite nuts. Please contact your Phenomenex technical consultant or distributor for the appropriate nut and ferrule part numbers for your GC system.



For Replacement Ferrules for Mini-unions, see p. 171



All ferrules are 1/16 in. (except SiTite™) and ** ferrules are 1/8 in. Preconditioned ferrules provide lower bleed.






All Vespel containing ferrules should be pre-shrunk in an oven at 250 °C for at least 4 hours prior to use.

GC Accessories

O-Rings

Ordering Information

O-Rings

Fits Liners for Manufacturer	Description	Similar to Mfr. No.*	Part No.	Unit	
Agilent®		Viton® Fluorocarbon, rated to < 300 °C	5180-4182	AGO-7326	10/pk
		Graphite, rated to 450 °C	5180-4168	AGO-7327	10/pk
PerkinElmer®		Viton for 6.2 mm OD inlet liners	N9302783	AGO-8674	10/pk
Shimadzu® (Model 2010)		Viton	036-11203-84	AGO-8675	10/pk

* Similar to but not always an exact equivalent to the original manufacturer's product.

Septa



Advanced silicone formulations reduce coring, enhance durability and re-sealing capabilities, and increase septum lifetime. Septa with GuideRight™ holes guide the needle during injection, for longer lifetime and less bent needles.

Septa Sizes by GC Instrument

Manufacturer	Instrument Model	Septa Diameter		
		9.5 mm (³ / ₈ in.)	11 mm (⁷ / ₁₆ in.)	Septa Plug
Agilent® (HP)	5850, 5880A, 5890, 6850, 6890, 7890		•	
	5700 series, 5880	•		
Antek®	All	•		
Thermo Scientific®	Finnigan 9600	•		
GOW-MAC®	All	•		
HNU	Portable GC	•		
PerkinElmer®	Sigma series, 900, 990, 8000, AutoSystem, Clarus 500		•	
Shimadzu®	All			•
SRI	All			•
Tracor	550, 560	•		
Varian®	1040, 1041, 1060, 1061	•		
	1075, 1077, 1078, 1079	•		
	3700 / Vista, Capillary Injectors		•	
	Packed Column Injectors	•		
	SPI			•

Ordering Information

Septa

Type	Description		Diameter		Includes GuideRight Hole	Part No.	Unit
			(mm)	(in.)			
Silicone Rubber Septa		<ul style="list-style-type: none"> Our most popular choice for low-bleed septa, rated to 400 °C Designed and conditioned for high sensitivity Durometer rating of 50 with typical injection life of 150 punctures 	9.5	³ / ₈	✓	AGO-7916	50/pk
			9.5	³ / ₈		AGO-4690	50/pk
			9.5	³ / ₈		AGO-4691	100/pk
			11	⁷ / ₁₆	✓	AGO-7917	50/pk
			11	⁷ / ₁₆		AGO-4696	50/pk
			11	⁷ / ₁₆		AGO-4697	100/pk
			9.5	³ / ₈		AGO-8572	50/pk
			11	⁷ / ₁₆	✓	AGO-7875	50/pk
			11	⁷ / ₁₆		AGO-8573	50/pk
			9.5	³ / ₈		AGO-4688	50/pk
PhenoGreen™ -400	<ul style="list-style-type: none"> Long-life, high temperature septa for use up to 400 °C 	11	⁷ / ₁₆	✓	AGO-7875	50/pk	
		11	⁷ / ₁₆		AGO-8573	50/pk	
		9.5	³ / ₈		AGO-4688	50/pk	
PhenoBlue™ -300	<ul style="list-style-type: none"> Low-bleed septum heat stable to 350 °C Durometer rating of 50 - 60 for easy puncture up to 100 injections at 300 °C 	9.5	³ / ₈		AGO-4689	100/pk	
		11	⁷ / ₁₆		AGO-4694	50/pk	
		11	⁷ / ₁₆		AGO-4695	100/pk	
PhenoGrey™ -250	<ul style="list-style-type: none"> General purpose silicone rubber septum rated to 250 °C Durometer rating of 40 - 45 for easy puncture up to 100 injections 	9.5	³ / ₈		AGO-4686	50/pk	
		11	⁷ / ₁₆		AGO-4692	50/pk	
		11	⁷ / ₁₆		AGO-4693	100/pk	
Injector Septa Plugs	BTO® Silicone Septa Plug	<ul style="list-style-type: none"> Fits Shimadzu (9A, 14, 15A, 17A, 2010) and SRI injectors Rated to 400 °C 				AGO-7517	50/pk
							

GC Accessories

Merlin Microseal™ Septum

- Improves chromatographic performance and quantitative results by reducing bleed and ghost peaks
- Improves reliability and performance during extended automated runs
- Thousands of injections before seal replacement
- Save time changing septa, instrument downtime and troubleshooting

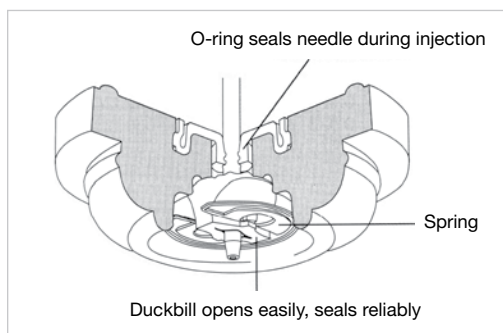


The Merlin Microseal Septum is a long-life replacement for the standard septum on the capillary inlet or the purged-packed inlet of Agilent GC systems.

The Microseal is a patented inlet assembly that provides two distinct sealing mechanisms. The first is a double O-ring seal around the syringe that ensures gas leak integrity during time of injection. There is no traditional septum to core or flake, which can cause bleeding and ghost peaks, and less force is required for the user to make a manual injection. The second seal is a spring-assisted duckbill that reliably maintains a high-pressure seal within the injection port at all times.

Since the syringe does not pierce any septum material, seal lifetime is significantly extended – Microseals are typically used for up to one year or more under normal conditions before septum replacement. Many laboratories experience lifetimes of 5,000 to 10,000 injections or more. This means you save tremendously in time changing septa, instrument downtime and troubleshooting. Chromatographic performance will also improve due to less bleed and fewer ghost peaks, improving quantitation and data reliability.

Instrument Compatibility: The Merlin Microseal systems can be used manually with all Agilent 5800, 6800, and 7890 series GCs. However, for autosampler use it is compatible with only the 7673A and 7673B units. Other inlets or autosampler systems from Agilent or other manufacturers are not compatible.



(1) Complete High Pressure Kits include the nut and one or two Microseal septa. All High Pressure Kits are rated for inlet pressures up to 100 psi. For long-term operation (>6 months) with the Microseal septum use the following injection port limits: (a) Agilent 6890, 5890 Series II - 325 °C; (b) Agilent 5890A - 300 °C. Higher temperatures will result in shorter lifetimes.

(2) The Merlin Microseal Septum should only be used with a blunt-tipped, 0.63 mm diameter (0.025 in., 23 gauge) syringe needle (typically used with the Agilent 7673 autosampler). Sharp-pointed or sharp-edged needles should not be used as they may slice or pierce the seals.

Ordering Information

Merlin Microseal Septum

Part No.	Description	Unit
AGO-5985	Merlin Microseal High Pressure Septum Standard Kit, includes nut and 2 septa	ea
AGO-5986	Merlin Microseal High Pressure Septum Starter Kit, includes nut and 1 septum	ea

Replacement Parts

AGO-5987	Merlin Microseal High Pressure Septum	ea
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Syringes for Use With the Merlin Microseal

Ordering Information

Part No.	Mfr. No.	Agilent P/N	Description*	Capacity (µL)	Unit
For Agilent 7673 Autosamplers					
ASO-4386	87987	9301-0892	75ASN (23s/1.71in./HP)	5	ea
ASO-4387	80387	9301-0713	701ASN (23s/1.71in./HP)	10	ea
ASO-4388	80390	9301-0725	701ASN (23s/1.71in./HP)	10	6/pk

NOTE: Replacement needles are available in packs of three.

* Values in parentheses denote the following: (gauge/length/point style). "s" after gauge denotes smaller/reduced internal needle diameter.



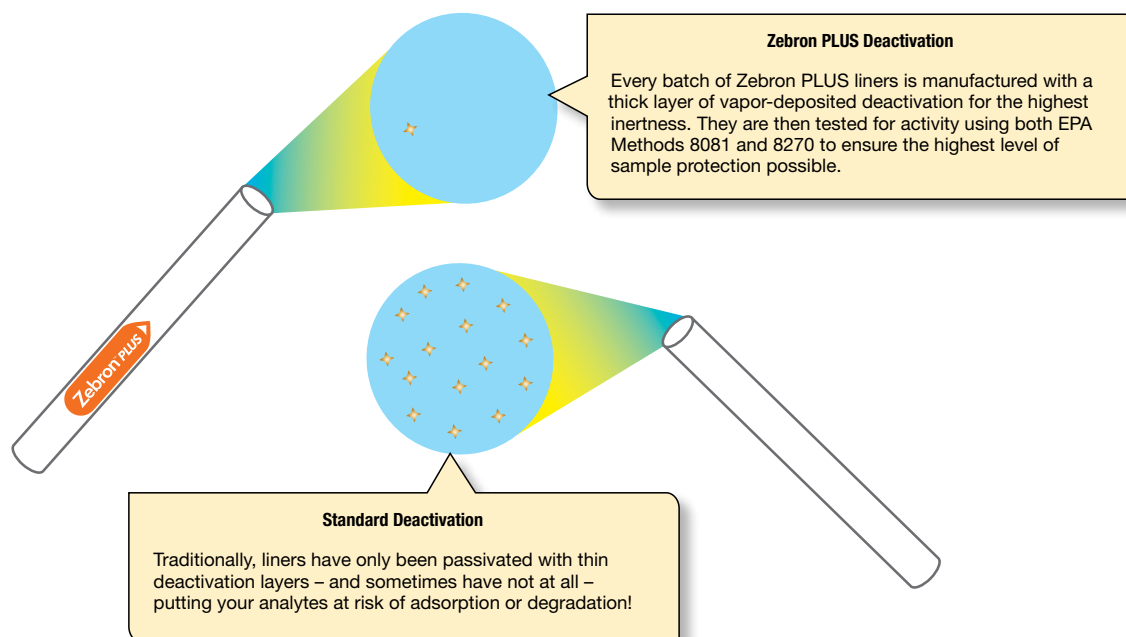
Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Inlet Liners

Protect Your Samples with Zebtron PLUS GC Inlet Liners

Zebtron PLUS GC inlet liners undergo a unique deactivation process, resulting in a remarkably inert pathway that prevents sample adsorption and degradation for active compounds.

See The Difference: Zebtron PLUS vs. Traditional Deactivation



Enhance Your Analysis

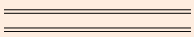


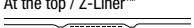
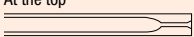
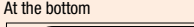
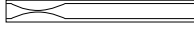

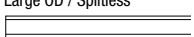

Analysis of dirty samples, samples with wide boiling points, or samples with wide molecular weights can be enhanced by choosing a Zebtron PLUS liner with quartz wool. Liners packed with wool can prevent non-volatile compounds from entering the column and also improve sample vaporization for a more robust, reproducible analysis.

Why Use Pre-Packed Liners?

Though the upfront cost of self-packing your liner may seem attractive, the time and headaches caused by resulting tailing or irreproducible peaks can be sizeable! Self-packed wool fibers commonly break during installation and any existing deactivation on the liner can also be scratched or damaged. Pre-packed Zebtron PLUS liners undergo the deactivation process with the quartz wool already in place, which ensures that any active sites that form during packing are not exposed.

Inlet Liners

Liner Geometry Selection Guide

Liner Style*	Function	Advantages	Disadvantages	Recommended For
Straight 	Low surface area for less activity	<ul style="list-style-type: none"> Simple to use Least expensive Low activity 	<ul style="list-style-type: none"> Possible inlet discrimination More frequent gold seal maintenance from exposure to sample contamination Possible inconsistency if sample injection bypasses split ratio 	Volatiles
Glass Wool In the middle 	Traps non-volatiles; mixes sample; vaporizes sample above the column	<ul style="list-style-type: none"> Reduces gold seal/column contamination and maintenance More reproducible results Can help focus analytes Extends column life 	<ul style="list-style-type: none"> Higher surface area that can become active Glass wool can become dislodged 	Dirty samples, volatiles, high initial oven temperatures
At the bottom 	Traps non-volatiles; mixes sample; vaporizes sample above the column	<ul style="list-style-type: none"> Reduces gold seal/column contamination and maintenance More reproducible results Can provide higher responses than wool in middle 	<ul style="list-style-type: none"> Higher surface area that can become active Glass wool can become dislodged 	Dirty samples
At the top / Z-Liner™ 	Keeps glass wool in place; wipes syringe needle clean	<ul style="list-style-type: none"> Reduces gold seal/column contamination and maintenance More reproducible results Can help focus analytes Extends column life 	<ul style="list-style-type: none"> Higher surface area that can become active 	Pressure pulsed injections, dirty samples, volatiles, high initial oven temperatures
Taper / Gooseneck At the top 	Limits the expansion of the solvent to the inlet	<ul style="list-style-type: none"> Allows for larger injection volumes Decrease backflash 	<ul style="list-style-type: none"> Higher risk of needle breakage Increased cost Cannot self-pack with glass wool 	Water injections
At the bottom 	Directs flow onto column; low surface area	<ul style="list-style-type: none"> Reduces gold seal/column contamination and maintenance Improved sensitivity Lower activity 	<ul style="list-style-type: none"> Increased cost 	Pesticides (without wool), semi-volatiles (with wool)
Direct Connect 	Connects directly to column to aid transfer of analytes	<ul style="list-style-type: none"> Better sensitivity for splitless injections Decreases inlet discrimination 	<ul style="list-style-type: none"> Only used for splitless injections Increased cost One-time use 	Trace analysis, splitless injections, separation from solvent peak (with top hole), aqueous samples (with bottom hole)
Internal Diameter (ID) Small 	Small internal volume and surface area; restricts sample diffusion	<ul style="list-style-type: none"> Better peak shape of gaseous samples Less activity for small injections of active compounds 	<ul style="list-style-type: none"> Very small internal volume is easy to overload with normal injection volumes 	Headspace, purge and trap, or gas injections; active samples with low expansion solvents
Outer Diameter (OD) / Splitless Large OD / Splitless 	Fits tightly inside the inlet and limits sample contact with inlet components	<ul style="list-style-type: none"> Better sensitivity for long splitless hold times 	<ul style="list-style-type: none"> Not very amenable for changing to large split ratios 	Splitless injections of active compounds
Cup Liner 	Cup traps non-volatiles but has lower surface area than wool; vaporizes sample above the column	<ul style="list-style-type: none"> Good sample mixing Reduces gold seal/column contamination and maintenance More reproducible results Improves results for active compounds Provides receptacle for multiple injections 	<ul style="list-style-type: none"> Increased cost Higher surface area than straight liner can result in increased activity for very active compounds 	Multiple or large volume injections, active samples, dirty samples

*Examples given are only one possible option. Other available options may be better suited for your analysis.

What's a Z-Liner?



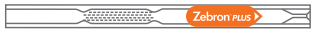



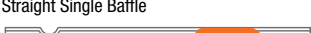
Zebron PLUS Liners with a Z-Liner geometry contain optimally-placed deactivated quartz wool, which is held in place by two tapered sections of glass inside the liner. This ensures that the wool

remains in the correct position for injection, wipes the needle tip completely clean, and properly volatilizes the sample.

Liners for Agilent® GC Systems




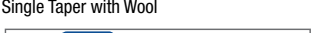



Ordering Information

Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 5890, 6890 and 7890 Models						
Direct Connect 	Trace analysis, Splitless injections	S/SL	4 x 78.5	PLUS Inert	AG2-0A50-01 AG2-0A50-05 AG2-0A50-25	ea 5/pk 25/pk
Single Taper 	Pesticides	S/SL	4 x 78.5	PLUS Inert	AG2-0A10-01 AG2-0A10-05 AG2-0A10-25	ea 5/pk 25/pk
Single Taper Z-Liner™ 	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	PLUS Inert	AG2-0A13-01 AG2-0A13-05 AG2-0A13-25	ea 5/pk 25/pk
Single Taper with Wool 	Semi-volatiles	S/SL	4 x 78.5	PLUS Inert	AG2-0A11-01 AG2-0A11-05 AG2-0A11-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 78.5	PLUS Inert	AG2-0A00-01 AG2-0A00-05 AG2-0A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	PLUS Inert	AG2-0A03-01 AG2-0A03-05 AG2-0A03-25	ea 5/pk 25/pk
Straight Single Baffle 	Semi-volatiles, Pesticides	S/SL	1.8 x 71	PLUS Inert	AG2-1F06-01 AG2-1F06-05 AG2-1F06-25	ea 5/pk 25/pk

Ordering Information

Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 5890, 6890 and 7890 Models						
Direct Connect 	Trace analysis, Splitless injections	S/SL	4 x 78.5	Standard	AG1-0A50-01 AG1-0A50-05 AG1-0A50-25	ea 5/pk 25/pk
Single Taper 	Pesticides	S/SL	4 x 78.5	Standard	AG1-0A10-01 AG1-0A10-05 AG1-0A10-25	ea 5/pk 25/pk
Single Taper Z-Liner 	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	Standard	AG1-0A13-01 AG1-0A13-05 AG1-0A13-25	ea 5/pk 25/pk
Single Taper with Wool 	Semi-volatiles	S/SL	4 x 78.5	Standard	AG1-0A11-01 AG1-0A11-05 AG1-0A11-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 78.5	Standard	AG1-0A00-01 AG1-0A00-05 AG1-0A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	Standard	AG1-0A03-01 AG1-0A03-05 AG1-0A03-25	ea 5/pk 25/pk
Straight Single Baffle 	Semi-volatiles, Pesticides	PTV	1.8 x 71	Standard	AG1-1F06-01 AG1-1F06-05 AG1-1F06-25	ea 5/pk 25/pk



Inlet Styles Key

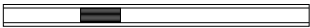







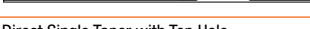
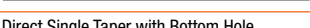




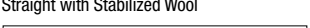

- S/SL: Split/Splitless
- PTV: Programmed-Temperature Vaporization
- PSS: Programmed-Temperature Split/Splitless
- SPI: Single Point Injection

GC Accessories

Liners for Agilent® GC Systems (cont'd)

Ordering Information

GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 5890, 6890, and 7890 Models						
 Straight with Wool	Large injection, Trace analysis	S/SL	4 x 78.5	Standard	AGO-4655 AGO-4656	5/pk 25/pk
 Single Taper with Wool	Large injection, Trace analysis	S/SL	4 x 78.5	Standard	AGO-4657 AGO-4658	5/pk 25/pk
 Cup	High and low MW compounds, Large volume injections	S/SL	4 x 78.5	Not Deactivated	AGO-4647 AGO-4648	5/pk 25/pk
 Cup with Wool	Large volume injection of dirty samples	S/SL	4 x 78.5	Not Deactivated	AGO-7853	5/pk
 Straight	Large injection, Trace analysis	S/SL	2 x 78.5	Not Deactivated	AGO-4649 AGO-4650	5/pk 25/pk
 Straight	Large injection, Trace analysis	S/SL	4 x 78.5	Standard	AGO-4651 AGO-4652	5/pk 25/pk
 Single Taper	Small injection, Trace analysis	S/SL	2 x 78.5	Standard	AGO-4653	5/pk
 Direct	Injection < 1 µL, Purge and Trap/Headspace	S/SL	1.5 x 78.5	Standard	AGO-4659 AGO-4660	5/pk 25/pk
 Recessed Gooseneck with Wool	Large injection of dirty samples	S/SL	4 x 78.5	Standard	AGO-4661 AGO-4662	5/pk 25/pk
 Direct Single Taper with Top Hole	Trace analysis of active compounds	S/SL	4 x 78.5	Standard	AGO-7850	5/pk
 Direct Single Taper with Bottom Hole	Trace analysis of active compounds	S/SL	4 x 78.5	Standard	AGO-7851	5/pk
 Single Taper with Wool	General use, Dirty samples	S/SL	4 x 78.5	Standard	AGO-8172	5/pk
 Double Taper	Large injection, Trace analysis of active compounds	S/SL	4 x 78.5	Standard	AGO-8173	5/pk
 Double Gooseneck with Bottom Hole	Trace analysis of active compounds	S/SL	4 x 78.5	Standard	AGO-8430	5/pk
 Straight with Wool	Large injection Trace analysis,	S/SL	4 x 78.5	Standard	AGO-8653 AGO-8654	5/pk 25/pk
 Straight with Stabilized Wool	Small injection, Trace analysis of dirty samples	S/SL	2.3 x 78.5	Standard	AGO-8379	5/pk



Inlet Styles Key

S/SL: Split/Splitless

PTV: Programmed-Temperature Vaporization

PSS: Programmed-Temperature Split/Splitless

SPI: Single Point Injection

Find Your Liner Online!




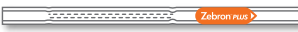

Easily search by part numbers, applications, injection mode, or system manufacturer for quick selection **in under 1 minute!**



Liners for PerkinElmer® GC Systems


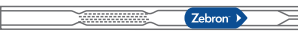



Ordering Information

Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For AutoSystem™, AutoSystem XL, Clarus 500, and Clarus 600 Models						
Single Taper 	Pesticides	S/SL	4 x 92	PLUS Inert	AG2-2A10-01 AG2-2A10-05 AG2-2A10-25	ea 5/pk 25/pk
Single Taper Z-Liner™ 	Semi-volatiles, Dirty samples	S/SL	4 x 92	PLUS Inert	AG2-2A13-01 AG2-2A13-05 AG2-2A13-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 92	PLUS Inert	AG2-2A00-01 AG2-2A00-05 AG2-2A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples	PSS	2 x 86.2	PLUS Inert	AG2-2E03-01 AG2-2E03-05 AG2-2E03-25	ea 5/pk 25/pk
Straight Z-Liner 	High initial oven temperatures	S/SL	4 x 92	PLUS Inert	AG2-2A03-01 AG2-2A03-05 AG2-2A03-25	ea 5/pk 25/pk



Ordering Information

Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For AutoSystem, AutoSystem XL, Clarus 500, and Clarus 600 Models						
Single Taper 	Pesticides	S/SL	4 x 92	Standard	AG1-2A10-01 AG1-2A10-05 AG1-2A10-25	ea 5/pk 25/pk
Single Taper Z-Liner 	Semi-volatiles, Dirty samples	S/SL	4 x 92	Standard	AG1-2A13-01 AG1-2A13-05 AG1-2A13-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 92	Standard	AG1-2A00-01 AG1-2A00-05 AG1-2A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples	PSS	2 x 86.2	Standard	AG1-2E03-01 AG1-2E03-05 AG1-2E03-25	ea 5/pk 25/pk
Straight Z-Liner 	High initial oven temperatures	S/SL	4 x 92	Standard	AG1-2A03-01 AG1-2A03-05 AG1-2A03-25	ea 5/pk 25/pk

Ordering Information

GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For AutoSystem, AutoSystem XL, Clarus 500, and Clarus 600 Models						
Straight 	General use, Trace samples	S/SL	4 x 92	Not Deactivated	AG0-4665	5/pk
Sintered Glass 	Large injection, Trace analysis	PSS	2 x 86.2	Standard	AG0-8658	5/pk



Inlet Styles Key

S/SL: Split/Splitless

PTV: Programmed-Temperature Vaporization

PSS: Programmed-Temperature Split/Splitless







SPI: Single Point Injection

GC Accessories

Liners for Shimadzu® GC Systems







Ordering Information

Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 17A, 2014 and 2025 Models						
Single Taper Z-Liner™ 	Pesticides	S/SL	3.4 x 95	PLUS Inert	AG2-3B13-01 AG2-3B13-05 AG2-3B13-25	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	AG2-3B03-01 AG2-3B03-05 AG2-3B03-25	ea 5/pk 25/pk
For 2010 Models						
Single Taper 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	AG2-4B10-01 AG2-4B10-05 AG2-4B10-25	ea 5/pk 25/pk
Single Taper Z-Liner 	Pesticides	S/SL	3.4 x 95	PLUS Inert	AG2-4B13-01 AG2-4B13-05 AG2-4B13-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	3.4 x 95	PLUS Inert	AG2-4B00-01 AG2-4B00-05 AG2-4B00-25	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	AG2-4B03-01 AG2-4B03-05 AG2-4B03-25	ea 5/pk 25/pk

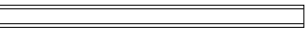




Ordering Information

Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 17A, 2014, and 2025 Models						
Single Taper Z-Liner 	Pesticides	S/SL	3.4 x 95	Standard	AG1-3B13-01 AG1-3B13-05 AG1-3B13-25	ea 5/pk 25/pk
Straight Z-Liner 		S/SL	3.4 x 95	Standard	AG1-3B03-01 AG1-3B03-05 AG1-3B03-25	ea 5/pk 25/pk
For 2010 Models						
Single Taper 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	Standard	AG1-4B10-01 AG1-4B10-05 AG1-4B10-25	ea 5/pk 25/pk
Single Taper Z-Liner 	Pesticides	S/SL	3.4 x 95	Standard	AG1-4B13-01 AG1-4B13-05 AG1-4B13-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	3.4 x 95	Standard	AG1-4B00-01 AG1-4B00-05 AG1-4B00-25	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	Standard	AG1-4B03-01 AG1-4B03-05 AG1-4B03-25	ea 5/pk 25/pk

Ordering Information



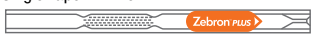
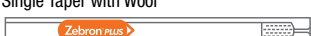


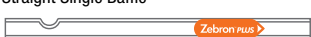
GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 17A, 2014, and 2025 Models						
Straight 	Small injection, Trace analysis	S/SL	2.6 x 95	Standard	AGO-4667	5/pk
For 14A Models						
Straight 	Trace analysis	WBC	3.4 x 139	Standard	AGO-4669	5/pk
Single Taper FocusLiner™ 	General use, Dirty samples	S/SL	3.4 x 99	Standard	AGO-4682	5/pk
Middle Gooseneck 	General use, Dirty samples	S/SL	3.4 x 95	Standard	AGO-8661	5/pk
Recessed Gooseneck with Wool 	General use, Dirty samples	S/SL	3.4 x 95	Standard	AGO-8663	5/pk

Liners for Thermo Scientific® GC Systems

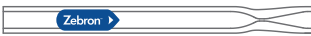

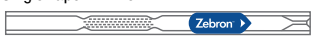



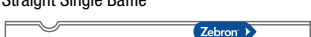
Ordering Information

Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 5890, 6890 and 7890 Models						
Direct Connect 	Trace analysis, Splitless injections	S/SL	4 x 78.5	PLUS Inert	AG2-0A50-01 AG2-0A50-05 AG2-0A50-25	ea 5/pk 25/pk
Single Taper 	Pesticides	S/SL	4 x 78.5	PLUS Inert	AG2-0A10-01 AG2-0A10-05 AG2-0A10-25	ea 5/pk 25/pk
Single Taper Z-Liner™ 	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	PLUS Inert	AG2-0A13-01 AG2-0A13-05 AG2-0A13-25	ea 5/pk 25/pk
Single Taper with Wool 	Semi-volatiles	S/SL	4 x 78.5	PLUS Inert	AG2-0A11-01 AG2-0A11-05 AG2-0A11-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 78.5	PLUS Inert	AG2-0A00-01 AG2-0A00-05 AG2-0A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	PLUS Inert	AG2-0A03-01 AG2-0A03-05 AG2-0A03-25	ea 5/pk 25/pk
Straight Single Baffle 	Semi-volatiles, Pesticides	PTV	1.8 x 71	PLUS Inert	AG2-1F06-01 AG2-1F06-05 AG2-1F06-25	ea 5/pk 25/pk

Ordering Information

Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 5890, 6890 and 7890 Models						
Direct Connect 	Trace analysis, Splitless injections	S/SL	4 x 78.5	Standard	AG1-0A50-01 AG1-0A50-05 AG1-0A50-25	ea 5/pk 25/pk
Single Taper 	Pesticides	S/SL	4 x 78.5	Standard	AG1-0A10-01 AG1-0A10-05 AG1-0A10-25	ea 5/pk 25/pk
Single Taper Z-Liner 	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	Standard	AG1-0A13-01 AG1-0A13-05 AG1-0A13-25	ea 5/pk 25/pk
Single Taper with Wool 	Semi-volatiles	S/SL	4 x 78.5	Standard	AG1-0A11-01 AG1-0A11-05 AG1-0A11-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 78.5	Standard	AG1-0A00-01 AG1-0A00-05 AG1-0A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	Standard	AG1-0A03-01 AG1-0A03-05 AG1-0A03-25	ea 5/pk 25/pk
Straight Single Baffle 	Semi-volatiles, Pesticides	PTV	1.8 x 71	Standard	AG1-1F06-01 AG1-1F06-05 AG1-1F06-25	ea 5/pk 25/pk



Inlet Styles Key



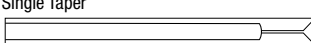
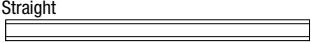


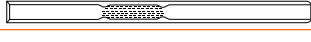
- S/SL: Split/Splitless
- PTV: Programmed-Temperature Vaporization
- PSS: Programmed-Temperature Split/Splitless
- SPI: Single Point Injection

GC Accessories

Liners for Thermo Scientific® GC Systems (cont'd)

Ordering Information


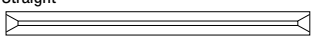

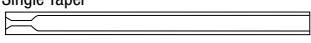
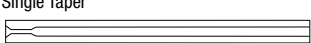


GC Liners


Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For TRACE 8000 and FOCUS Models						
 Double Taper FocusLiner™ Trace analysis of dirty samples	Trace analysis of dirty samples	S/SL	5 x 105	Standard	AGO-4679 AGO-7863	5/pk 25/pk
 Straight General use	General use	S/SL	3 x 105	Standard	AGO-4645	5/pk
 Single Taper Trace analysis	Trace analysis	S/SL	5 x 105	Standard	AGO-7852	5/pk
 Straight General use	General use	S/SL	5 x 105	Standard	AGO-8669	5/pk
 Single Taper FocusLiner General use, Dirty samples	General use, Dirty samples	S/SL	5 x 105	Standard	AGO-8671	5/pk
 Single Taper Small injection, Trace analysis	Small injection, Trace analysis	S/SL	3 x 105	Standard	AGO-8672	5/pk
 Straight FocusLiner General use, Dirty samples	General use, Dirty samples	S/SL	5 x 105	Standard	AGO-8673	5/pk

Liners for Bruker/Varian® GC Systems

Ordering Information

GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 1093 / 1094 Models						
 Straight Large injection, Trace analysis	Large injection, Trace analysis	S/SL	4 x 75	Standard	AGO-4673	5/pk
For 1078 / 1079 Models						
 Straight Trace analysis	Trace analysis	S/SL	0.5 x 54	Standard	AGO-8665	5/pk
 Single Taper FocusLiner™ General use or Dirty samples	General use or Dirty samples	S/SL	3.4 x 54	Standard	AGO-8666	5/pk
 Single Taper Large injection, Trace analysis	Large injection, Trace analysis	S/SL	3.4 x 54	Standard	AGO-8667	5/pk
 Single Taper Small injection, Trace analysis	Small injection, Trace analysis	S/SL	2 x 54	Standard	AGO-8668	5/pk
For 1075 / 1077 Models						
 Straight For 0.25 and 0.32 mm ID Column	For 0.25 and 0.32 mm ID Column	SPI	0.5 x 54	Standard	AGO-4675	5/pk
 Straight For 0.53 mm ID Column	For 0.53 mm ID Column	SPI	0.8 x 54	Standard	AGO-4677	5/pk

	Inlet Styles Key
	S/SL: Split/Splitless
	PTV: Programmed-Temperature Vaporization
	PSS: Programmed-Temperature Split/Splitless
	SPI: Single Point Injection

Inlet Consumables Are Available Online!

Need inlet seals, septa, or syringes? Explore hundreds of available parts online at:



Column Unions, Mini-Unions, and Splitters

Selection Guide

Use the Union or Mini-Union for:	Use the Y-Connector (splitter) for:
<ul style="list-style-type: none"> Connecting a guard column to an analytical column Connecting columns of different selectivities Connecting transfer lines to, e.g., mass spec Repairing a broken column 	<ul style="list-style-type: none"> Splitting a sample onto two columns (perform confirmational analysis in a single injection) Splitting the column eluent to two detectors

Mini-Unions

- High-precision unions for connecting capillary GC columns of same or dissimilar sizes
- Inert and precise glass-lined bore
- Low dead volume



Graphite/Vespel® Ferrule Mini-Unions

- 15% Graphite / 85% Vespel ferrules, Rated to 350 °C
- Includes 1 mini-union, 2 nuts, and 5 ferrules

Ordering Information

Graphite/Vespel Ferrule Mini-Unions

Column 1 ID (mm)	Column 2 ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.10-0.53	0.4	103431	AG0-5160	ea
0.28-0.35	0.32-0.53	0.5	103432	AG0-5161	ea
0.45-0.53	0.45-0.53	0.8	103433	AG0-5162	ea

Replacement Ferrules

Column ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.4	072696	AG0-7033	10/pk
0.28-0.35	0.5	072697	AG0-7034	10/pk
0.45-0.53	0.8	072698	AG0-7035	10/pk

SilTite™ Mini-Unions

- Supplied with SilTite ferrules – no more leaks and no need to re-tighten after installation
- Recommended for high temperature analysis. Stable above 450 °C.

Ordering Information

SilTite Mini-Unions

Column 1 ID (mm)	Column 2 ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.10-0.53	0.4	073550	AG0-8763	ea
0.28-0.35	0.32-0.53	0.5	073551	AG0-8764	ea
0.45-0.53	0.45-0.53	0.8	073554	AG0-8825	ea

Replacement Ferrules

Column ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.4	073470	AG0-8759	10/pk
0.28-0.35	0.5	073471	AG0-8760	10/pk
0.45-0.53	0.8	073473	AG0-8824	10/pk

* Similar to but not always an exact equivalent to the original manufacturer's product.

Press-Fit Unions and Splitters

- Connect fused silica capillary tubing of the same or different diameter, from 0.10 to 0.53 mm ID
- Patented laser-formed linear taper
- Provides leak-free seal without tools, glue, or fittings
- Stays sealed even at high temperatures and pressures
- Laser-cut smooth ends prevent column damage during insertion



Ordering Information

Capillary Unions and Splitters

Part No.	Description	Unit
AG0-4716	Universal Capillary Column Union, Fused Quartz	5/pk
AG0-4717	Universal Capillary Column Y-connector, Fused Quartz	ea

Polyimide Resins

- Permanently connects unions and splitters to capillary tubing
- Prevents connections from dislodging due to vibration or shock



Ordering Information

Polyimide Resins

Part No.	Description	Unit
AG0-5722	Polyimide Resin, 350 °C, 0.5 mL	ea
AG0-8514	High Temperature, 400 °C, Polyimide Resin, 0.5 mL	ea



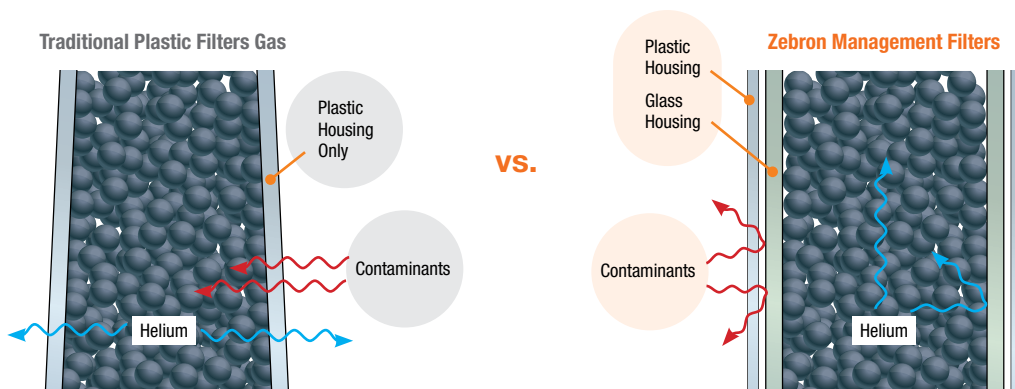
For GC Retention Gaps and Guard Column Kits, see p. 154

GC Accessories

new Zebtron™ Gas Management

UPGRADE Your Gas Filter System!

Improved design with a dual wall housing (plastic outside and glass inside). Glass prevents diffusion, ensuring a leak and contaminant free system.



Plug-In GC and LC-MS Gas Filters

- Easy to use
- Dual filter housing prevents diffusion and increases safety
- Incredible high capacity
- Ensures high gas purity (99.9999% pure)
- 4 filter types



Universal



Oxygen



Moisture



Hydrocarbon



Click-On GC Gas Traps

- Easy to use, Click-on GC Gas Traps
- Serves multiple GC instruments at once
- Incredible high capacity
- Ensures high gas purity (99.9999% pure)
- 5 trap types



Universal



Oxygen



Moisture



Hydrocarbon



Carbon Dioxide



Protect Your LC-MS using NEW Zebtron LC-MS Gas Filters

- Removes water, organic compounds, and other foreign material from LC-MS nebulizer gas
- Dual filter: Moisture and Hydrocarbon
- To be used in combination with a high flow 2-position connecting unit (Part No.: [AG6-2204](#)) and Particle Filter (Part No.: [AG6-2205](#))



Moisture



Hydrocarbon



Save Time and Money!

Zebtron Electronic Indicator

Easily know when to replace the Gas Filter and Trap by using the NEW Zebtron Electronic Indicator

Zebron Gas Management

Ordering Information

Zebron Gas Management Filters

Part No.	Description	Unit
AG6-1010	Gas Filter Oxygen	ea
AG6-1020	Gas Filter Moisture	ea
AG6-1030	Gas Filter Hydrocarbon	ea
AG6-1040	Gas Filter Universal	ea
AG6-1070	Gas Filter Universal (Helium specific)	ea
AG6-1050	Gas Filter Hydrocarbon/moisture for LC-MS	2/pk
AG6-1060	Ring nut for Gas Filter	ea



Ordering Information

Zebron Gas Management Traps

Part No.	Description	Unit
AG6-3110	Click-on Oxygen Trap	ea
AG6-3120	Click-on Moisture Trap	ea
AG6-3130	Click-on Hydrocarbon Trap	ea
AG6-3140	Click-on Universal Trap	ea
AG6-3150	Click-on Carbon Dioxide Trap	ea



Ordering Information

Zebron Connecting Units

Part No.	Description	Unit
AG6-2101	1-position Connecting Unit 1/4 in.	ea
AG6-2102	2-position Connecting Unit 1/4 in.	ea
AG6-2103	4-position Connecting Unit 1/4 in.	ea
AG6-2201	1-position Connecting Unit 1/8 in.	ea
AG6-2202	2-position Connecting Unit 1/8 in.	ea
AG6-2203	4-position Connecting Unit 1/8 in.	ea
AG6-2204	High flow 2-position connecting unit for LC-MS	ea
AG6-2205	Particle Filter for LC-MS	ea
AG6-2206	O-ring replacement for gas filter baseplate	10/pk

Ordering Information

Zebron Connecting Units (cont'd)

Part No.	Description	Unit
AG6-2301	1-position Connecting Unit 1/4 in. Stainless Steel	ea
AG6-2302	2-position Connecting Unit 1/4 in. Stainless Steel	ea
AG6-2303	4-position Connecting Unit 1/4 in. Stainless Steel	ea
AG6-2304	1-position Connecting Unit 1/8 in. Stainless Steel	ea
AG6-2305	2-position Connecting Unit 1/8 in. Stainless Steel	ea
AG6-2306	4-position Connecting Unit 1/8 in. Stainless Steel	ea

Ordering Information

Zebron Base Electronic Indicator and Other Accessories

Part No.	Description	Unit
AG6-3160	1/8 in. Brass CLICK-ON Connector Set	2/pk
AG6-3170	1/4 in. Brass CLICK-ON Connector Set	2/pk
AG6-4150	1/8 in. Stainless Steel CLICK-ON Connector Set	2/pk
AG6-4160	1/4 in. Stainless Steel CLICK-ON Connector Set	2/pk
AG6-3180	Wall-mounting Clamp Set for Gas Traps	2/pk
AG6-3190	O-ring replacement set for Gas Trap	10/pk
AG6-4110	Electronic Indicator for Gas Trap	ea
AG6-4120	Electronic Indicator for Gas Filter	ea



Electronic Indicator

Wall-mounting Clamp Set

Brass Click-on Connector

First time ordering Zebron Click-On Gas Traps?

Be sure to order the brass or stainless steel connector with your first trap.



[AG6-4150](#)
(1/8 in. Stainless Steel)



[AG6-4160](#)
(1/4 in. Stainless Steel)

Moisture, Oxygen, and Hydrocarbon Gas Traps/Purifiers






- Extends column lifetimes
- Protects columns from irreversible damage
- Improve analytical reliability (identification and quantitation results)
- Reliable and affordable high-capacity, high-performance purifiers


Recommended Gas Traps


Use	Gas	Recommended Trap(s)
Carrier Gas	Helium, Hydrogen, or Nitrogen	Moisture, Hydrocarbon, Oxygen
	Air	Hydrocarbon
FID, NPD	Make-up	Hydrocarbon
	Hydrogen	Hydrocarbon
ECD	Make-up	Water, Oxygen
TCD	Same as carrier	Moisture, Hydrocarbon, Oxygen

Ordering Information

Moisture, Oxygen, and Hydrocarbon Gas Traps / Purifiers

Type	Media	Max Pressure	Purity	Capacity	Indicating	Fittings	Part No.	Unit
Moisture	Molecular Sieve 13x	100 psi	≤10 ppb water	 100 cc	Yes	1/8 in.	AG0-4766	ea
				250 cc	Yes	1/8 in.	AG0-4768	ea
				250 cc	Yes	1/4 in.	AG0-4769	ea
Hydrocarbon	Impregnated carbon filter media	250 psi	Call for specific compounds	 100 cc	No	1/8 in.	AG0-4770	ea
				100 cc	No	1/4 in.	AG0-4771	ea
				200 cc	No	1/8 in.	AG0-4772	ea
Oxygen	Proprietary	50 psi	≤1 ppb oxygen	 50 cc	Yes	1/8 in.	AG0-4774	ea
				150 cc	Yes	1/8 in.	AG0-4776	ea
				150 cc	Yes	1/4 in.	AG0-4777	ea
Oxygen / Moisture	Proprietary	250 psi	≤5 ppb oxygen	 5.5 x 2 in.	No	1/8 in.	AG0-4792	ea
				5.5 x 2 in.	No	1/4 in.	AG0-4791	ea
Oxygen / Moisture	Proprietary	250 psi	≤15 ppb oxygen and water	 150 cc	No	1/8 in.	AG0-4778	ea
				150 cc	No	1/4 in.	AG0-4779	ea




 To get the greatest lifetime out of gas traps, try placing a large capacity non-indicating trap in-line before an indicating trap. Replace the large capacity trap only when the indicating trap starts to change color. Mark the color transition on the indicating trap with a marker. The color transition moves only when the large capacity trap is saturated. This gives long term savings by eliminating unnecessary maintenance and maintains quality gas.

 For maximum efficiency, flow rates for any trap should not exceed 3 L/min. Trapping efficiency will drop-off rapidly as flow rates increase.

Tools & Maintenance Kits

Ordering Information

Tools & Maintenance Kits

Description	Part No.	Unit
Ferrule Remover Tool Kit <ul style="list-style-type: none"> • Simple, effective tools effectively remove stuck ferrules • Spiral-cut ratchet grabs ferrules tightly • Includes two tools for removing ferrules from 0.4 to 0.8 mm ID 	AD0-4725	ea
Ceramic Scoring Wafers <ul style="list-style-type: none"> • High-quality ceramic cutting tool for fused silica columns 	AG0-4718	2/pk
Flame Detector Jet Cleaning Kit <ul style="list-style-type: none"> • For routine maintenance of FIDs • Use either while flame jet has been taken apart or still installed • Includes: 3 jet reamers (0.008, 0.08, 0.02 in.); 1 stainless steel and 1 brass brush; 1 dual-ended pin vise 	AD0-4723	ea

Replace. Reorder. Relax.

Zebtron
Gas Management

GC Accessories

Test the Performance of GC Columns

- Convenient way to check column performance
- Essential tool for GC troubleshooting
- Affordable and easy to use
- Suitable for Phenomenex Zebron™ and equivalent brands
- Sealed in 2 mL glass ampules—prevent evaporation and increase shelf life
- All test mixes supplied with Certificate of Analysis



App ID 15840

Zebtron ZB-1^{PLUS}
Part No.: [AGO-7805](#)
 500 µg/mL each in acetone:

1. Decane	5. Tridecane
2. 2-Ethylhexanoic Acid	6. 1-Undecanol
3. 4-Chlorophenol	7. Dicyclohexylamine
4. Naphthalene	8. Pentadecane

App ID 5160, App ID 10714

Zebtron ZB-1, ZB-5, ZB-1HT, and ZB-5HT
Part No.: [AGO-5155](#)
 250 µg/mL each in hexane:

1. Undecane	4. 1-Undecanol
2. 4-Chlorophenol	5. Dicyclohexylamine
3. Tridecane	6. Pentadecane

App ID 14386

Guardian™ Integrated Guard / ZB-5
Part No.: [AGO-7549](#)
 250 µg/mL each in acetone:

1. Decane	6. 1-Methylnaphthalene
2. 2-Ethylhexanoic Acid	7. 1-Undecanol
3. 1,6-Hexanediol	8. Tetradecane
4. 4-Chlorophenol	9. Dicyclohexylamine
5. Tridecane	

App ID 16439

Zebtron ZB-5^{PLUS}
Part No.: [AGO-8362](#)
 250 µg/mL each in acetone:

1. Decane	6. 1,8-Octanediol
2. Methyl Caprylate	7. Dihexylamine
3. 1,6-Hexanediol	8. 1-Undecanol
4. 4-Chlorophenol	9. Dicyclohexylamine
5. Tridecane	10. Pentadecane

App ID 14973

Zebtron ZB-5ms, ZB-SemiVolatiles, ZB-XLB, and ZB-XLB-HT
Part No.: [AGO-7578](#)
 250 µg/mL each in acetone:

1. Decane	6. 1-Methylnaphthalene
2. 2-Ethylhexanoic Acid	7. 1-Undecanol
3. 1,6-Hexanediol	8. Tetradecane
4. 4-Chlorophenol	9. Dicyclohexylamine
5. Tridecane	10. Pentadecane

App ID 5162, App ID 5161

Zebtron ZB-35, ZB-35HT, ZB-1701, and ZB-1701^P
Part No.: [AGO-5156](#)
 250 µg/mL each in hexane:

1. Undecane	5. 1-Undecanol
2. 2,4-Dimethylphenol	6. 1-Methylnaphthalene
3. 2,6-Dimethylaniline	7. Hexadecane
4. Tetradecane	

App ID 5163

Zebtron ZB-50
Part No.: [AGO-5157](#)
 250 µg/mL each in hexane:

1. Undecane	5. 1-Undecanol
2. Tridecane	6. 1-Methylnaphthalene
3. 2,4-Dimethylphenol	7. Hexadecane
4. 2,6-Dimethylaniline	

App ID 24917

Zebtron ZB-624^{PLUS}
Part No.: [AGO-9203](#)
 250 µg/mL each in hexane:

1. Dodecane	5. 1-Methylnaphthalene
2. 2,4-Dimethylphenol	6. 1-Undecanol
3. 2,6-Dimethylaniline	7. Pentadecane
4. Tridecane	

App ID 5165

Zebtron ZB-624
Part No.: [AGO-5159](#)
 1000 µg/mL each in methanol:

1. 1,2-Dichloropropane	4. Chlorobenzene
2. Octane	5. Nonane
3. Tetrachloroethylene	

App ID 16214

Zebtron ZB-WAX^{PLUS}
Part No.: [AGO-7869](#)
 250 µg/mL each in hexane:

1. 2-Octanone	6. Methyl decanoate	11. Methyl dodecanoate
2. Tetradecane	7. Heptadecane	12. 2,6-Dimethylaniline
3. Pentadecane	8. Methyl undecanoate	13. Nonadecane
4. 1-Octanol	9. 1-Decanol	14. 2,6-Dimethylphenol
5. Hexadecane	10. Octadecane	

App ID 5164, App ID 14326, App ID 5164

Zebtron ZB-WAX and ZB-FFAP
Part No.: [AGO-5158](#)
 250 µg/mL each in hexane:

1. 2-Octanone	6. 1-Decanol
2. Tetradecane	7. Methyl dodecanoate
3. 1-Octanol	8. 2,6-Dimethylaniline
4. Methyl decanoate	9. 2,6-Dimethylphenol
5. Methyl undecanoate	

App ID 18461

Zebtron ZB-Drug-1
Part No.: [AGO-8431](#)
 250 µg/mL each in acetone:

1. Dodecane	5. 1-Undecanol
2. Tridecane	6. 1-Methylnaphthalene
3. 4-Chlorophenol	7. Dicyclohexylamine
4. Tetradecane	8. Hexadecane

App ID 19305

Zebtron ZB-1XT SimDist
Part No.: [AGO-8645](#)
 1000 µg/mL each in hexane:

1. Undecane	4. 1-Undecanol
2. Dodecane	5. Dicyclohexylamine
3. Tridecane	6. Pentadecane

App ID 5158

Grob Test Mixture
Part No.: [AGO-5154](#)
 400 µg/mL each in methylene chloride:

1. 2,3-Butanediol	5. 1-Nonanal	9. Methyl decanoate
2. Decane	6. 2-Ethylhexanoic acid	10. Methyl undecanoate
3. Undecane	7. 2,6-Dimethylphenol	11. Dicyclohexylamine
4. 1-Octanol	8. 2,6-Dimethylaniline	12. Methyl dodecanoate



Test mix components are shown in order of elution

Chiral LC

Chiral LC Column Types.....	178	Hypersil.....	Inquire
Polysaccharide Chiral Columns.....	282	Hypersil BDS.....	Inquire
Lux	282	IB-Sil.....	Inquire
Additional Chiral LC Columns		InertClone.....	224
Chiral CD-Ph.....	Inquire	Inertsil.....	Inquire
Chirex.....	213	Jupiter.....	225
Hypercarb.....	Inquire	Kinetex	227
Sumichiral OA.....	Inquire	Kromasil.....	Inquire
Ultron ES.....	335	LiChrosorb.....	256
HPLC Column Selection		LiChrospher.....	256
Column Selection Tree.....	179	Luna	257
Column Selection by Application.....	180	Luna Omega	271
Column Selection by Manufacturer.....	181-182	Lux	282
Column Selection by Separation Mode.....	183	Lux AMP	292
Column Selection by USP Specifications.....	184-187	Merck KGaA.....	Inquire
Column Selection by Ph. Eur. Listing.....	188-193	Nucleosil.....	Inquire
HPLC Column Protection		Onyx	294
Column Performance Check Standards.....	398-399	Phenogel	296
SecurityGuard Cartridge System.....	311	PhenoSphere.....	Inquire
HPLC/UHPLC Columns		PhenoSphere-NEXT.....	Inquire
Aeris	194	PLgel, PLRP-S.....	Inquire
Aqua.....	198	PolymerX.....	302
Asahipak.....	Inquire	PolySep-GFC-P.....	303
Axia Packed Columns	352	PREP/Preparative.....	352
BioSep.....	199	Prodigy.....	304
bioZen.....	200	Rezex	305
Bondclone.....	212	SecurityGuard	311
Capcell Pak.....	Inquire	SecurityGuard ULTRA	316
Chiral CD-Ph.....	Inquire	Selectosil.....	Inquire
Chirex.....	213	Shodex.....	319
Clarity	376	SphereClone.....	322
Columbus.....	Inquire	Spherex.....	Inquire
Cosmosil.....	Inquire	Spherisorb.....	Inquire
Curosil.....	Inquire	STAR-ION A300.....	323
Develosil.....	Inquire	Sumichiral OA Chiral.....	Inquire
EnviroSep.....	Inquire	Synergi	324
EZ:faast.....	372	Ultracarb.....	335
Gemini	215	Ultremex.....	335
Hamilton.....	Inquire	Ultron ES Chiral.....	335
Hypercarb.....	Inquire	Yarra	336
HyperClone.....	222		



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SecurityCAP LC Solvent Safety Products.....391-392

Proteins/Peptides

Aeris 194

BioSep 199

bioZen 200

Jupiter 225

Yarra 336

Yarra PREP 339

UHPLC Columns

bioZen for Analysis of Biologics 200

Kinetex 1.3µm, 1.7µm and 2.6µm Core-Shell Technology Columns 227

Luna Omega 1.6µm Fully Porous Columns 271

Aeris Core-Shell Technology for RP-LC of Proteins & Peptides 194

Clarity Core-Shell Columns for Synthetic DNA/RNA 376

SecurityGuard ULTRA Column Protection 316

“ At first, I honestly didn’t believe the marketing claim that their Core-Shell 5µ particles had greater efficiency than fully porous 3µ particles. But wow! Now I can issue my awesome, cutting edge chromatography, and QC can have their jumbo, 5µ, abuse-proof particles. Everybody wins.”

Chester Chan
Nexgen Pharma, USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

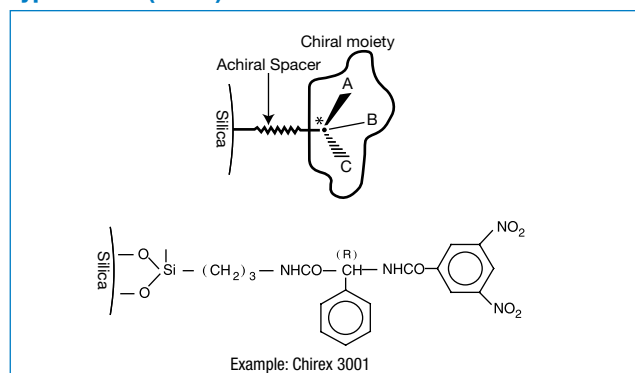
Chiral LC Column Types

LC Chiral Stationary Phase (CSP) Classification Diagram

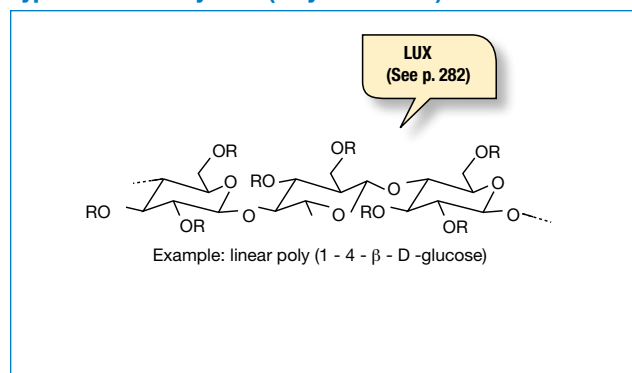
Type	Description	Chemistry	Mechanism	Brands	Page
I	Brush (Pirkle)	Low molecular weight chiral selectors Ionic or covalent bonding	Attractive interactions Hydrogen bonding Charge transfer (π - π interaction) Dipole stacking	Chirex Sumichiral OA	213 Inquire
II	Helical Polymers	Cellulose and amylose derivatives	Attractive interactives Insertion complexes	Lux Cellulose and Amylose	282
III	Cavity	Cyclodextrins, Crown ether	Inclusion complexes	Chiral CD-Ph Sumichiral OA	Inquire Inquire
IV	Ligand Exchange	Amino acid-metal complex	Diastereomeric metal complex	Chirex Sumichiral OA	213 Inquire
V	Protein	α -acid glycoprotein Bovine Serum Albumin	Hydrophobic interactions Polar interactions	Ultron ES	335
VI	Macrocyclic	Antibiotics Glycopeptides	Hydrogen bonding Charge transfer (π - π interaction) Inclusion complexation Ionic interactions Peptide bonding	None	

Other Types Carbon-Based (Hypercarb) and Ceramic-based (Ceramospher)

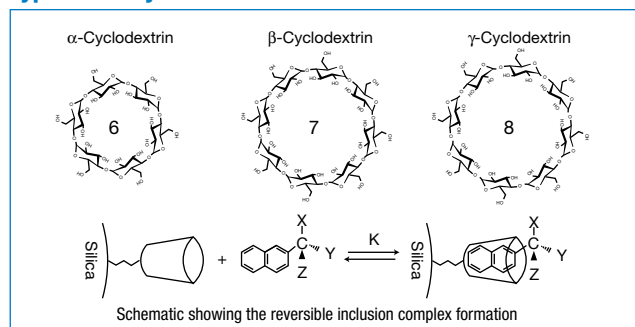
Type I Brush (Pirkle)



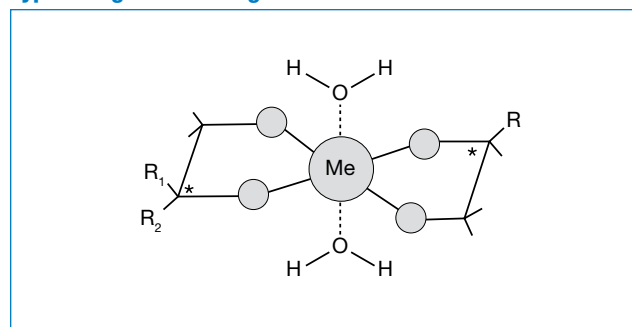
Type II Helical Polymers (Polysaccharide)



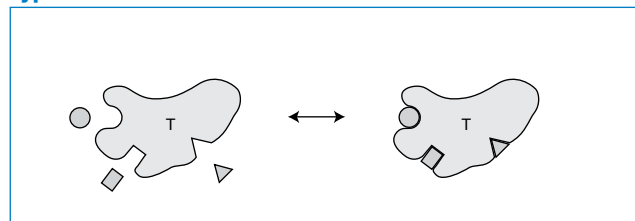
Type III Cavity



Type IV Ligand Exchange



Type V Protein



HPLC Column Selection Tree

Sample MW	Sample Solubility	Separation Mode	Our Recommended Column	Page	
MW < 5000	Organic-Soluble	Normal Phase Adsorption	Kinetex HILIC	227	
			Luna Silica(2)	257	
		Normal Phase Bonded	Luna CN, NH ₂ , HILIC	257	
			Kinetex C18, EVO C18, XB-C18, C8, Phenyl-Hexyl, Biphenyl, F5, Polar C18, PS C18	227	
		Reversed Phase Bonded	Synergi Max-RP, Fusion-RP	324	
	Luna C8(2), C18(2)		257		
	THF-Soluble	Chiral	Luna Omega C18, Omega PS C18, Omega Polar C18	271	
			Gemini C18, NX-C18, C6-Phenyl	215	
	Gel Permeation GPC	Lux	Lux	282	
			Phenogel 50 Å, 100 Å	296	
	Aqueous-Soluble	Non ionic	Reversed Phase	Kinetex C18, EVO C18, XB-C18, C8, Phenyl-Hexyl, Biphenyl, F5, Polar C18, PS C18	227
				Synergi Polar-RP, Hydro-RP	324
			Chiral	Luna C8(2), C18(2), Luna PFP(2)	257
				Luna Omega C18, Omega PS C18, Omega Polar C18	271
				Gemini C18, NX-C18	215
Ionic		Ion Pairing / Reversed Phase	Onyx C18	294	
			Lux	282	
		Ion-Exchange	Kinetex C18, EVO C18, XB-C18, C8, Polar C18, PS C18	227	
			Synergi Max-RP, Hydro-RP	324	
			Luna C8(2), C18(2)	257	
Peptides		Ion-Exchange	Luna Omega C18, Omega PS C18, Omega Polar C18	271	
			Gemini C18, NX-C18	215	
		HILIC	Onyx C18	294	
			bioZen WCX	200	
			Luna SCX, NH ₂	257	
MW > 5000	Organic-Soluble	Gel Permeation Chromatography (GPC)	PhenoSphere SAX	Inquire	
			Clarity Oligo-SAX	376	
		Gel Filtration Aqueous GFC/SEC	Unknown MW Range	Kinetex HILIC	227
				Luna HILIC, NH ₂ Silica(2)	257
			Known MW Range	bioZen Glycan	200
	Luna Omega SUGAR	271			
	Aqueous-Soluble	Ion-Exchange	pH 2-7.5	Lux	282
				Chirex	213
			pH > 7.5	bioZen Peptide PS-C18, XB-C18	200
				Aeris PEPTIDE	194
				Jupiter Proteo	225
		Reversed Phase	Cation-Exchange	Phenogel Linear (2)	296
				Shodex GPC	319
			Anion-Exchange	Specific Pore: Phenogel	296
				Shodex GPC	319
bioZen SEC-2, SEC-3				200	
Hydrophobic Interaction (HIC)	pH 2-9	Yarra SEC Series	336		
		BioSep-SEC-S Series	199		
	pH > 9	PolySep-GFC-P	303		
		bioZen WCX	200		
		Luna SCX	257		

HPLC Column Selection by Application

This table is to aid you in selecting the right column for your application. For application notes or method development assistance please call your technical representative.

Amino Acids	Page
Phenomenex EZ:faast (GC and LC-MS)	372
Phenomenex Chirex (chiral)	213
Phenomenex Lux (chiral)	282
Phenomenex Kinetex EVO C18 (FMOc or OPA derivatized)	227
Anions	
Phenomenex Luna NH ₂	257
Phenomenex STAR-ION A300	323
Phenomenex Lux (chiral)	282
Phenomenex PhenoSphere SAX	Inquire
Hamilton PRP	Inquire
Shodex IC	319
Phenomenex Clarity Oligo-SAX	376
Phenomenex Rezex ROA-Organic Acid	305
Antibiotics	
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Luna	257
Phenomenex Luna Omega	271
Phenomenex Synergi	324
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Phenomenex Aeris WIDEPORE / PEPTIDE	194
Phenomenex bioZen Intact XB-C8/C4	200
Phenomenex Clarity	376
Phenomenex Jupiter 300/Jupiter Proteo	225
Phenomenex bioZen SEC-2/SEC-3	200
Phenomenex BioSep-SEC-S	199
Phenomenex Yarra SEC	336
Phenomenex PolySep-GFC-P	303
Phenomenex Luna SCX	257
Phenomenex bioZen Peptide PS-C18/XB-C18	200
Phenomenex Luna NH ₂	257
Phenomenex bioZen Glycan	200
Phenomenex bioZen WCX	200
Shodex GFC, KW	319
Carbohydrates	
Phenomenex Rezex	305
Phenomenex Luna Omega SUGAR	271
Phenomenex Luna NH ₂	257
Shodex SUGAR	319
Cations	
Phenomenex Luna SCX	257
Phenomenex bioZen WCX	200
Hamilton PRP	Inquire
Enantiomers (Chiral)	
Phenomenex Lux	282
Phenomenex Chirex	213
Environmental (Carbamates, PAHs, Explosives)	
Phenomenex Zebtron (GC)	87
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Luna	257
Phenomenex Luna Omega	271
Phenomenex Synergi	324
Foods, Flavors and Fragrances	
Phenomenex Rezex	305
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Luna	257
Phenomenex Luna Omega SUGAR	271
Phenomenex Lux (chiral)	282
Phenomenex Synergi	324
Phenomenex Zebtron (GC)	87

Nucleosides and Nucleotides	Page
Phenomenex Kinetex EVO C18	227
Phenomenex Luna NH ₂ , SCX	257
Phenomenex Luna Omega Polar C18, Luna Omega PS C18	271
Phenomenex Synergi Polar-RP	324
Phenomenex PhenoSphere SAX	Inquire
Phenomenex Clarity Oligo-SAX	376
Oligonucleotides	
Phenomenex Clarity Oligo-XT	376
Phenomenex Clarity Oligo-RP	376
Phenomenex Clarity Oligo-MS	376
Phenomenex Clarity Oligo-SAX	376
Phenomenex Aeris WIDEPORE	194
Organic Acids	
Phenomenex Luna Omega PS C18	271
Phenomenex Rezex	305
Phenomenex Synergi Hydro-RP	324
Peptides/Proteins	
Phenomenex Aeris WIDEPORE / PEPTIDE	194
Phenomenex bioZen PEPTIDE PS-C18 / XB-C18	200
Phenomenex Jupiter 300/Jupiter Proteo	225
Phenomenex bioZen Glycan	200
Phenomenex bioZen Intact	200
Phenomenex Luna SCX, NH ₂	257
Phenomenex bioZen SEC	200
Phenomenex Yarra SEC	336
Phenomenex BioSep-SEC-S	199
Phenomenex bioZen WCX	200
Pesticides, Herbicides, and Dioxins	
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Synergi	324
Phenomenex Luna	257
Phenomenex Luna Omega	271
Phenomenex Zebtron (GC)	87
Pharmaceuticals	
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Synergi	324
Phenomenex Luna	257
Phenomenex Luna Omega	271
Phenomenex Lux (chiral)	282
Phenomenex Chirex (chiral)	213
Polymers, Plastics, Rubber	
Phenomenex Zebtron (GC)	87
Phenomenex Phenogel	296
Shodex Asahipak GF	Inquire
Vitamins	
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Synergi	324
Phenomenex Luna	257
Phenomenex Luna Omega	271
Taxanes	
Phenomenex Kinetex F5	227
Phenomenex Luna PFP(2)	257
Textiles/Dyes	
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Synergi	324
Phenomenex Luna	257
Phenomenex Luna Omega	271
Phenomenex Phenogel GPC	296

HPLC Column Selection by Manufacturer

In recognizing the tremendous difficulty the chromatographer has in choosing from literally hundreds of columns and to aid in your selection of alternative materials from different manufacturers, an HPLC column selection guide is presented below.

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list, and the accuracy of the data is not guaranteed.

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
Agilent Technologies / Varian / Polymer Labs		
Advanced AAA	Gemini	Kinetex EVO
Advanced Bio Glycan	bioZen Glycan	—
Advanced Bio SEC	Yarra	bioZen SEC
Advanced Bio PEPTIDE plus	bioZen XB-C18	bioZen PS-C18
Advanced Bio RP-Ab	Aeris	bioZen Intact
Advanced Bio Oligonucleotide	Clarity XT	Clarity MS/RP
Bio Mab (WCX)	bioZen WCX	—
Bio SEC	BioSep-SEC-S	Yarra
Chiradex	Shiseido Chiral CD-pH	Shinwa Ultron
HC-C18(2)	Luna C18(2)	Synergi Hydro-RP
MetaSil	Prodigy	Luna
MetaSil AQ C18	Aqua C18	Synergi Hydro-RP
Microsorb	Luna	Synergi
Microsorb 300 Å	Jupiter 300	Aeris WIDEPORE
PL-Aquagel-OH	PolySep GFC-P	Shodex OHPak SB-800H
PLgel	Phenogel	Phenogel
PL Hi-PLEX	Rezex	Rezex
PLRP-S	PolymerX RP-1	Gemini NX-C18
PLRP-S 300 Å	Hamilton PRP-3	Aeris WIDEPORE
PlusPore	Phenogel	Phenogel
Polaris C18 Amide, C8 Ether	Luna Omega Polar C18	Synergi Fusion-RP
Poroshell 300	Aeris WIDEPORE	Aeris WIDEPORE
Poroshell 120	Kinetex	Kinetex
ProSEC 300S	Yarra	bioZen SEC
Pursuit	Luna	Synergi
Pursuit DiPhenyl	Kinetex Biphenyl	Gemini C6-Phenyl
Pursuit PAH	Kinetex PAH	—
Pursuit XRs	Luna	Kinetex
Taxsil (1, 2, 3)	Luna PFP(2)	Kinetex F5
TC-C18(2)	Synergi Hydro-RP	Luna C18(2)
ZORBAX Eclipse AAA	Gemini C18	Kinetex EVO
ZORBAX Eclipse-XDB	Luna	Kinetex
ZORBAX Eclipse Plus	Gemini	Kinetex EVO C18
ZORBAX Rapid Resolution HT	Kinetex	Luna Omega
ZORBAX PrepHT	Luna(3) 10 µm	Luna 10 µm PREP
ZORBAX Rx	HyperClone	Luna
ZORBAX SB 80 Å	Kinetex XB-C18	Luna
ZORBAX SB 300 Å	Jupiter 300	Aeris WIDEPORE/bioZen Intact
ZORBAX SB Aq	Synergi Hydro-RP	Synergi Hydro-RP
ZORBAX GF (BioSeries)	BioSep-SEC-S	Yarra
ZORBAX Extend-C18	Gemini NX-C18	Kinetex EVO C18
ZORBAX 300 Extend	Jupiter 300	Aeris WIDEPORE
ZORBAX Bonus RP	Synergi Fusion-RP	Synergi Hydro-RP
ZORBAX Oligo	Clarity Oligo-RP	Clarity Oligo-MS
ZORBAX Carbohydrate	Luna NH ₂ /Luna Omega SUGAR	Rezex
Hichrom Ltd.		
Alltima	Luna	Luna Omega
Alltima HP	Luna	Kinetex
Apex	Luna	Kinetex
Apollo	Luna	Kinetex
Genesis	Luna	Gemini
Prevail	Synergi	Luna Omega Polar
Vydac	Jupiter	Aeris
Bio-Rad		
Aminex	Rezex	Rezex
Macro-Prep	bioZen WCX	Shodex IEC
Nuvia	—	Shodex IEC
UNOsphere	bioZen WCX	Shodex IEC

* Alternative - This category indicates an alternative column which will likely give a similar selectivity.

** Recommended Alternative - This category indicates an alternative column which may yield somewhat different selectivity but may also lead to improved resolution.

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
Chiral Technologies/DAICEL Corporation		
CHIRALCEL AY-H	Lux Amylose-2	Lux Cellulose-2
CHIRALCEL OD-H	Lux Cellulose-1	Lux Cellulose-2
CHIRALCEL OJ-H	Lux Cellulose-3	Lux Cellulose-4
CHIRALCEL OX-H	Lux Cellulose-4	Lux Cellulose-2
CHIRALCEL OZ-H	Lux Cellulose-2	Lux Cellulose-4
CHIRALPAK AD-H	Lux Amylose-1	Lux Amylose-2
CHIRALPAK IA	Lux i-Amylose-1	—
CHIRALPAK IC	Lux i-Cellulose-5	—
CHIRALPAK IG	Lux i-Amylose-3	—

E.S. Industries

Aquasep	Synergi Fusion-RP	Synergi Hydro-RP
Chromegabond	Nucleosil	Luna
Chromegabond HC	Ultracarb ODS (30)	Synergi Hydro-RP
Chromegabond BAS	Synergi Fusion-RP	Synergi Hydro-RP
Chromegabond WR	Luna	Gemini
Chromegapore	Yarra	bioZen SEC
Epic	Synergi 2.5 µm	Kinetex
Epic Polar	Kinetex Biphenyl	Synergi Hydro-RP
FluoroSep-RP Phenyl	Luna Phenyl-Hexyl	Kinetex Phenyl-Hexyl
FluoroSep-RP Octyl	—	Kinetex C8
Gammabond C1	PhenoSphere C1	Develosil TMS-UG (C1)
Gammabond C8, C18	Luna C8(2), C18(2)	Kinetex C8, C18
MacroSep BIO-Gold	Aeris	bioZen
MacroSep	Jupiter	Aeris WIDEPORE
Protec-RP	Synergi Fusion-RP	Synergi Hydro-RP
RingSep	Kinetex PAH	—

GL Sciences

Inertsil ODS-Prep-100 Å	Luna 10 µm PREP C18(2)	Luna 10 µm C18(2)
Inertsil ODS(2)	Prodigy ODS(2)	Luna C18(2)
Inertsil ODS(3)	Prodigy ODS(3)	Luna C18(2)
Inertsil ODS(4)	Kinetex XB-C18	Synergi Max-RP
Inertsil Peptide C18	Aeris PEPTIDE	Luna Omega PS C18
Inertsil 300 Å WP300 C8	Jupiter C5	Aeris WIDEPORE C8 / bioZen Intact C8
InertSustain	Gemini NX-C18	Kinetex EVO C18
InertSustain AQC18	Luna Omega Polar C18	Kinetex Polar C18
InertSustain Swift C18 (200Å)	Gemini NX-C18	Kinetex EVO C18

MAC-MOD/Bischoff/ACT/Advanced Materials Technology

ACE C18	Gemini NX-C18	Kinetex XB-C18
ACE-AQ	Synergi Fusion-RP	Luna Omega Polar C18
ACE-300 A	Jupiter 300	Aeris WIDEPORE
ACE Excel	Gemini NX-C18	Kinetex EVO
ACE Ultracore	Kinetex	Luna Omega
HALO	Kinetex	Luna Omega
HALO Bioclass	Aeris	bioZen
HALO Glycan	bioZen Glycan	bioZen Glycan
HALO Peptide ES-C18	Aeris WIDEPORE XB-C18	bioZen PEPTIDE
HALO Protein	Aeris WIDEPORE	bioZen Intact
HALO Penta-HILIC	Kinetex HILIC	Luna HILIC
Hydrobond	Synergi Fusion-RP	Luna Omega Polar C18
Pronto Pearl	Luna Omega	Kinetex
ProntoSIL 120 Å	Luna C18(2)	Kinetex
ProntoSIL 300 Å	Jupiter 300	Aeris WIDEPORE
ProntoSIL Aq 120 Å	Synergi Hydro-RP	Develosil RP-Aqueous(C30)
ProntoSIL Aq PLUS	Synergi Hydro-RP	Luna Omega Polar C18
ProntoSIL SH 120 Å	Gemini NX-C18	Luna C18(2)
ProntoSIL ACE-EPS	Synergi Hydro-RP	Luna Omega Polar C18
ProntoSIL Chiral AX	—	Chirex
ProntoSIL C30	Develosil C30	Luna Phenyl-Hexyl
Partisil	Luna	Synergi
Partisphere	Luna	Synergi
Ultrasphere	Luna	Synergi

Restek

Allure	Ultracarb ODS (30)	Luna C18(2)
Force	Luna Omega	Kinetex
Pinnacle DB	HyperClone	Luna C18(2)
Pinnacle Ultra C18	Ultracarb ODS (20)	Luna C18(2)
Pinnacle II	HyperClone BDS	Luna C18(2)
Roc	Luna	Luna Omega
Raptor	Kinetex	Synergi
Ultra Aqueous	Synergi Hydro-RP	Luna Omega Polar C18
Ultra Aromax	Luna Phenyl-Hexyl	Kinetex Biphenyl
Ultra II	Kinetex	Synergi
Viva	Aeris WIDEPORE	Jupiter

continued

HPLC Column Selection by Manufacturer

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list, and the accuracy of the data is not guaranteed.

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
Supelco / Sigma-Aldrich / MilliporeSigma / Sepax Technologies		
Antibodix	—	Clarity Oligo-WAX
Ascentis	Synergi	Gemini NX-C18
Ascentis Express	Kinetex	Luna Omega
Ascentis Peptide	bioZen PEPTIDE	Aeris PEPTIDE
Astec	Lux	—
BIOshell	Aeris WIDEPORE	Jupiter
Chromolith	Onyx	Onyx
Discovery Bio	bioZen Intact	Aeris WIDEPORE
Discovery HSF5	Luna PFP(2)	Kinetex F5
Discovery HSC18	Luna C18(2)	Kinetex C18
Discovery C18	Luna C18(2)	Kinetex C18
Discovery RP C16 Amide	Synergi Fusion-RP	Synergi Fusion-RP
Discovery (C18, C16)	Synergi Hydro-RP	Luna Omega
Proteomix	—	Clarity Oligo-WAX
Supelco ABZ, ABZ+	Luna C8(2)	Luna C18(2)
Supelco LC-18-T	Prodigy (3)	Luna C18(2)
Supelco LC-18-S	Prodigy (3)	Luna C18(2)
Supelco LC-F	Luna PFP(2)	Kinetex F5
Supelco LC-PAH	—	Synergi Hydro-RP
Supelcosil LC	PhenoSphere-NEXT	Synergi Hydro-RP
Supelcogel	Rezex	Rezex
Supelcogel ODP-50	Asahipak ODP-50	Luna C18(2)
Supelcosil LC-DB	HyperClone BDS	Synergi Hydro-RP
Supelcosil LC-304/308/318	Jupiter 300	Aeris WIDEPORE
Supelcosil LC-NH ₂ -NP	—	Luna NH ₂
Supelcosil LC-PCN	Luna CN	Develosil CN-UG
Supelcosil LC-SAX	PhenoSphere SAX	Clarity SAX
Supelcosil LC-SCX	PhenoSphere SCX	Luna SCX
Titan	Luna Omega	Kinetex
Unix SEC	Yarra	Yarra
SRT GFC	Yarra	Yarra
Zenix GFC	Yarra	Yarra

Thermo Fisher Scientific / Thermo Scientific Dionex

Acclaim 120	Luna	Kinetex
Acclaim 300	Jupiter	Aeris WIDEPORE
Acclaim HILIC-10	Luna HILIC	Kinetex HILIC
Acclaim PA	Synergi Fusion-RP	Luna Omega Polar C18
Acclaim PA 2	Synergi Fusion-RP	Luna Omega Polar C18
Acclaim PepMap 300Å	bioZen	Aeris
Acclaim OA	Synergi Hydro-RP	Synergi Fusion-RP
Acclaim Surfactant	—	Gemini
Accucore	Kinetex	Luna Omega PS C18
Accucore Vanquish C18+	Kinetex EVO	Luna Omega PS C18
AminoPac PA	—	Asahipak IEC/ES
Aquasil	Synergi Hydro-RP	Develosil ODS-MG
BetaBasic	Luna	Kinetex
BioBasic SEC	Yarra	bioZen SEC
BioBasic IEX	Shodex IEC	Clarity Oligo-WAX
BioBasic RP	Jupiter 300	Aeris WIDEPORE
BETASIL	Prodigy (3)	Luna
BetaMax	Luna	Gemini
BETASIL Phenyl-Hexyl	Luna Phenyl-Hexyl	Kinetex Phenyl-Hexyl
Carbamate	Synergi Fusion-RP	Synergi Hydro-RP
CarboPac (MA, PA)	—	Rezex
Deltabond	Luna C18(2)	Synergi Max-RP
DNAPac	Asahipak IEC	Clarity Oligo-WAX
DNASwift	—	Clarity Oligo-RP
Fluophase	Luna PFP(2)	Kinetex F5
GlycanPac	bioZen Glycan	bioZen Glycan
Hypercarb	—	Gemini
HyperREZ XP	Rezex	Rezex
Hypersil GOLD	Luna	Kinetex
Hypersil GOLD aQ C18	Luna Omega Polar C18	Synergi Hydro-RP
Hypersil Green	—	Synergi Hydro-RP
Hypersil	HyperClone	Synergi Max-RP
HyPURITY	Luna	Kinetex
HyPURITY ADVANCE	Synergi Fusion-RP	Luna Omega
HyPURITY AQUASTAR	Synergi Fusion-RP	Luna Omega

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
Thermo Fisher Scientific / Thermo Scientific Dionex (cont'd)		
Ionpac AS series	STAR-ION A300	Shodex IC series
IonPac CS series	Shodex IC series	Hamilton PRP-X200
IonPac ICE AS series	Rezex ROA	Rezex ROA
IonPac IonSwift	—	Star-Ion
MAB Pac SEC-1	bioZen SEC-3	Yarra
OmniPac	—	Luna SCX
Pep Map 300	bioZen Intact	Aeris
Prism RP	Synergi Hydro-RP	Luna Omega Polar C18, PS C18
ProPac	bioZen WCX	Shodex IEC
Synchronis	Luna	Kinetex
Waters		
ACQUITY APC	—	Phenogel
ACQUITY BEH	Luna Omega C18	Synergi 2.5 µm
ACQUITY CSH	Luna Omega PS C18	Kinetex EVO
ACQUITY Protein BEH SEC	Yarra	Yarra
ACQUITY UPC2	—	Kinetex
ACQUITY UPLC Glycan BEH Amide	bioZen Glycan	—
ACQUITY UPLC PEPTIDE BEH	bioZen PEPTIDE XB-C18	—
ACQUITY UPLC PEPTIDE CSH	bioZen PEPTIDE PS-C18	—
ACQUITY UPLC Oligonucleotide BEH C18	Clarity	Clarity
Atlantis	Synergi Fusion-RP	Synergi Hydro-RP
BioSuite IEX	Shodex IEC	—
BioSuite SEC	Yarra	bioZen SEC
BioSuite RPC	—	Jupiter 300
Carbamate	—	Synergi Hydro-RP
Carbohydrate	PhenoSphere NH ₂	Luna Omega SUGAR
CORTECS	Kinetex	Kinetex
Deltapak 100A	—	Luna
Deltapak 300A	Aeris	bioZen Intact
GST	—	Luna HILIC
IC-pak	Hamilton PRP-X100	STAR-ION A300
µBondapak	Bondclone	Synergi Hydro-RP
µPorasil	Bondclone Silica	Luna Silica
µStyragel	Phenogel	Phenogel
Novapak 4 µm	—	Synergi Hydro-RP
OST	Clarity Oligo-RP	Clarity Oligo-MS
PAH C18	Kinetex PAH	—
Protein-Pak IEC	Shodex IEC	—
Protein-Pak SW	Yarra	bioZen SEC
PrST	Aeris WIDEPORE	Jupiter 3 µm C18
PST	Aeris PEPTIDE	bioZen
Resolve	PhenoSphere	Luna
Spherisorb	SphereClone	Synergi Hydro-RP
Sugar-pak	Rezex	Rezex
SunFire	Luna	Kinetex
Symmetry C18, C8	Luna C18(2), C8(2)	Synergi Max-RP
Symmetry Shield C18, C8	Synergi Fusion-RP	Synergi Hydro-RP
Symmetry 300	Jupiter	Aeris
Styragel	Phenogel	Phenogel
UltraStyragel	Phenogel	Phenogel
Ultrahydrogel	PolySep-GFC-P	Shodex OHPak SB
XBridge	Gemini NX-C18	Kinetex EVO C18
XBridge Glycan BEH Amide	bioZen Glycan	—
XBridge Oligonucleotide BEH C18	Clarity	Clarity
XSelect	Luna Omega PS C18	Kinetex
XTerra MS	Gemini	Kinetex EVO C18
XTerra RP	Gemini	Kinetex EVO C18

* Alternative - This category indicates an alternative column which will likely give a similar selectivity.

** Recommended Alternative - This category indicates an alternative column which may yield somewhat different selectivity but may also lead to improved resolution.

HPLC Column Selection by Separation Mode

This table is to aid you in selecting the right column from Phenomenex for the separation mode you desire. For specific application notes or method development assistance please call your Phenomenex technical consultant.

Separation Mode	Page
Adsorption Chromatography	
Phenomenex Kinetex HILIC	227
Phenomenex Luna Silica(2)	257
Chiral Chromatography	
Phenomenex Lux	282
Phenomenex Chirex	213
Shinwa Ultron ES	335
Shiseido Chiral CD-Ph	Inquire
Sumika Sumichiral OA	Inquire
Gel Filtration Chromatography	
Phenomenex bioZen SEC	200
Phenomenex Yarra SEC (silica)	336
Phenomenex BioSep SEC/GFC (silica)	199
Phenomenex PolySep GFC-P (polymer)	303
Asahipak GF and GS	Inquire
Shodex GFC OHPak SB, Sugar KS, Protein KW	319
Gel Permeation Chromatography	
Phenomenex Phenogel	296
Shodex Asahipak GF	Inquire
Shodex GPC, KF	319
Hydrophilic Interaction Chromatography (HILIC)	
Phenomenex bioZen Glycan	200
Phenomenex Kinetex HILIC	227
Phenomenex Luna HILIC	257
Phenomenex Luna NH ₂	257
Phenomenex Luna Silica(2)	257
Phenomenex Luna Omega SUGAR	271
Hydrophobic Interaction Chromatography (HIC)	
Shodex HIC	319
Ion-Exclusion Chromatography	
Phenomenex Rezex	305
Shodex RSpak, SUGAR	319
Ion-Exchange Chromatography	
Phenomenex bioZen WCX	200
Phenomenex Clarity Oligo-SAX	376
Phenomenex Luna SCX, Luna NH ₂	257
Phenomenex PhenoSphere SAX	Inquire
Phenomenex Rezex	305
Macherey-Nagel Nucleosil SAX, SB	Inquire
Shiseido Capcell UG-SCX	Inquire
Shodex Asahipak ES	Inquire
Shodex IEC	319
Shodex RSpak KC-811	319
Ion Chromatography	
Phenomenex STAR-ION A300	323
Hamilton PRP	Inquire
Shodex IC	319

Separation Mode	Page
Ligand Exchange Chromatography	
Phenomenex Rezex	305
Phenomenex bioZen WCX	200
Shodex SUGAR	319
Multi-Mode Chromatography	
Phenomenex Luna SCX	257
Phenomenex Luna NH ₂	257
Shodex Asahipak GS	Inquire
Normal Phase Chromatography	
Phenomenex Kinetex HILIC	227
Phenomenex Luna CN, NH ₂ , Silica(2)	257
Reversed Phase Chromatography	
Phenomenex Kinetex	227
Phenomenex Luna Omega	271
Phenomenex Luna	257
Phenomenex bioZen	200
Phenomenex Gemini	215
Phenomenex Synergi	324
Phenomenex Aeris	194
Phenomenex Bondclone	212
Phenomenex Clarity	376
Phenomenex Gemini NX	215
Phenomenex HyperClone	222
Phenomenex Jupiter	225
Phenomenex Onyx	294
Phenomenex PhenoSphere	Inquire
Phenomenex PhenoSphere-NEXT	Inquire
Phenomenex PolymerX	302
Phenomenex Prodigy	304
Phenomenex SphereClone	322
GL Sciences Inertsil	Inquire
Hamilton PRP	Inquire
Macherey-Nagel Nucleosil	Inquire
Merck KGaA LiChrospher, Superspher	256
Shiseido Capcell SG, UG, MG, ACR, AQ	Inquire
Waters Spherisorb	Inquire

HPLC Column Selection by USP Listing

For each United States Pharmacopeia (USP) column specification, you will find listed the most suitable Phenomenex column.

It is widely understood that all HPLC packings are not alike, and no single column can perform a myriad of desired separations. HPLC packings differ in hydrophobicity, surface coverage, surface area, pore size and particle shape.

The USP does give chromatographers the flexibility to make adjustments to Monographs. As you can read below, column manufacturers or sources and materials stated in USP Monographs are only recommendations. Chromatographers can and should change and adapt the Monograph's specifications to yield the most satisfactory analytical results.

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
L1 Octadecyl silane chemically bonded to porous or non-porous silica or ceramic microparticles, 1.5 to 10 µm in diameter, or a monolithic rod.	Kinetex® C18	Core-Shell	227
	Kinetex EVO C18	Core-Shell	227
	Kinetex Polar C18	Core-Shell	227
	Kinetex PS C18	Core-Shell	227
	Kinetex XB-C18	Core-Shell	227
	Luna® C18(2)	Spherical	257
	Luna Omega C18	Spherical	271
	Luna Omega PS C18	Spherical	271
	Luna Omega Polar C18	Spherical	271
	Gemini® NX-C18	Spherical	215
	Gemini C18	Spherical	215
	Synergi™ Hydro-RP	Spherical	324
	Synergi Fusion-RP	Spherical	324
	bioZen™ Peptide PS-C18	Spherical	200
	Onyx™ C18	Monolith	294
	Jupiter® C18	Spherical	225
	Clarity® Oligo-RP	Spherical	376
Clarity Oligo-MS	Core-Shell	376	
Clarity Oligo-XT	Core-Shell	376	
Aeris™ WIDEPORE XB-C18	Core-Shell	194	
bioZen Peptide XB-C18	Core-Shell	200	
L2 Octadecyl silane chemically bonded to silica gel of a controlled surface porosity that has been bonded to a solid spherical core, 30 to 50 µm in diameter.			
L3 Porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex HILIC	Core-Shell	227
	Luna Silica(2)	Spherical	257
	Onyx Silica	Monolith	294
L4 Silica gel of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter.			
L5 Alumina of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter.			
L6 Strong cation-exchange packing: sulfonated fluorocarbon polymer coated on a solid spherical core, 30 to 50 µm in diameter.			
L7 Octyl silane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex C8	Core-Shell	227
	Luna C8(2)	Spherical	257
	Onyx C8	Monolith	294
	bioZen Intact XB-C8	Core-Shell	200
L8 An essentially monomolecular layer of aminopropyl-silane chemically bonded to totally porous silica gel support, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna NH ₂	Spherical	257
	Luna Omega SUGAR	Spherical	271
L9 Irregular or spherical, totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating, 3 to 10 µm in diameter.	Luna SCX	Spherical	257
L10 Nitrile groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna CN	Spherical	257
L11 Phenyl groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex Biphenyl	Core-Shell	227
	Kinetex Phenyl-Hexyl	Core-Shell	227
	Synergi Polar-RP	Spherical	324
	Luna Phenyl-Hexyl	Spherical	257
	Gemini C6-Phenyl	Spherical	215
	Prodigy PH-3	Spherical	304
L12 Strong anion-exchange packing made by chemically bonding a quaternary amine to a solid silica spherical core, 30 to 50 µm in diameter.			
L13 Trimethylsilane chemically bonded to porous silica particles, 3 to 10 µm in diameter.	Develosil® TMS-UG (C1) 130 Å	Spherical	Inquire
L14 Silica gel having a chemically bonded, strongly basic quaternary ammonium anion-exchange coating, 5 to 10 µm in diameter.	PhenoSphere™ SAX	Spherical	Inquire
L15 Hexyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter.	PhenoSphere C6	Spherical	Inquire
L16 Dimethyl silane chemically bonded to porous silica particles, 5 to 10 µm in diameter.			
L17 Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 6 to 12 µm in diameter.	Rezex™ RHM-Monosaccharide	Spherical	305
	Rezex ROA-Organic Acid	Spherical	305
L18 Amino and cyano groups chemically bonded to porous silica particles, 3 to 10 µm in diameter.			
L19 Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 5 to 15 µm in diameter.	Rezex RCM-Monosaccharide	Spherical	305
	Rezex RCU-Sugar Alcohols	Spherical	305
L20 Dihydroxypropane groups chemically bonded to porous silica or hybrid particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna HILIC	Spherical	257
	BioSep™-SEC-S	Spherical	199
	Yarra™ SEC	Spherical	336
L21 A rigid, spherical styrene-divinylbenzene copolymer, 3 to 30 µm in diameter.	PolymerX™ RP-1	Spherical	302
	Phenogel™ 100 Å	Spherical	296
L22 A cation-exchange resin made of porous polystyrene gel with sulfonic acid groups, 5 to 15 µm in diameter.	Rezex ROA-Organic Acid	Spherical	305
L23 An anion-exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, 7-12 µm in size.	Shodex® IEC QA-825	Spherical	319
L24 Polyvinylalcohol chemically bonded to porous silica particles, 5 µm in diameter.			
L25 Packing having the capacity to separate compounds with a MW range from 100 to 5000 daltons (as determined by polyethylene oxide), applied to neutral, anionic, and cationic water-soluble polymers. A polymethacrylate resin base, crosslinked with poly-hydroxylated ether (surface contained some residual carboxyl functional groups) was found suitable.	PolySep™-GFC-P2000	Spherical	303
	Shodex OHpak SB-802.5HQ	Spherical	319

HPLC Column Selection by USP Listing

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
L26	Butyl silane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter.	Jupiter 300 C4 bioZen Intact C4	Spherical Core-Shell 225 200
L27	Porous silica particles, 30 to 50 µm in diameter.	Sepra Silica	Irregular 369
L28	A multifunctional support, which consists of a high purity, 100Å, spherical silica substrate that has been bonded with anionic exchanger, amine functionality in addition to a conventional reversed phase C8 functionality.		
L29	Gamma alumina, reversed phase, low carbon percentage by weight, alumina-based polybutadiene spherical particles, 5 µm diameter with a pore volume of 80Å.		
L30	Ethyl silane chemically bonded to a totally porous silica particle, 3 to 10 µm in diameter.		
L31	A hydroxide-selective, strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 8.5 µm macroporous particles having a pore size of 2000Å and consisting of ethylvinylbenzene cross-linked with 55% divinyl benzene.		
L32	A chiral ligand-exchange resin packing-L-proline copper complex covalently bonded to irregularly shaped silica particles, 5 to 10 µm in diameter.		
L33	Packing having the capacity to separate dextrans by molecular size over a range of 4,000 to 500,000 daltons. It is spherical, silica-based and processed to provide pH stability.	Yarra SEC-2000 BioSep- SEC-S2000 Yarra SEC-3000 BioSep- SEC-S3000	Spherical Spherical Spherical Spherical 336 199 336 199
L34	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, 7 to 9 µm in diameter.	Rezex RPM-Monosaccharide	Spherical 305
L35	A zirconium-stabilized spherical silica packing with a hydrophilic (diol-type) molecular monolayer bonded phase having a pore size of 150Å.	(BioSep- SEC-S2000 or Yarra SEC-2000 may be used)	Spherical Spherical 199 336
L36	3,5-dinitrobenzoyl derivative of L-phenylglycine covalently bonded to 5 µm aminopropyl silica.		
L37	Polymethacrylate gel packing having the capacity to separate proteins by molecular size over a range of 2,000 to 40,000 daltons.	PolySep- GFC-P3000 Shodex OHPak SB-803HQ	Spherical Spherical 303 319
L38	Methacrylate-based size-exclusion packing for water-soluble samples.	PolySep- GFC-P series Shodex OHPak SB-800HQ	Spherical Spherical 303 319
L39	Hydrophilic polyhydroxymethacrylate gel of totally porous spherical resin.	PolySep- GFC-P series Shodex OHPak SB-800HQ series Shodex RSpak DM-614	Spherical Spherical Spherical 303 319 319
L40	Cellulose tris-3,5-dimethylphenylcarbamate coated porous silica particles, 3 µm to 20 µm in diameter.	Lux Cellulose-1	Spherical 282
L41	Immobilized α-acid glycoprotein on spherical silica particles, 5 µm in diameter.		
L42	Octylsilane and octadecylsilane groups chemically bonded to porous silica particles, 5 µm in diameter.		
L43	Pentafluorophenyl groups chemically bonded to silica particles by a propyl spacer, 1.5 to 10 µm in diameter.	Kinetex F5 Luna PFP(2)	Core-Shell Spherical 227 257
L44	A multifunctional support, which consists of a high purity, 60Å, spherical silica substrate that has been bonded with a cationic exchanger, sulfonic acid functionality in addition to a conventional reversed phase C8 functionality.		
L45	Beta cyclodextrin, R, S-hydroxypropyl ether derivative, bonded to porous silica particles, 3 to 10 µm in diameter	Shiseido Chiral CD-Ph	Spherical Inquire
L46	Polystyrene/divinylbenzene substrate agglomerated with quaternary amine functionalized latex beads, about 9 to 11 µm in diameter.		
L47	High capacity anion-exchange microporous substrate, fully functionalized with a trimethylamine group, 8 µm in diameter.		
L48	Sulfonated, cross-linked polystyrene with an outer layer of submicron, porous, anion-exchange microbeads, 5 to 15 µm in diameter.		
L49	A reversed phase packing made by coating a thin layer of polybutadiene on to spherical porous zirconia particles, 3 to 10 µm in diameter.		
L50	Multifunction resin with reversed phase retention and strong anion-exchange functionalities. The resin consists of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 3 to 15 µm in diameter, and a surface area of not less than 350 m ² /g. Substrate is coated with quaternary ammonium functionalized latex particles consisting of styrene cross-linked with divinylbenzene.		
L51	Amylose tris-3,5-dimethylphenylcarbamate-coated, porous, spherical, silica particles, 3 to 10 µm in diameter.	Lux Amylose-1	Spherical 282
L52	A strong cation-exchange resin made of porous silica with sulfopropyl groups, 1 to 10 µm in diameter.		
L53	Weak cation-exchange resin consisting of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 3 to 15 µm diameter. Substrate is surface grafted with carboxylic acid and/or phosphoric acid functionalized monomers. Capacity not less than 500 µEq/column.		
L54	A size exclusion medium made of covalent bonding of dextran to highly cross-linked porous agarose beads, 5 to 15 µm in diameter.		
L55	A strong cation-exchange resin made of porous silica coated with polybutadiene-maleic acid copolymer, about 5 µm in diameter.		
L56	Propyl silane chemically bonded to totally or superficially porous silica particles, 3 to 10 µm in diameter.		
L57	A chiral-recognition protein, ovomucoid, chemically bonded to silica particles, about 5 µm in diameter, with a pore size of 120Å.	Ultron ES-OVM	Spherical 335
L58	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 6 to 30 µm in diameter.	Rezex RNM-Carbohydrate	Spherical 305
L59	Size-exclusion separations of proteins (separation by molecular weight) over the range of 5 to 7000 kDa. Spherical (1.5 to 10 µm), silica or hybrid packing with a hydrophilic coating.	Yarra SEC-2000 BioSep- SEC-S2000 Yarra SEC-3000 BioSep- SEC-S3000	Spherical Spherical Spherical Spherical 336 199 336 199
L60	Spherical, porous silica gel, 10 µm or less in diameter, surface has been covalently modified with alkyl amide groups and endcapped.		
L61	Hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 µm microporous particles, pore size less than 10Å, and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 85 nm diameter microbeads bonded with alkanol quaternary ammonium ions (6%).		
L62	C30 silane bonded phase on a fully porous spherical silica, 3 to 15 µm in diameter.	Develosil Combi-RP Develosil RP-Aqueous Develosil RP-Aqueous-AR	Spherical Spherical Spherical Inquire Inquire Inquire

HPLC Column Selection by USP Listing

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
L63			
L64			
L65			
L66			
L67	Asahipak ODP-50	Spherical	Inquire
L68			
L69			
L70			
L71	Shodex RSPak DE-413 Shodex RSPak DE-613	Spherical Spherical	319 319
L72			
L73			
L74			
L75			
L76			
L77			
L78			
L79			
L80	Lux Cellulose-3	Spherical	282
L81			
L82	Asahipak NH ₂ -50	Spherical	Inquire
L83			
L84			
L85			
L86			
L87	Synergi Max-RP	Spherical	324
L88			
L89			
L90			
L91			
L92			
L93	Lux Cellulose-1	Spherical	282
L94			
L95			
L96	Kinetex Polar C18 Kinetex PS C18 Luna Omega Polar C18 Luna Omega PS C18 Kinetex EVO C18 Synergi Hydro-RP Synergi Fusion-RP	Core-Shell Core-Shell Spherical Spherical Core-Shell Spherical Spherical	227 227 271 271 227 324 324

HPLC Column Selection by USP Listing

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
L97 Weak cation-exchange resin consisting of a highly cross-linked core of 5.5 µm porous particles having a pore size of 2000 Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 2400 µEq/column (4 mm x 25 cm).			
L98 Weak cation-exchange resin consisting of a highly cross-linked core of 8 µm microporous particles having an average pore size of 10 Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 46 µEq/column (4 mm x 5 cm).			
L99 Amylose tris-(3,5- dimethylphenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 µm in diameter	Lux i-Amylose-1	Spherical	282
L100 A 55% cross-linked, microporous, hydrophobic resin core (9 µm microporous particles having a pore size of 10 Å) that consists of a bilayer of anion and cation-exchange latex. The first layer is fully sulfonated (140 nm) and the second layer is fully aminated (76 nm).			
L101 Cholesteryl groups chemically bonded to porous or non-porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter, or a monolithic rod.			
L102 (Naproxen, (S,S)Whelk-O 1) 1-(3,5- dinitrobenzamido)-1,2,3,4- tetrahydrophenanthrene covalently bonded to porous spherical silica particles, 5 to 10 µm in diameter.			
L103 A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 7.5 µm porous particles having a pore size of 2000 Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene electrostatically bonded with hyperbranched alkanol quaternary ammonium ions.			
L104 Triazole groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter.			
L105 A strong anion-exchange resin consisting of a highly cross-linked 9 µm supermacroporous (2000 Å) particles functionalized with very low cross-linked latex (0.2%) to provide alkyl quaternary ammonium ion sites.			
L106 Weak cation-exchange resin consisting of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 5-8 µm diameter, macroporous particles having an average pore size of 100 Å units. Substrate is surface grafted with carboxylic acid and phosphonic acid functional groups. Capacity not less than 2800 µEq/column (4 mm x 25 cm).			
L107 Cellulose tris(4-methylbenzoate)-coated porous spherical particles, 3 to 5 µm in diameter, for use with reversed phase mobile phases.	Lux Cellulose-3	Spherical	282
L108 A chiral-recognition protein, cellobiohydrolase (CBH), chemically bonded to silica particles, about 5 µm in diameter.			
L109 Spherical particles of porous graphitic carbon, 3 to 30 µm in diameter.			
L110 A strong anion-exchange resin consisting of a highly cross-linked 13 µm microporous (less than 10 Å) particles coated with very low cross-linked latex (0.5%) to provide alkanol quaternary ammonium ion-exchange sites.			
L111 Polyamine chemically bonded to porous spherical silica particles, 5 µm in diameter.			
L112 A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 8.5 µm porous particles having a pore size of 2000 Å units and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 65 nm diameter microbeads (5% cross-linked) bonded with alkanol quaternary ammonium ions.			
L113 A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 7.5 µm porous particles having a pore size of 2000 Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 65 nm diameter microbeads (5% crosslinked) bonded with alkanol quaternary ammonium ions.			
L114 Sulfobetaine graft-polymerized to totally or superficially porous silica, 1.5 to 10 µm in diameter, or a monolithic rod. Packing having densely bonded zwitterionic groups with 1:1 charge balance.			
L115 Ethylvinylbenzene/divinylbenzene substrate (55% cross-linked) agglomerated with quaternary amine functionalized 275 nm latex microbeads (6% cross-linked), about 8.5 µm in diameter.			
L116 Sulfonated ethylvinylbenzene/divinylbenzene substrate agglomerated with hydrophilic quaternary amine functionalized glycidyl-derivative methacrylate microbeads, approximately 2 to 50 µm in diameter.			
L117 A crown ether coated on a 5 µm particle size silica gel substrate. The active site is (R)-18-crown-6-ether.			
L118 Aqueous polymerized C18 groups on silica particles, 1.2 to 5 µm in diameter.	Kinetex PAH	Core-Shell	227
L119 Cellulose tris-(3,5-dichlorophenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 µm in diameter.	Lux i-Cellulose-5	Spherical	282
L120 A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 µm microporous particles having a pore size of < 10 Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 65 nm diameter microbeads (8% cross-linked) bonded with alkanol quaternary ammonium ions. Capacity not less than 10 µEq/column(4 mm x 5 cm).			

HPLC Column Selection by Ph. Eur. Listing

The European Pharmacopoeia (*Ph. Eur.*), of the Council of Europe is a pharmacopoeia, listing a wide range of active substances and excipients used to prepare pharmaceutical products in Europe. It includes general and specific monographs that give quality standards for all the main medicines used in Europe. All medicines sold in the 38 Member States of the European Pharmacopoeia must comply with these quality standards so that consumers have a guarantee for products obtained from pharmacies and other legal suppliers.

It is widely understood that all HPLC packings are not alike, and no single column can perform a myriad of desired separations. HPLC packings differ in hydrophobicity, surface coverage, surface area, pore size, and particle shape.

For each European Pharmacopoeia (*Ph. Eur.*) description of the HPLC stationary phase, you will find listed the most suitable Phenomenex HPLC column. Other possible columns can also be used for these analyses. Please contact Phenomenex for your specific LC column needs.

Description According to Pharm. Eur. 10 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
Silica gel π -acceptor / π -Donor for chiral separations (1-(3,5-dinitrobenzamide)-1,2,3,4-tetrahydrophenanthrene).	1160100		
Silica gel AGP for chiral chromatography. (alpha 1-acid glycoprotein).	1148700		
Silica gel BC for chiral chromatography. (Beta-Cyclodextrin).	1161300	Sumichiral OA-7000	Inquire
Silica gel for chiral chromatography, urea type derivative: (R)-phenylglycin and 3, 5-dinitroaniline; 5 μ m.	1181000	Chirex 3012	Inquire
Silica gel AD for chiral separation coated with Amylose tris (3,5-dimethylphenylcarbamate); 5 μ m.	1171700	Lux Amylose-1	282
Silica gel for chiral separation, cellulose derivative coated with tris (3,5-dimethylphenylcarbamate), 5 μ m.	1110300	Lux Cellulose-1	282
Silica gel for chromatography, human albumin coated.	1138500		
Silica gel for chiral separation, protein derivative of	1196300		
Silica gel for chiral separation, vancomycin-bonded	1205300		
Silica gel for CR+ for chiral chromatography (crown-ether)	1192400	Sumichiral OA-8000	Inquire
Silica gel for chiral separation, L-Penicillamine coated silica gel.	1200050	Sumichiral OA-5000L	Inquire
Silica gel for chromatography.	1076900	Kinetex HILIC Luna Silica(2)	227 257
Silica gel for chromatography, alkyl bonded for use with highly aqueous mobile phases.	1160200	Luna Omega Polar C18 Luna Omega PS C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	271 271 324 324 215 215 227 227 227 227 227
Silica gel for chromatography, alkyl bonded for use with highly aqueous mobile phases, endcapped. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1176900	Luna Omega Polar C18 Luna Omega PS C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	271 271 324 324 215 215 227 227 227 227 227
Silica gel for chromatography, alkylsilyl, solid core, endcapped. Spherical silica particles containing a non-porous solid silica core surrounded by a thinner outer porous silica coating with alkylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1194300	Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex C8 Kinetex Polar C18	227 227 227 227 227
Silica gel for chromatography, amidoalkylsilyl	1205400		
Silica gel for chromatography, amidohexadecylsilyl.	1170400		
Silica gel for chromatography, amidohexadecylsilyl, endcapped	1201100		
Silica gel for chromatography, aminopropylmethylsilyl.	1102400	SphereClone NH ₂ (Amino) PhenoSphere NH ₂ (Amino)	322 Inquire
Silica gel for chromatography, aminopropylsilyl.	1077000	SphereClone NH ₂ (Amino) PhenoSphere NH ₂ (Amino)	322 Inquire
Silica gel for chromatography, aminopropylsilyl R1 particle size of ~55 μ m.	1077001	Strata NH ₂	70
Silica gel for chromatography, Amylose derivative of.	1109800	Lux Amylose-1 Lux Amylose-2	282 282
Silica gel for chromatography, butylsilyl. Spheroidal 300 Å; pore volume: 0.6 cm ³ /g; area: 80 m ² /g.	1076200	bioZen Intact C4 Aeris WIDEPORE C4	200 194

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, butylsilyl, endcapped.	1170500	bioZen Intact C4 Aeris WIDEPORE C4 Jupiter 300 C4	200 194 225
Silica gel for chromatography compatible with 100% aqueous mobile phase, octadecylsilyl, endcapped.	1188400	Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Kinetex EVO C18 Kinetex Polar C18	271 324 324 227 227
Silica gel for chromatography compatible with 100% aqueous mobile phase, octadecylsilyl.	1203900	Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18	271 271 324 324 227 227 227
Silica gel for chromatography compatible with highly aqueous mobile phase, octadecylsilyl diol, endcapped.	1207500		
Silica gel for chromatography, crown-ether.	1178000	Sumichiral OA-8000	Inquire
Silica gel for chromatography, cyanopropylsilyl, endcapped, base-deactivated.	1194200	Luna CN (Cyano)	257
Silica gel for chromatography, cyanosilyl.	1109900	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	257 222 Inquire
Silica gel for chromatography, cyanopropylsilyl, endcapped.	1195000	Luna CN (Cyano)	257
Silica gel for chromatography, di-isobutyloctadecylsilyl.	1140000	Kinetex XB-C18	227
Silica gel for chromatography, diisopropylcyanopropylsilyl.	1168100		
Silica gel for chromatography, 4-dimethylaminobenzylcarbamidesilyl. Chemically modified at the surface by bonding of 4-dimethylaminobenzylcarbamidesilyl groups.	1204000		
Silica gel for chromatography, dimethyloctadecylsilyl. Irregular; area: 300 m ² /g.	1115100	Bondclone C18	212
Silica gel for chromatography, diol dihydroxypropyl, 100 Å; 10 µm.	1110000	Spherex OH (Diol)	Inquire
Silica gel for chromatography, dodecylsilyl, endcapped.	1179700	Synergi Max-RP	324
Silica gel for chromatography, hexadecylamidylsilyl with hexadecylcarboxamidopropyl dimethylsilyl groups; 5 µm.	1162500		
Silica gel for chromatography, hexadecylamidylsilyl, endcapped with hexadecylcarboxamidopropyl dimethylsilyl groups; 5 µm.	1172400		
Silica gel for chromatography, hexylsilyl.	1077100	SphereClone C6 PhenoSphere C6	322 Inquire
Silica gel for chromatography, hexylsilyl, endcapped.	1174400	SphereClone C6 PhenoSphere C6	322 Inquire
Silica gel for chromatography, (hybrid material), octadecylsilyl, ethylene-bridged, charged surface, endcapped. Synthetic, spherical ethylene-bridged hybrid particles with a charged surface, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of octadecylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1202800	Kinetex EVO C18 (Luna Omega PS C18)	227 (271)
Silica gel for chromatography, octadecylsilyl, ethylene-bridged (hybrid material), endcapped. Synthetic, spherical ethylene-bridged hybrid particles, containing both organic (organosiloxanes) and inorganic (silica) components.	1190500	Kinetex EVO C18 Gemini NX-C18	227 215
Silica gel for chromatography, (hybrid material), phenylsilyl, ethylene-bridged, charged surface, endcapped. Synthetic, spherical ethylene-bridged hybrid particles with a charged surface, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of phenylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1204100		
Silica gel for chromatography, (hybrid material), phenylsilyl, ethylene-bridged, endcapped. Synthetic, spherical ethylene-bridged hybrid particles containing both organic (organosiloxanes) and inorganic (silica) components, chemically modified at the surface by bonding of phenylsilyl groups. To minimize the interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1200700	Gemini C6-Phenyl	215
Silica gel for chromatography, (hybrid material), polar-embedded, octadecylsilyl, ethylene-bridged, endcapped. Synthetic, spherical ethylene-bridged hybrid particles, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of polar embedded octadecylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1200800		
Silica gel for chromatography, hydrophilic surface has been modified to provide hydrophilic characteristics.	1077200	Luna HILIC Kinetex HILIC	257 227
Silica gel for chromatography, nitrile cyanopropylsilyl.	1077300	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	257 222 Inquire
Silica gel for chromatography, nitrile R1 chemically bonded nitrile groups.	1077400	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	257 222 Inquire
Silica gel for chromatography, nitrile R2 ultrapure silica (<20 ppm metal) with cyanopropylsilyl groups.	1119500	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	257 222 Inquire
Silica gel for chromatography, nitrile, endcapped with cyanopropylsilyl groups.	1174500	Luna CN (Cyano)	257
Silica gel for chromatography, 4-nitrophenylcarbamidesilyl. A very finely divided silica gel, chemically modified at the surface by bonding with 4-nitrophenylcarbamide groups.	1185200		

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, octadecanoylamino propylsilyl aminopropylsilyl groups which are acylated with octadecanoyl groups.	1115200		
Silica gel for chromatography, octadecylsilyl, endcapped. A very finely divided silica gel, chemically modified at the surface by bonding of octadecylphenylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1199300		
Silica gel for chromatography, octadecylsilyl.	1077500	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 HyperClone C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18 SphereClone C18 ODS(1) or (2)	257 271 271 271 324 324 215 215 222 227 227 227 227 227 322
Silica gel for chromatography, octadecylsilyl R1 ultrapure silica (<20 ppm metals), pore size and C-load are indicated in the method.	1110100	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Jupiter C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	257 271 271 271 324 324 215 215 225 227 227 227 227 227
Silica gel for chromatography, octadecylsilyl R2 ultrapure silica; 150 Å pore size; 20% C-load; optimized for the analysis of PAHs.	1115300	EnviroSep-PP Prodigy ODS-2	Inquire 304
Silica gel for chromatography, octadecylsilyl, base-deactivated pretreated before the bonding by careful washing and hydrolyzing most of the superficial siloxane bridges to minimize the interaction with basic components.	1077600	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	257 271 271 271 215 215 227 227 227 227 227
Silica gel for chromatography, octadecylsilyl, cross-linked, endcapped. Chemically modified at the surface by cross-linking and bonding of octadecylsilyl groups. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1204200	Kinetex PAH	227
Silica gel for chromatography, octadecylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1115400	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	257 271 271 271 215 215 227 227 227 227 227
Silica gel for chromatography, octadecylsilyl, endcapped R1 ultrapure silica (<20 ppm metal), 100Å pore size; 19% C-load. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1115401	Luna C18	257
Silica gel for chromatography, octadecylsilyl, endcapped, base-deactivated; pore size 100 Å; 16% C-load, pretreated before the bonding by careful washing and hydrolyzing most of the superficial siloxane bridges. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1108600	Luna C18(2) Prodigy ODS-3 Gemini C18 Gemini NX-C18	257 304 215 215
Silica gel for chromatography, octadecylsilyl, extra-dense bonded, endcapped.	1188500	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	257 271 271 271 215 215 227 227 227 227 227

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, octadecylsilyl, for separation of polycyclic aromatic hydrocarbons. A very finely divided ultrapure silica gel, chemically modified at the surface by the bonding of octadecylsilyl groups, optimized for the analysis of polycyclic aromatic hydrocarbons.	1202900	Kinetex PAH	227
Silica gel for chromatography, octadecylsilyl, monolithic.	1154500	Onyx C18	294
Silica gel for chromatography, octadecylsilyl, endcapped, base-deactivated R1; pretreated before the bonding by careful washing and hydrolyzing most of the superficial siloxane bridges. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1162600	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	257 271 271 271 215 215 227 227 227 227 227
Silica gel for chromatography, octadecylsilyl, polar endcapped.	1205500	Synergi Hydro RP Luna Omega Polar C18	324 271
Silica gel for chromatography, octadecylsilyl, solid core.	1205600	Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18 Aeris PEPTIDE XB-C18 Aeris WIDEPORE XB-C18	227 227 227 227 227 194 194
Silica gel for chromatography, octadecylsilyl, solid core, endcapped with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octadecylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1193900	bioZen Peptide XB C18 Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18 Aeris PEPTIDE XB-C18 Aeris WIDEPORE XB-C18	200 227 227 227 227 227 194 194
Silica gel for chromatography, octadecylsilyl, with polar embedded groups, endcapped; the particles are based on a mixture of silica chemically modified at the surface by the bonding of octadecylsilyl groups and silica chemically modified with a reagent providing a surface with chains having embedded polar groups.	1177900	Synergi Fusion-RP	324
Silica gel for chromatography, octadecylsilyl, with extended pH range, endcapped (resistant to bases up to pH 11)	1196700	Gemini C18 Gemini NX-C18 Kinetex EVO C18	215 215 227
Silica gel for chromatography, octadecylsilyl, with polar incorporated groups, endcapped; the particles are based on silica, chemically modified with a reagent providing a surface with chains having polar incorporated groups and terminating octadecyl groups.	1165100	Synergi Fusion-RP	324
Silica gel for chromatography, octylsilyl.	1077700	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (MOS) SphereClone C8	227 257 304 222 322
Silica gel for chromatography, octylsilyl R1. Bonding of octylsilyl and methyl groups (double bonded phase).	1077701	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (MOS) SphereClone C8	227 257 304 222 322
Silica gel for chromatography, octylsilyl R2 ultrapure silica (<20 ppm metal); pore size 100Å; C-load: 19%.	1077702		
Silica gel for chromatography, octylsilyl R3 ultrapure silica, bonding of octylsilyl groups and sterically protected with branched hydrocarbons at the silanes.	1155200	bioZen Intact XB C8	200
Silica gel for chromatography, octylsilyl, base-deactivated pretreated before the bonding by careful washing and hydrolyzing most of the superficial siloxane bridges to minimize the interaction with basic components.	1131600	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (BDS)	227 257 304 222
Silica gel for chromatography, octylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1119600	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (BDS)	227 257 304 222
Silica gel for chromatography, octylsilyl, endcapped, base-deactivated pretreated before the bonding by careful washing and hydrolyzing most of the superficial siloxane bridges to minimize the interaction with basic components. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanols.	1148800	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (BDS)	227 257 304 222
Silica gel for chromatography, octylsilyl, with polar incorporated groups, endcapped; chains having polar incorporated groups and terminating octyl groups.	1152600		
Silica gel for chromatography, octylsilyl, extra-dense bonded, endcapped.	1200900	Luna C8(2) Kinetex C8	257 227
Silica gel for chromatography, oxypropionitrilsilyl	1184700		
Silica gel for chromatography, palmitamidopropylsilyl, endcapped bonding with palmitamidopropyl groups and endcapped with acetamidopropyl groups.	1161900		

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, pentafluorophenylpropylsilyl, solid core, endcapped.	1207600	Kinetex F5 Kinetex PFP	227 227
Silica gel for chromatography, phenylhexylsilyl.	1153900	Kinetex Phenyl-Hexyl Luna Phenyl-Hexyl Gemini C6-Phenyl	227 257 215
Silica gel for chromatography, phenylhexylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1170600	Kinetex Phenyl-Hexyl Luna Phenyl-Hexyl Gemini C6-Phenyl	227 257 215
Silica gel for chromatography, phenylhexylsilyl, solid core, endcapped. Silica gel with spherical silica particles containing a non-porous solid core surrounded by a thin outer porous silica coating with phenylhexylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1198900	Kinetex Phenyl-Hexyl	227
Silica gel for chromatography, phenylsilyl.	1110200	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	324 257 215 304 227 227
Silica gel for chromatography, phenylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1154900	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	324 257 215 304 227 227
Silica gel for chromatography, phenylsilyl, endcapped, base-deactivated.	1197900	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	324 257 215 304 227 227
Silica gel for chromatography, phenylsilyl, extra-dense bonded, endcapped.	1207700	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6 Phenyl Prodigy Phenyl PH3 Kinetex Phenyl-Hexyl Kinetex Biphenyl	324 257 215 304 227 227
Silica gel for chromatography, propoxybenzene, endcapped.	1174600	Synergi Polar-RP	324
Silica gel for chromatography, propylsilyl.	1170700		
Silica gel for chromatography, strong anion-exchange bonding of quaternary ammonium groups; pH limit of use: 2 to 8.	1077800	PhenoSphere SAX	Inquire
Silica gel for chromatography, strong cation-exchange bonding of sulfonic acid groups.	1161400	Luna SCX	257
Silica gel for chromatography, trimethylsilyl.	1115500	Develosil TMS-UG (C1) Capcell Pak C1 UG PhenoSphere C1	Inquire Inquire Inquire
Silica for size-exclusion chromatography. 10 µm silica with a very hydrophilic surface. Pore size average: 30 nm; pH stability 2 to 8; exclusion range for proteins: 1 x 10 ³ to 3 x 10 ⁶ ; 10 µm.	1077900	BioSep-SEC-S3000 Yarra SEC-3000	199 336
Silica gel OC for chiral separations. Coated with cellulose tris (phenylcarbamate); 5 µm.	1146800		
Silica gel OD for chiral separations.	1110300	Lux Cellulose-1	282
Silica gel OJ for chiral separations. Coated with cellulose tris (4-methylbenzoate).	1179800	Lux Cellulose-3	282
Organosilica polymer, amorphous, octadecylsilyl. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by trifunctionally bonded octadecylsilyl groups.	1144200	Kinetex EVO C18 Gemini C18 Gemini NX-C18	227 215 215
Organosilica polymer, amorphous, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by trifunctionally bonded octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1178600	Kinetex EVO C18 Gemini C18 Gemini NX-C18	227 215 215
Organosilica polymer, amorphous, polar embedded, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of polar embedded octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1150600		
Organosilica polymer, amorphous, polar embedded propyl-2-phenylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of polar embedded propyl-2-phenylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1178100		
Organosilica polymer for mass spectrometry, amorphous, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1164900	Kinetex EVO C18 Gemini C18 Gemini NX-C18	227 215 215
Organosilica polymer compatible with 100 % aqueous mobile phases, octadecylsilyl, solid core, endcapped.	1201700	Kinetex EVO C18	227
Organosilica polymer, multi-layered, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles, multi-layered, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1202500	Kinetex EVO C18 Gemini C18 Gemini NX-C18	227 215 215

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
Vinyl polymer for chromatography, amino alkyl. Spherical particles (5 µm) of a vinyl alcohol copolymer, bonding of amino alkyl groups.	1191500	Asahipak NH ₂ -P	Inquire
Vinyl polymer for chromatography, octadecyl. Spherical particles (5 µm) of a vinyl alcohol copolymer, bonding of octadecyl groups on the hydroxyl groups.	1155400	Asahipak ODP-50	Inquire
Vinyl polymer for chromatography, octadecylsilyl. Spherical particles (5 µm) of a vinyl alcohol copolymer bonded to an octadecylsilane. C-load: 17 %.	1121600	Asahipak ODP-50	Inquire
Ion-exclusion resin for chromatography. A resin with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1131000	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	305 305
Cation-exchange resin, strong. Strong cation-exchange resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1156800	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	305 305
Cation-exchange resin. A resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 8 % divinylbenzene. Available as spherical beads.	1016700	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	305 305
Cation-exchange resin R1. A resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 4 % divinylbenzene. Available as spherical beads.	1121900		
Cation-exchange resin R2. Resin containing strongly acidic propylsulfonic acid groups.	1195400		
Cation-exchange resin (Calcium form), strong. Resin in calcium form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 8 % divinylbenzene	1104600	Rezex RCM-Monosaccharide Rezex RCU-USP Sugar Alcohols	305 305
Cation-exchange resin (Sodium form), strong. Resin in sodium form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1176100	Rezex RNM-Carbohydrate	305
Cation-exchange resin, weak. Weak cation exchange resin in protonated form with carboxylate functional groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1203200	bioZen WCX	200
Anion-exchange resin. Resin in chlorinated form containing quaternary ammonium groups [CH ₂ N ⁺ (CH ₃) ₃] attached to a polymer lattice consisting of polystyrene cross-linked with 2 % of divinylbenzene. Available as spherical beads.	1007200		
Anion-exchange resin R1. Resin containing quaternary ammonium groups [CH ₂ N ⁺ (CH ₃) ₃] attached to a lattice consisting of methacrylate.	1123400		
Anion-exchange resin R2. Conjugate of homogeneous 10 µm hydrophilic polyether particles, and a quaternary ammonium salt, providing a matrix suitable for strong anion-exchange chromatography of proteins.	1141900		
Anion-exchange resin R3. Resin with quaternary ammonium groups attached to a lattice of ethylvinyl-benzene crosslinked with 55 % of divinylbenzene.	1180900		
Anion-exchange resin for chromatography, strongly basic with quaternary ammonium groups attached to a lattice of latex cross-linked divinylbenzene.	1112700		
Anion-exchange resin for chromatography, strongly basic R1. Non-porous resin agglomerated with a 100 nm alkyl quaternary ammonium functionalized latex.	1187400		
Anion-exchange resin, weak resin with diethylaminoethyl groups attached to lattice consisting of poly(methyl methacrylate).	1146700		

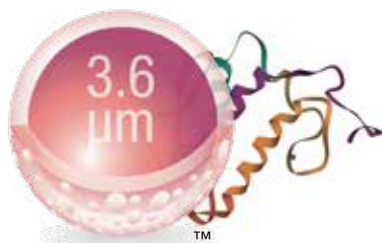
Core-Shell HPLC / UHPLC Columns for Proteins and Peptides

Ultra-High Resolution and Performance

Introducing Aeris, a specialized line of reversed phase core-shell HPLC / UHPLC columns, built exclusively for the ultra-high performance separation and analysis of proteins and peptides.

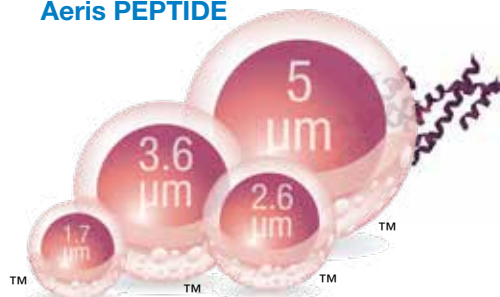
These columns can provide improved resolving power, selectivity, throughput, sensitivity, column lifetime, and method flexibility compared to other fully porous and core-shell columns typically used for bioseparations.

Aeris WIDEPORE



Large pore optimized for intact proteins and polypeptides

Aeris PEPTIDE



Small pore optimized for peptides and for peptide mapping

The precise architecture of Aeris core-shell particles provides dramatic leaps in performance in two important ways:

1 The thin, porous layer, or “shell”, decreases the diffusion path length, thus reducing the time it takes for biomolecules to adsorb/desorb into and out of the particle.

2 Expert manufacturing combined with tight packing specifications and high particle density reduces losses in efficiency and performance due to band broadening.

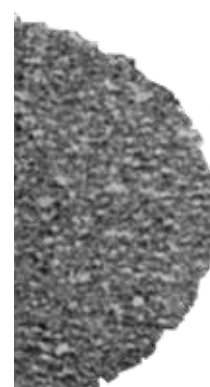
Aeris Core-Shell Particle

- High particle density helps create optimal bed structure which reduces band broadening effects of Eddy Diffusion
- Ultra-high performance on HPLC and UHPLC systems alike
- Reduced diffusion path improves efficiency



Fully Porous Particle

- Less homogenous bed structure leads to performance loss
- Ultra-high performance limited to sub-2µm particles on UHPLC systems
- Diffusion path limits efficiencies



The result is:

- **3.6µm core-shell particles** that can perform like sub-2µm columns on both HPLC and UHPLC systems at a fraction of the pressure
- **5µm core-shell particles** allow scale up to preparative dimensions
- **1.7µm and 2.6µm core-shell particles** that can provide higher peak capacities compared to fully porous sub-2µm columns on UHPLC systems

Selecting the Optimal Aeris Column for Your Applications

Aeris core-shell columns are designed for the separation of complex protein and peptide mixtures. Chromatographers can easily narrow down the column(s) that has a high probability of success for their separation by selecting from a variety of phase, pore size, and particle size options.

Aeris PEPTIDE

Recommended for the separation of low molecular weight peptides and for peptide mapping.

- **XB-C18 chemistry best suited for resolving peptides**
- **1.7 µm, 2.6 µm, and 3.6 µm particles for method development flexibility between HPLC and UHPLC systems**
- **5 µm particle for peptide purification**
- **Small pore optimized for peptide diffusion**

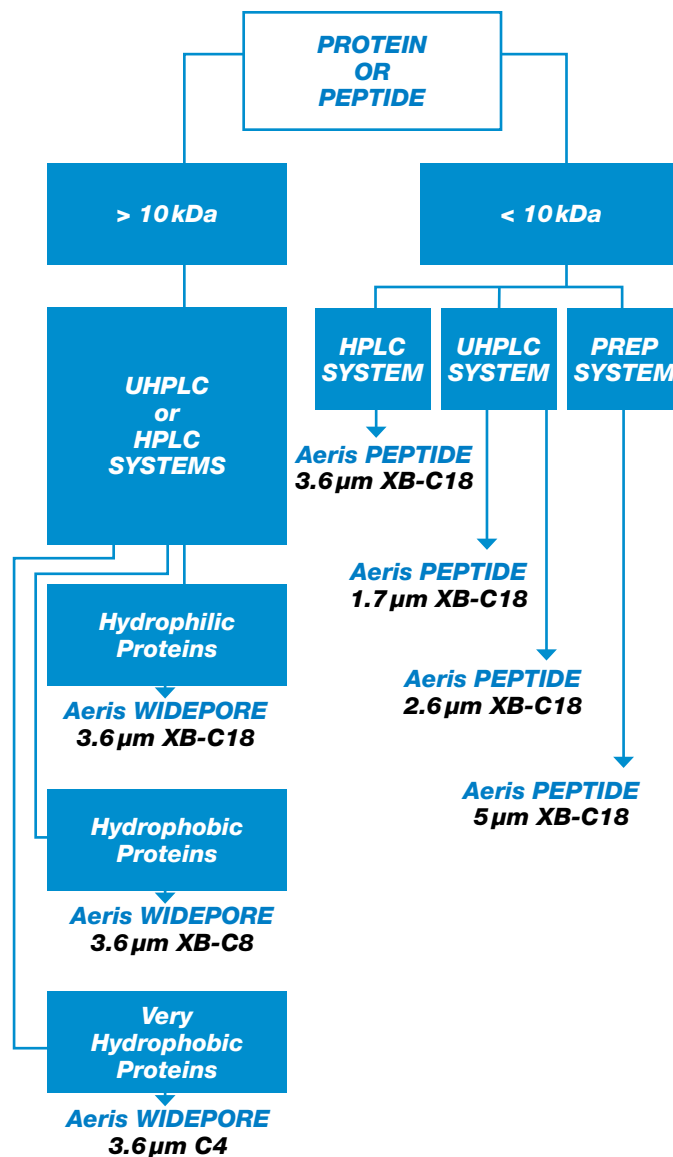
For increased resolving power, use a longer column, preferably a 250mm (or 150mm for the Aeris 1.7 µm XB-C18). Due to the lower backpressure of Aeris 3.6µm, one can easily run 250mm columns on both HPLC and UHPLC systems, AND one can couple multiple 250mm columns together and run them inline for even better results. For maximum UHPLC resolution, the 150mm length Aeris 1.7 µm or 250mm length Aeris 2.6 µm columns are excellent choices.

Aeris WIDEPORE

Recommended for the separation of intact proteins and polypeptides.

- **XB-C18, XB-C8, and C4 phases for alternate selectivities**
- **3.6 µm particle for system flexibility**
- **Large pore optimized for fast protein adsorption/desorption**

Because of the reduced hydrophobicity compared to fully porous 300Å columns, one should start gradients with reduced organic concentrations compared to other columns to improve peak shape of polar proteins and peptides. Shallower gradients compared to other fully porous columns may be appropriate.



Material Characteristics

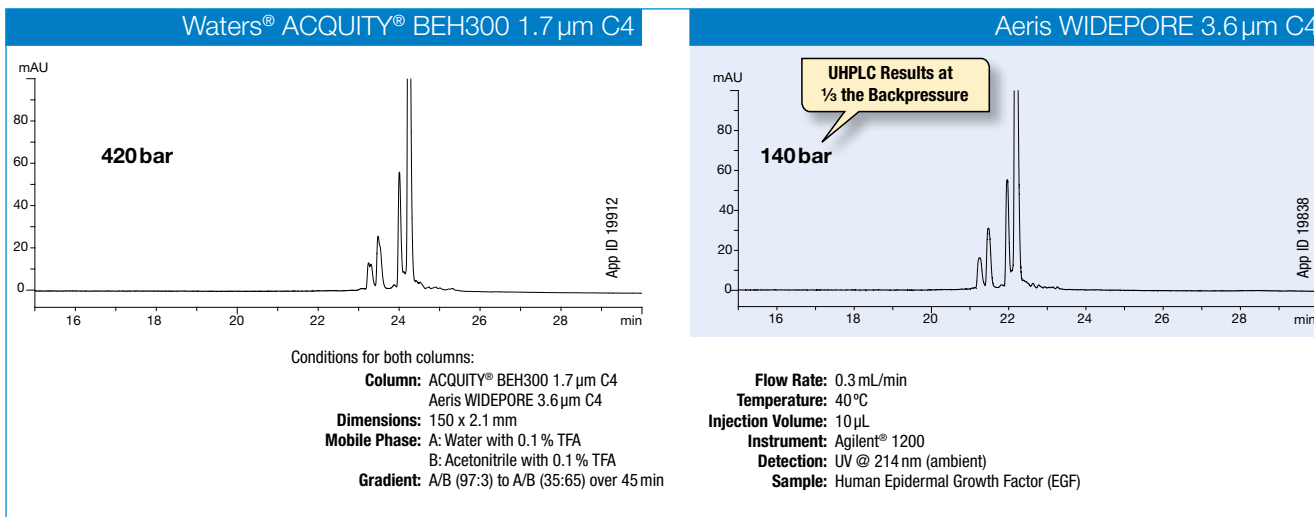
Packing Material	Total Particle Size (µm)	Porous Shell (µm)	Core Size (µm)	pH Stability	Temp Stability °C	Pressure Stability bar
Aeris WIDEPORE	3.6	0.2	3.2	1.5 - 9	90	600
Aeris PEPTIDE	1.7	0.22	1.25	1.5 - 9	90	1000
Aeris PEPTIDE	2.6	0.35	1.9	1.5 - 9	90	1000
Aeris PEPTIDE	3.6	0.5	2.6	1.5 - 9	90	600
Aeris PEPTIDE	5	0.6	3.8	1.5 - 9	90	600

Maximize Resolving Power with Unique Wide-Pore 3.6 μm Core-Shell Particle

3.6 μm core-shell technology combined with inert surface chemistries and tight packing specifications results in Aeris WIDEPORE columns delivering exceptional resolving power at significantly lower backpressures. Chromatographers now have the ability to

generate higher quality data than typically produced by columns packed with fully porous particles for every protein analysis – on HPLC or UHPLC systems.

Performance Equivalent to Sub-2 μm Particle at Low Backpressure

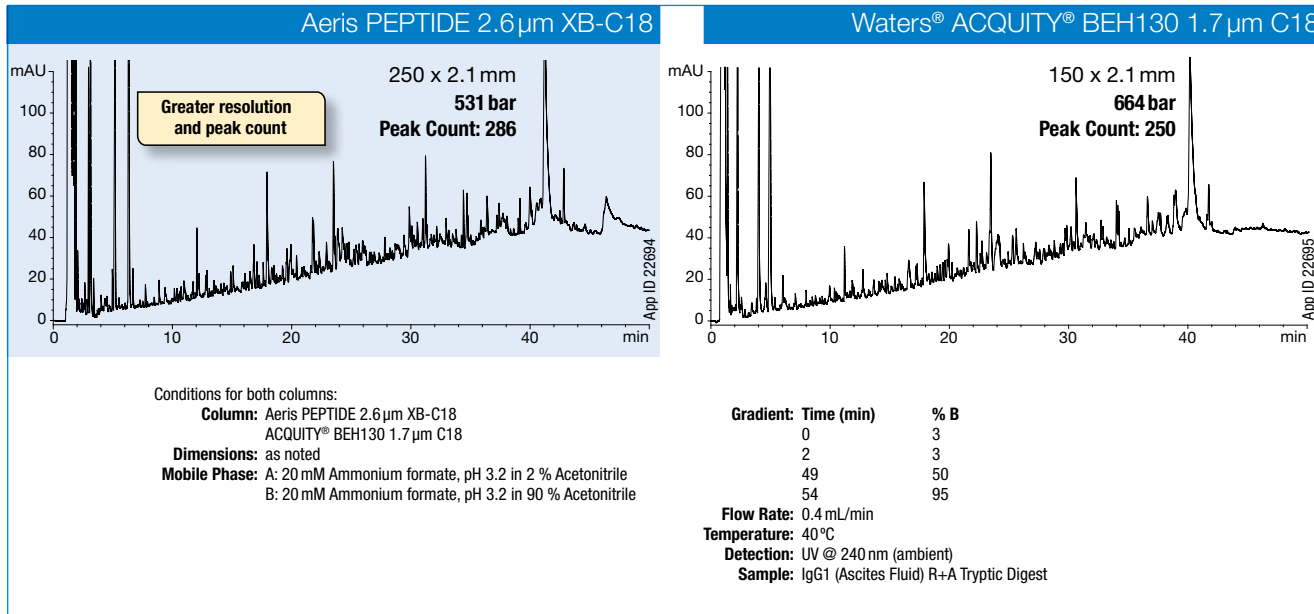


Ultra-High Resolving Power on UHPLC Systems with Aeris PEPTIDE 2.6 μm Columns of 250mm Length

The Aeris PEPTIDE 2.6 μm core-shell particle was designed with one purpose in mind: to enhance the separation and maximize the peak count of complex peptide maps on UHPLC systems. Because the 2.6 μm core-shell particle reduces backpressure on UHPLC

systems while maintaining similar efficiencies to sub-2 μm fully porous particles, longer columns can be used to further maximize the separation power while still being well within the backpressure constraints of the instrumentation.

Increase UHPLC Performance with Aeris PEPTIDE 2.6 μm Columns



Aeris™ Core-Shell LC Columns for Proteins & Peptides

Ordering Information

Aeris PEPTIDE 1.7 µm Minibore Columns (mm)				SecurityGuard™ ULTRA Cartridges*
Phase	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
XB-C18	00B-4506-AN	00D-4506-AN	00F-4506-AN	AJ0-8948

for 2.1 mm ID

Aeris PEPTIDE 2.6 µm Minibore Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	00B-4505-AN	00D-4505-AN	00F-4505-AN	00G-4505-AN	AJ0-8948

for 2.1 mm ID

Aeris PEPTIDE 2.6 µm MidBore™ and Analytical Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	150 x 3.0	150 x 4.6	250 x 4.6	3/pk	3/pk
XB-C18	00F-4505-YO	00F-4505-EQ	00G-4505-EQ	AJ0-8947	AJ0-8946

for 3.0 mm ID

for 4.6 mm ID

Aeris PEPTIDE 3.6 µm Minibore Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	00B-4507-AN	00D-4507-AN	00F-4507-AN	00G-4507-AN	AJ0-8948

for 2.1 mm ID

Aeris PEPTIDE 3.6 µm Analytical Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
XB-C18	00B-4507-EQ	00D-4507-EQ	00F-4507-EQ	00G-4507-EQ	AJ0-8946

for 4.6 mm ID

Aeris PEPTIDE 5 µm Analytical Scout and Semi-Prep Columns (mm)				SecurityGuard ULTRA Cartridges*	SecurityGuard SemiPrep Cartridges**	
Phase	150 x 4.6	250 x 4.6	150 x 10.0	250 x 10.0	3/pk	10 x 10
XB-C18	00F-4632-EQ	00G-4632-EQ	00F-4632-NQ	00G-4632-NQ	AJ0-8946	AJ0-9317

for 4.6 mm ID

for 10 mm ID

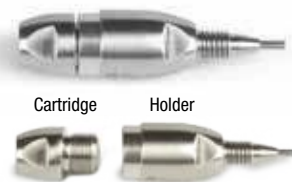
Aeris PEPTIDE 5 µm Axia™ Packed Preparative Columns (mm)			SecurityGuard PREP Cartridges†
Phase	150 x 21.2	250 x 21.2	15 x 21.2
XB-C18	00F-4632-P0-AX	00G-4632-P0-AX	AJ0-9318

for 21.2 mm ID

Aeris WIDEPORE 3.6 µm Minibore Columns (mm)				SecurityGuard™ ULTRA Cartridges*	
Phases	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	00B-4482-AN	00D-4482-AN	00F-4482-AN	00G-4482-AN	AJ0-8783
XB-C8	00B-4481-AN	00D-4481-AN	00F-4481-AN	00G-4481-AN	AJ0-8785
C4	00B-4486-AN	00D-4486-AN	00F-4486-AN	00G-4486-AN	AJ0-8899

for 2.1 mm ID

SecurityGuard ULTRA
Holder with cartridge



Cartridge Holder

Aeris WIDEPORE 3.6 µm Analytical Columns (mm)				SecurityGuard ULTRA Cartridges*
Phases	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
XB-C18	00D-4482-EQ	00F-4482-EQ	00G-4482-EQ	AJ0-8769
XB-C8	00D-4481-EQ	00F-4481-EQ	00G-4481-EQ	AJ0-8771
C4	00D-4486-EQ	00F-4486-EQ	00G-4486-EQ	AJ0-8901

for 4.6 mm ID

*SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

**SemiPREP SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

†PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)



For HPLC Column Performance Check Standards, see pp. 398-399



Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 391 - 392

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 317-318

For more about SecurityGuard ULTRA, see p. 316

For Core-Shell Performance Enhancement Kit, see p. 395

A C18 Column with Polar Endcapping

Use Synergi Hydro-RP, an Improved Alternative to Aqua 125 Å

See p. 324

Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m ² /g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m ²)	End Capping
AQUA C18	Spher. 3, 5	125	1.05	320	15	N/A	Proprietary
AQUA C18	Spher. 5	200	1.15	215	11	N/A	Proprietary

125 Å Aqua C18 Column

Aqua's polar endcapping produces a surface chemistry that is well suited for the analysis of small peptides. This chemistry...

- makes it an excellent column for smaller, basic peptides
- allows for faster column equilibration in gradient analyses
- ensures a surface that can be "wetted" with aqueous trifluoroacetic acid (TFA)

200 Å Aqua C18 Column

- Increased pore size for enhanced diffusion of large pharmaceuticals and biomolecules
- Reduced surface area for faster analyses and greater sample throughput

Ordering Information

3 µm Minibore, Analytical, LC-MS and CombiChem Columns (mm)						SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	75 x 2.0	150 x 2.0	100 x 4.6	150 x 4.6	4 x 2.0*	4 x 3.0*
C18 125 Å	00B-4311-B0	00C-4311-B0	00F-4311-B0	00D-4311-E0	00F-4311-E0	AJ0-7510 /10pk	AJ0-7511 /10pk
						for ID: 2.0–3.0 mm	3.2–8.0 mm

5 µm Minibore, MidBore™ and LC-MS Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	50 x 2.0	150 x 2.0	250 x 2.0	150 x 3.0	250 x 3.0	4 x 2.0*
C18 125 Å	00B-4299-B0	00F-4299-B0	00G-4299-B0	00F-4299-Y0	00G-4299-Y0	AJ0-7510 /10pk
C18 200 Å	—	00F-4331-B0	—	—	—	AJ0-7510 /10pk
						for ID: 2.0–3.0 mm

5 µm Analytical, CombiChem, SemiPrep and Preparative Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phases	150 x 4.6	250 x 4.6	250 x 10	4 x 3.0*	10 x 10 [‡]
C18 125 Å	00F-4299-E0	00G-4299-E0	00G-4299-N0	AJ0-7511 /10pk	AJ0-7512 /3pk
C18 200 Å	00F-4331-E0	00G-4331-E0	—	AJ0-7511	AJ0-7512
				for ID: 3.2–8.0 mm	9–16 mm



For SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315

*SecurityGuard Analytical Cartridges require holder, Part No.: [KJ0-4282](#)
[‡]SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

Aqueous Size Exclusion (SEC)/Gel Filtration (GFC) for Protein and Peptide Analysis

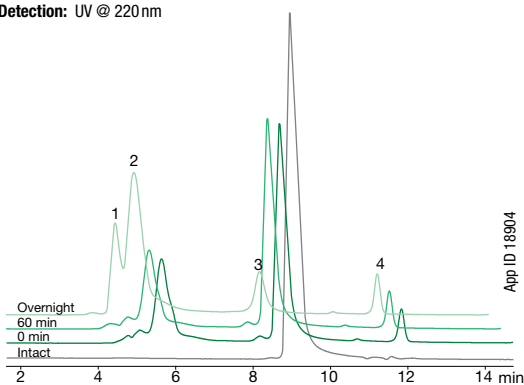
Gel Filtration Chromatography is used to analyze and/or characterize proteins, peptides, and other biomolecules; including antibodies, immunoglobulins, protein complexes, protein aggregates, and desalting. BioSep GFC columns offer many important benefits for your separation needs.

Low MW Proteins and Peptides on BioSep-SEC-s2000

PEGylated β-Lactoglobulin A (N-Terminal PEG 20 kDa)

Column: BioSep-SEC-s2000
Dimensions: 300 x 7.8 mm
Part No.: [00H-2145-K0](#)
Mobile Phase: 100 mM Sodium Phosphate pH 6.8
Flow Rate: 1 mL/min
Temperature: Ambient
Detection: UV @ 220 nm

Sample: 1. 2 PEG Modified Complex
 2. PEGylated β-Lactoglobulin
 3. β-Lactoglobulin
 4. PEG Reagent

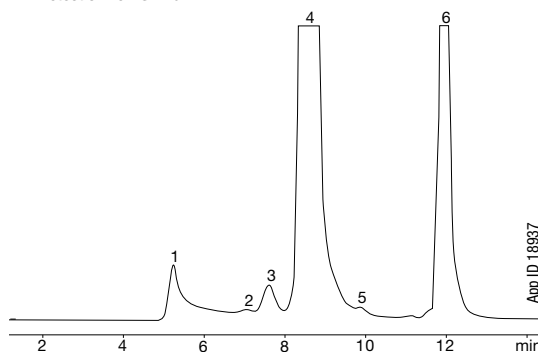


Medium MW Proteins on BioSep-SEC-s3000

Murine IgG1 Aggregates

Column: BioSep-SEC-s3000
Dimensions: 300 x 7.8 mm
Part No.: [00H-2146-K0](#)
Mobile Phase: 50 mM Sodium Phosphate pH 6.8, 300 mM Sodium Chloride
Flow Rate: 1 mL/min
Temperature: Ambient
Detection: UV @ 220 nm

Sample: 1. HMW aggregates
 2. IgG1 dimer 1
 3. IgG1 dimer 2
 4. IgG Monomer
 5. Low MW impurity
 6. Void Volume Peak

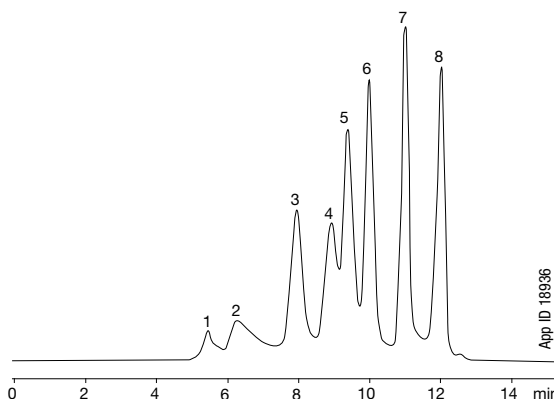


Large MW Proteins on BioSep-SEC-s4000

High MW Protein Mixture

Column: BioSep-SEC-s4000
Dimensions: 300 x 7.8 mm
Part No.: [00H-2147-K0](#)
Mobile Phase: 100 mM Sodium Phosphate pH 7.0, 300 mM Sodium Chloride
Flow Rate: 1 mL/min
Temperature: Ambient
Detection: UV @ 214 nm

Sample: 1. HMW impurity
 2. IgM 900 kDa
 3. Thyroglobulin 669 kDa
 4. IgA 380 kDa
 5. β-Amylase 200 kDa
 6. BSA 66 kDa
 7. Ribonuclease A 13.7 kDa
 8. Uridine 244 Da



Ordering Information

Columns (mm)	Analytical			SecurityGuard™ Cartridges (mm)
	Narrow Bore	300 x 7.8	600 x 7.8	4 x 3.0*
BioSep-SEC-s2000	00H-2145-E0	00H-2145-K0	00K-2145-K0	AJ0-4487
BioSep-SEC-s3000	00H-2146-E0	00H-2146-K0	00K-2146-K0	AJ0-4488
BioSep-SEC-s4000	00H-2147-E0	00H-2147-K0	00K-2147-K0	AJ0-4489

*SecurityGuard Analytical cartridges require holder, Part No.: [KJO-4282](#)

for ID: 4.6-7.8 mm

Guard Columns (mm)	Narrow Bore	Express	Analytical
Phases	30 x 4.6	35 x 7.8	75 x 7.8
BioSep-SEC-s2000	03A-2145-E0	03Q-2145-K0	03C-2145-K0
BioSep-SEC-s3000	03A-2146-E0	03Q-2146-K0	03C-2146-K0
BioSep-SEC-s4000	—	03Q-2147-K0	03C-2147-K0



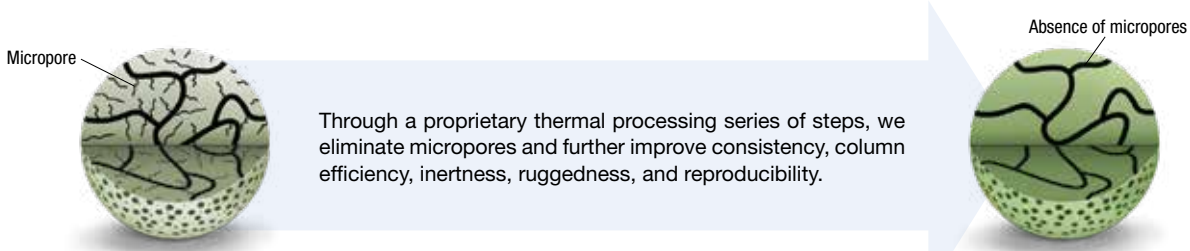
For Aqueous SEC1 Column Check Standard, see p. 398

3 Advanced Particle Platforms

All three of the new bioZen particle platforms were individually designed and built by Phenomenex to take advantage of integral levels of performance, ruggedness, and reproducibility for protein

characterization applications. Individually, each platform differs in the proprietary processing techniques used to control particle size and morphology.

Thermally Modified Fully Porous

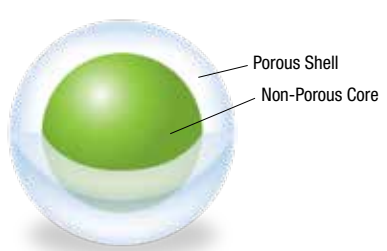


Micropore

Absence of micropores

Through a proprietary thermal processing series of steps, we eliminate micropores and further improve consistency, column efficiency, inertness, ruggedness, and reproducibility.

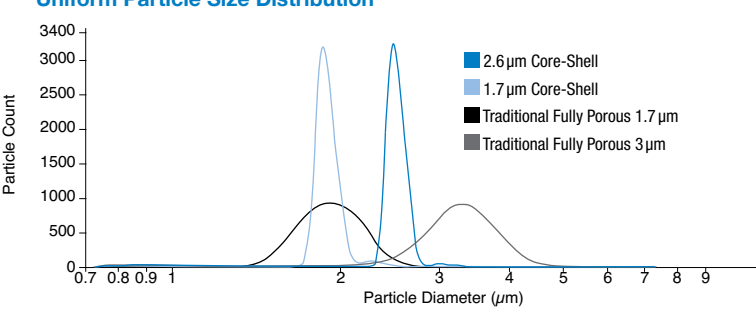
Core-Shell Technology



Porous Shell

Non-Porous Core

Uniform Particle Size Distribution



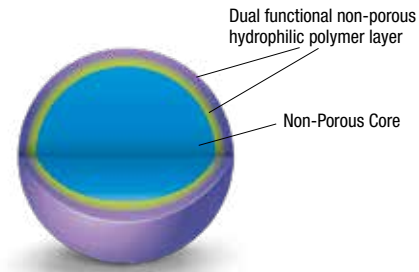
Particle Count

Particle Diameter (μm)

- 2.6 μm Core-Shell
- 1.7 μm Core-Shell
- Traditional Fully Porous 1.7 μm
- Traditional Fully Porous 3 μm

Using sol-gel processing techniques that incorporate nano structuring technology, a durable, homogeneous porous shell is grown on a solid silica core. This highly optimized process combined with industry leading column packing technology produces highly reproducible columns that generate extremely high efficiencies and sensitivity.

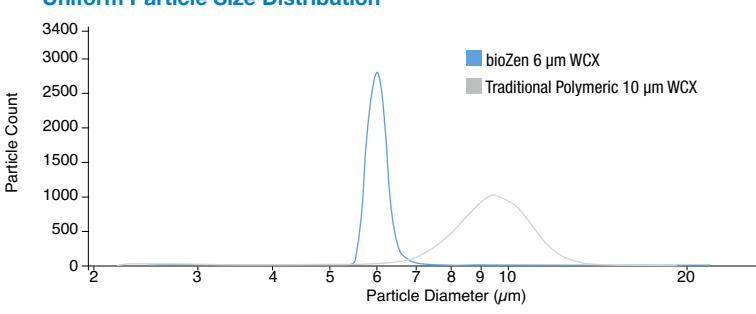
Monosized Polymeric Non-Porous



Dual functional non-porous hydrophilic polymer layer

Non-Porous Core

Uniform Particle Size Distribution



Particle Count

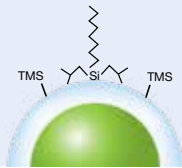

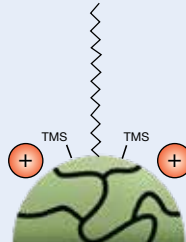
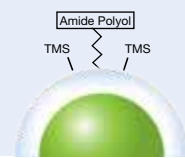
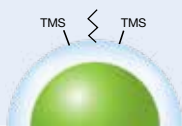

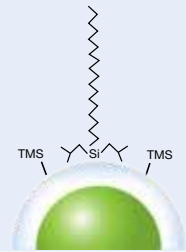
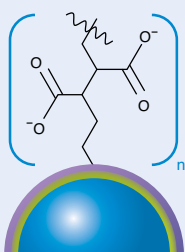
Particle Diameter (μm)

- bioZen 6 μm WCX
- Traditional Polymeric 10 μm WCX

Meticulously controlled monosized particle technology secures incredible particle consistency that leads to improved and reliable efficiency. This innovative non-porous particle serves as the perfect backbone for complex ion-exchange chemistries.

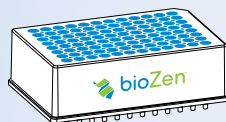
8 Particle Chemistries

With a single innovative product line spanning major biologics workflows, you can now gain some reprieve from juggling multiple catalogs, bookmarks, and vendors. Give yourself a break with high quality particle chemistries designed and tested for biologics.

<p>Intact</p> <p>bioZen Intact XB-C8</p>  <p>3.6 μm</p> <p>Large pore core-shell particle for fast intact biologic entry. C8 provides highly useful moderate hydrophobic selectivity.</p>	<p>Size Exclusion (SEC)</p> <p>bioZen SEC-2</p>  <p>1.8 μm</p> <p>Extremely inert, high density fully porous particle with high efficiency and low molecular weight (LMW) separation range of 1 k–450 kDa.</p>	<p>Peptide</p> <p>bioZen Peptide PS-C18</p>  <p>1.6 μm and 3 μm</p> <p>Excellent retention by combined positively charged surface ligand and C18 ligand.</p>	<p>Glycan</p> <p>bioZen Glycan</p>  <p>2.6 μm</p> <p>Provides optimal combination of high efficiency and selectivity for released glycans.</p>
<p>bioZen Intact C4</p>  <p>3.6 μm</p> <p>Large pore core-shell particle for fast intact biologic entry. C4 stationary phase provides highly sought after low hydrophobic retention, especially important for highly retentive biologics.</p>	<p>bioZen SEC-3</p>  <p>1.8 μm</p> <p>Extremely inert, high density fully porous particle with high efficiency and high molecular weight (HMW) separation range of 10 k–700 kDa.</p>	<p>bioZen Peptide XB-C18</p>  <p>1.7 μm and 2.6 μm</p> <p>Overall retention of both acidic and basic peptides through C18 stationary phase with di-isobutyl side chains.</p>	<p>Ion-Exchange</p> <p>bioZen WCX</p>  <p>6 μm</p> <p>Monosized particles grafted with linear polycarboxylate chains to envelop and separate proteins from acidic/basic variants.</p>

New Sample Preparation Solutions

N-Glycan Clean-Up



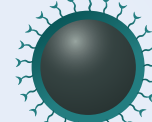
HILIC Solid Phase Extraction (SPE)

High recovery of labeled released N-glycans in a microelution format allowing for streamlined processing and clean-up of small sample volumes.



To learn more, see p. 78

MagBeads

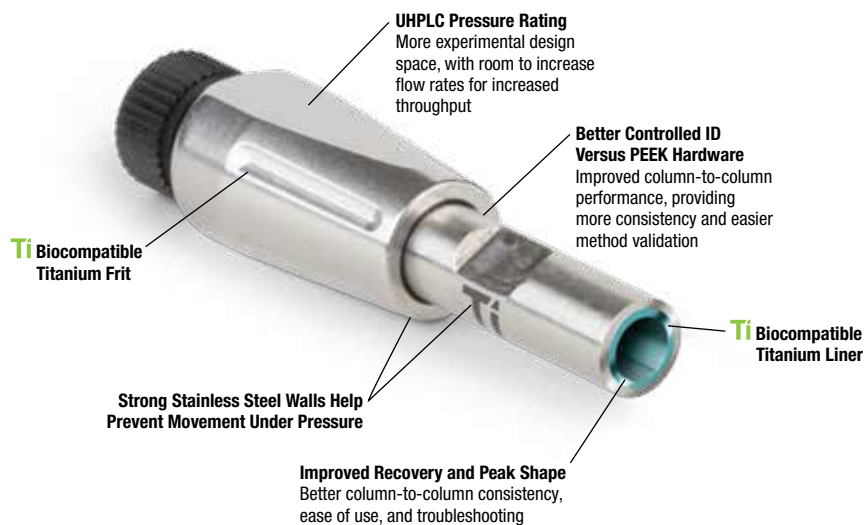


Streptavidin Coated

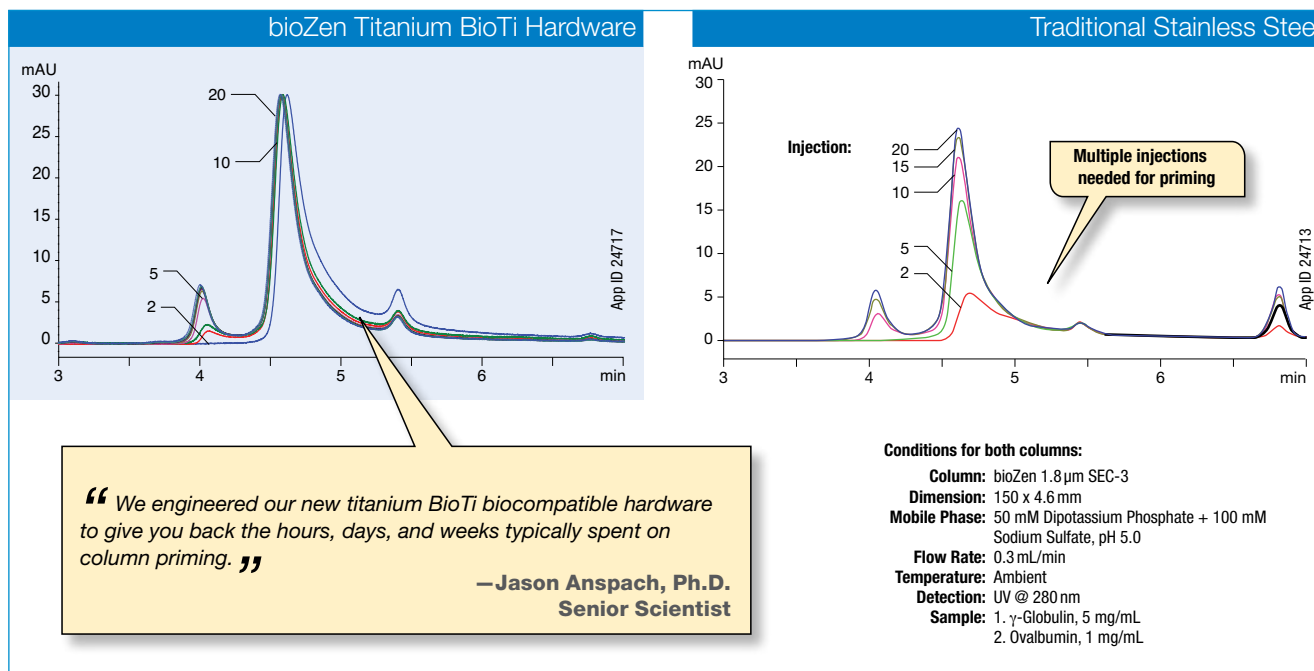
Higher binding capacity magnetic particles result in faster and reliable purification, clean-up, and isolation of proteins and peptide molecules.

Biocompatible Flow Path with BioTi™ Hardware

Keep your mind at ease knowing that we've minimized the need for priming with a new titanium infused biocompatible hardware and frit that doesn't interfere with protein or peptide integrity!



Overlaid Successive Injections - Protein Priming Comparison

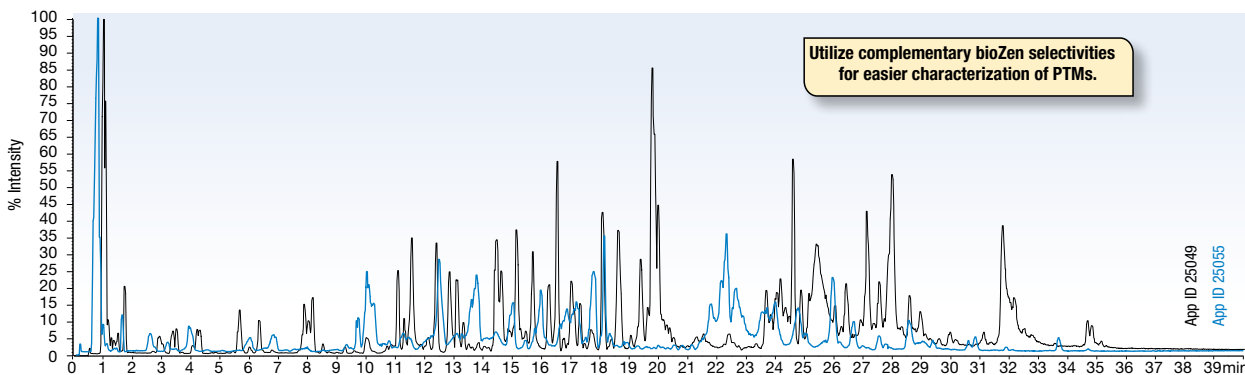


Peptide Mapping

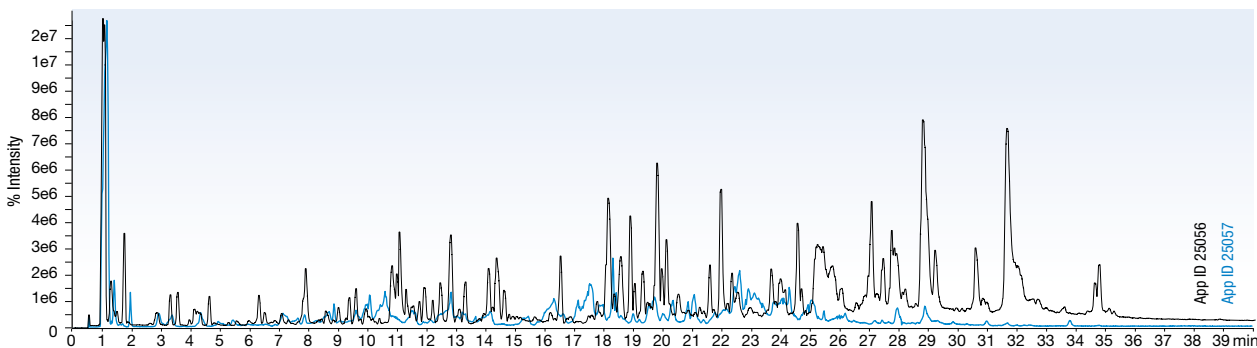
Digested mAbs or ADCs typically include a large body of compounds which are crucial to understanding post translation modifications. So we designed two bioZen Peptide columns to offer highly useful and unique retention profiles. Each allows for fast and

effective elution windows by utilizing either high efficiency core-shell or thermally modified fully porous particles to gain sharper peaks, better peak capacities, and overall higher sensitivity.

Trastuzumab Biosimilar Peptide Map



Infliximab Biosimilar Peptide Map



Conditions for all columns:

Columns:	■ bioZen 1.6 µm Peptide PS-C18	Gradient:	Time (min)	% B
	■ bioZen 2.6 µm Peptide XB-C18		0	1
Dimension:	150 x 2.1 mm		0.5	1
Part No.:	00F-4770-AN		50	50
	00F-4768-AN		55	50
			56	95
Mobile Phase:	A: 0.1 % Formic Acid in Water	Flow Rate:	0.3 mL/min	
	B: 0.1 % Formic Acid in Acetonitrile	Temperature:	40 °C	
		Detection:	QTOF (SCIEX® X500B)	

bioZen Products - Powered by BioTi™ Biocompatible Hardware

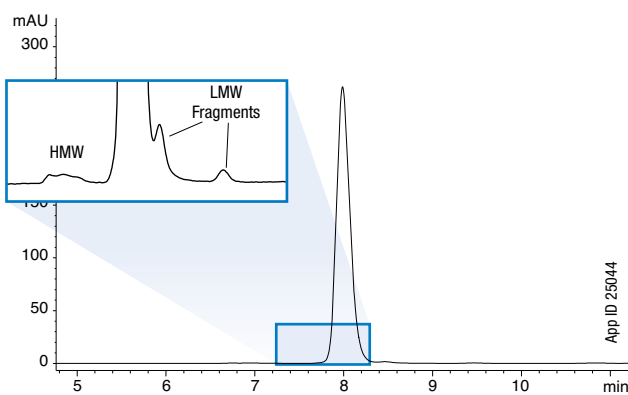
Ordering Information

bioZen Columns (mm)						Biocompatible Guard Cartridges		Holder
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	
bioZen 1.6 µm Peptide PS-C18	00B-4770-AN	00D-4770-AN	00F-4770-AN	—	—	/3pk	—	AJ0-9000
						AJ0-9803	—	
bioZen 3 µm Peptide PS-C18	00B-4771-AN	—	00F-4771-AN	00B-4771-E0	00F-4771-E0	/10pk	/10pk	KJ0-4282
						AJ0-7605	AJ0-7606	
bioZen 1.7 µm Peptide XB-C18	00B-4774-AN	00D-4774-AN	00F-4774-AN	—	—	/3pk	—	AJ0-9000
						AJ0-9806	—	
bioZen 2.6 µm Peptide XB-C18	00B-4768-AN	00D-4768-AN	00F-4768-AN	00B-4768-E0	00F-4768-E0	/3pk	/3pk	AJ0-9000
						AJ0-9806	AJ0-9808	

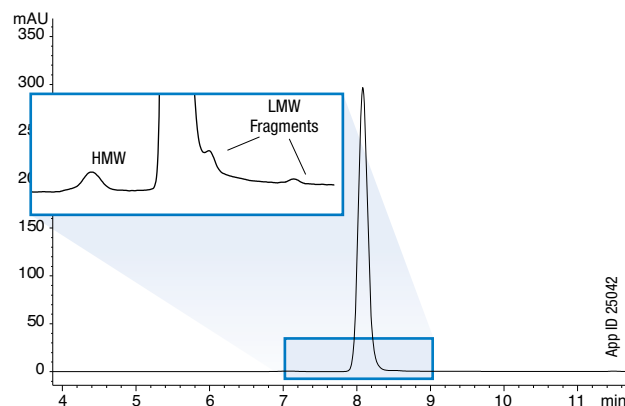
Aggregate Analysis

With mAb aggregate often at very low levels (<0.1% by peak area compared to monomer) and fragment separation a requirement, adequate resolution and peak shape have become even more crucial method outcomes. To address this need, the robust set of bioZen SEC columns were developed with a combination of UHPLC efficiency and higher sensitivity, to drive resolution and identification of even lower level targets.

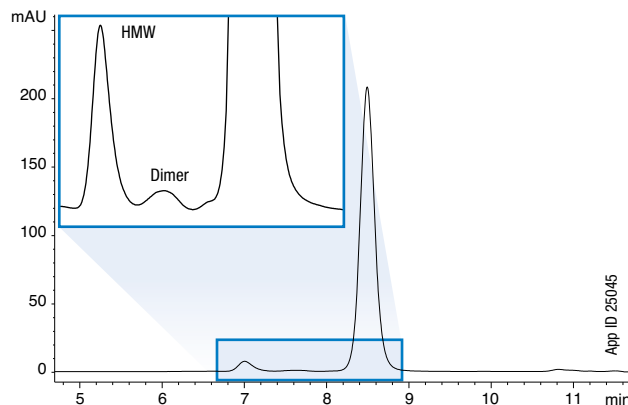
Cetuximab



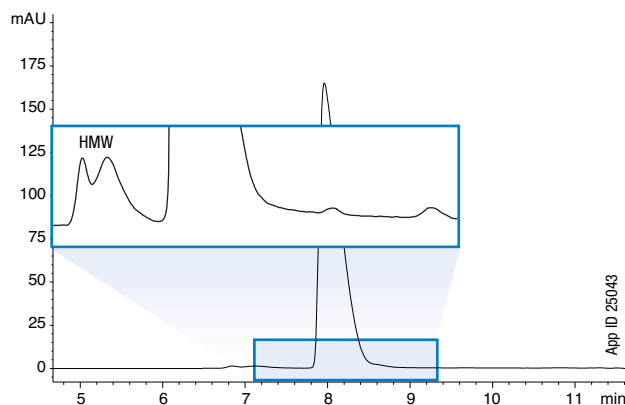
Trastuzumab



Rituximab



Infliximab—abda



Conditions same for all samples:

- Column: bioZen 1.8µm SEC-3
- Dimension: 300 x 4.6 mm
- Part No.: [00H-4772-EQ](#)
- Mobile Phase: 50 mM Potassium Phosphate + 250 mM Potassium Chloride (pH 6.8)
- Flow Rate: 0.35 mL/min

- Temperature: 30 °C
- Detection: UV @ 280 nm
- Sample: As noted

bioZen Products - Powered by BioTi™ Biocompatible Hardware

Ordering Information

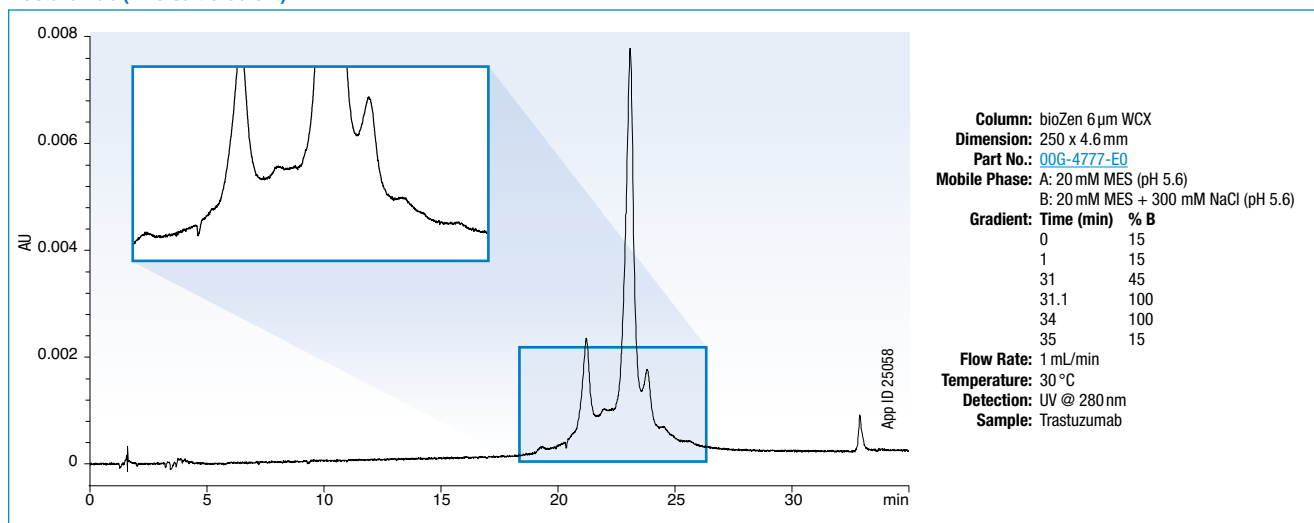
bioZen Columns (mm)	Biocompatible Guard Cartridges					
	50 x 2.1	100 x 4.6	150 x 4.6	300 x 4.6	for 4.6 mm /3pk	Holder ea
bioZen 1.8 µm SEC-2	00B-4769-AN	—	00F-4769-EQ	00H-4769-EQ	AJ0-9850	AJ0-9000
bioZen 1.8 µm SEC-3	00B-4772-AN	00D-4772-EQ	00F-4772-EQ	00H-4772-EQ	AJ0-9851	AJ0-9000

Charge Variant Analysis

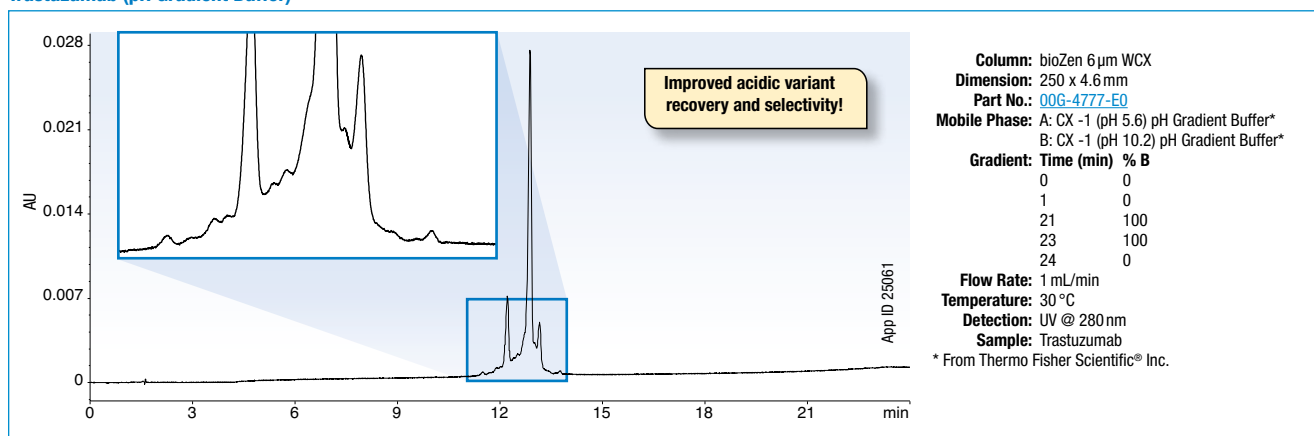
bioZen WCX was crafted to consistently decipher between native protein variants that arise from PTMs within a therapeutics creation and development. The linear polycarboxylate chains grafted to monosized non-porous polymeric particles, envelop and separate proteins from acidic and basic protein variants. With such a highly

tuned and controlled manufacturing process, bioZen WCX media affords scientists a way to reproducibly characterize heterogeneity while taking advantage of excellent recovery through high particle inertness and bioinert titanium BioTi™ column hardware.

Trastuzumab (MES Salt Gradient)



Trastuzumab (pH Gradient Buffer)



bioZen Products - Powered by BioTi™ Biocompatible Hardware

Ordering Information

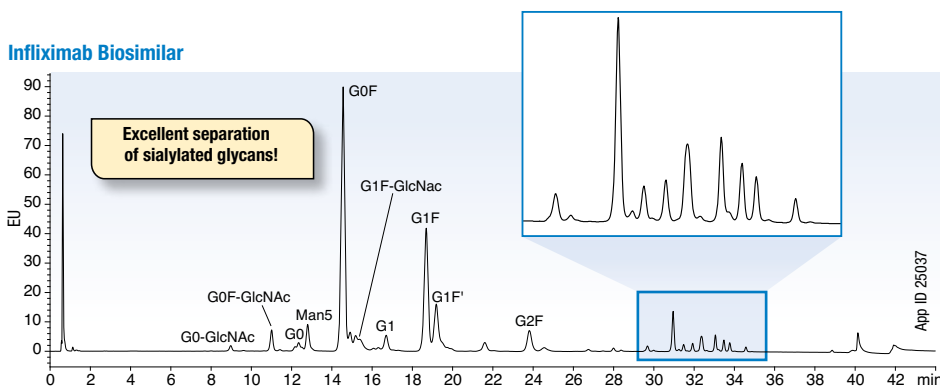
bioZen Columns (mm)					Biocompatible Guard Cartridges	
	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	for 2.1 mm	Holder
bioZen 6 μm WCX	00B-4777-AN	00D-4777-AN	00F-4777-AN	00G-4777-AN	AJO-9401	KJO-4282
	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	for 4.6 mm	Holder
					/10pk	ea
bioZen 6 μm WCX	00B-4777-E0	00D-4777-E0	00F-4777-E0	00G-4777-E0	AJO-9400	KJO-4282

Glycan Analysis

The unique selectivity of the bioZen Glycan was designed to provide higher order separations of released and labeled glycans. With a 2.6µm core-shell particle size, customers using either HPLC or UHPLC systems can draw upon a high efficiency bioZen Glycan

particle run at higher linear velocities to easily provide sharper peak shapes and faster elution windows, without high UHPLC pressures. Under HILIC-FLR or HILIC-MS conditions, the bioZen Glycan excels with increased polar retention and selectivity.

Infliximab Biosimilar



Conditions for both columns:

Column: bioZen 2.6µm Glycan
Dimensions: 150 x 2.1 mm

Part No.: [00F-4773-AN](#)

Mobile Phase: A: 100 mM Ammonium Formate, pH 4.5

B: Acetonitrile

Gradient Time (min)	% B
0	78
10	74.5
24	72
38.5	55.9
38.6	40
40.6	40
40.7	78
48	78

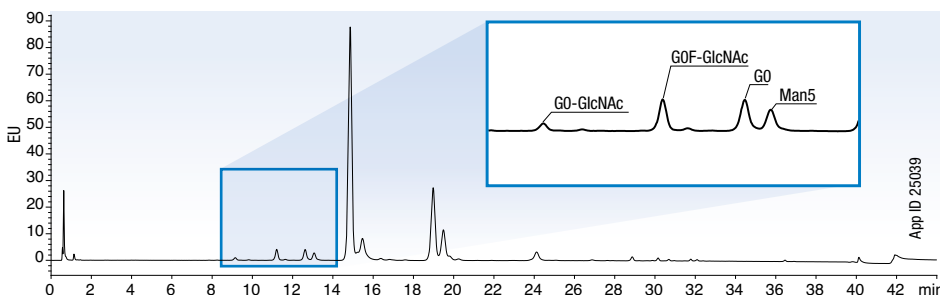
Flow Rate: 0.5 mL/min

Temperature: 50 °C

Detection: FLD ex/em 285/345 nm

Sample: As noted

Trastuzumab



bioZen Products - Powered by BioTi™ Biocompatible Hardware

Ordering Information

bioZen Columns (mm)	Biocompatible Guard Cartridges				
	50 x 2.1	100 x 2.1	150 x 2.1	for 2.1 mm	Holder
bioZen 2.6 µm Glycan	00B-4773-AN	00D-4773-AN	00F-4773-AN	AJ0-9800	AJ0-9000

Sample Preparation

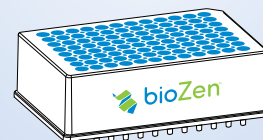
Ordering Information

Format	bioZen Solid Phase Extraction	Sorbent Mass	Part Number	Unit
Microelution 96-Well Plate	bioZen N-Glycan Clean-Up	5 mg/well	8M-S009-NGA	1/box



bioZen N-Glycan Clean-Up

Novel solid phase extraction (SPE) HILIC stationary phase that excels at retention and recovery of labeled, released N-glycans! Available in microelution 96-well plate format that works extremely well for processing and clean-up of small sample volumes.



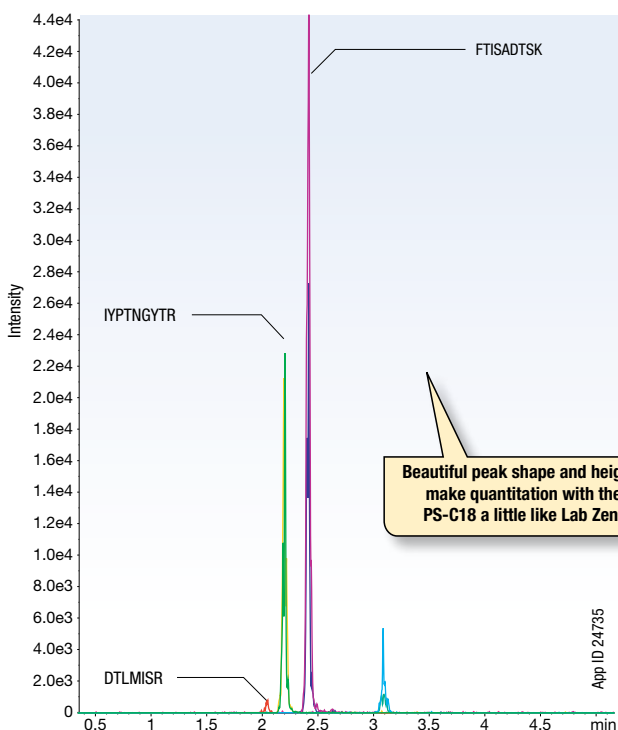
Peptide Quantitation

When quantitating signature peptides from biological matrices, you need sharp peak shape and sufficient retention of hydrophilic peptides to prevent any signal loss from matrix suppression regions. Both bioZen Peptide columns were developed to deliver excellent selectivity for even closely related peptides. Additionally, they build

on this body of valuable characteristics with unique ways of delivering sharper peak shape for basic peptides; bioZen Peptide XB-C18 blocks secondary surface interactions via isobutyl side chains, while the bioZen Peptide PS-C18 contains a positively charged weak base that repels other basic species.

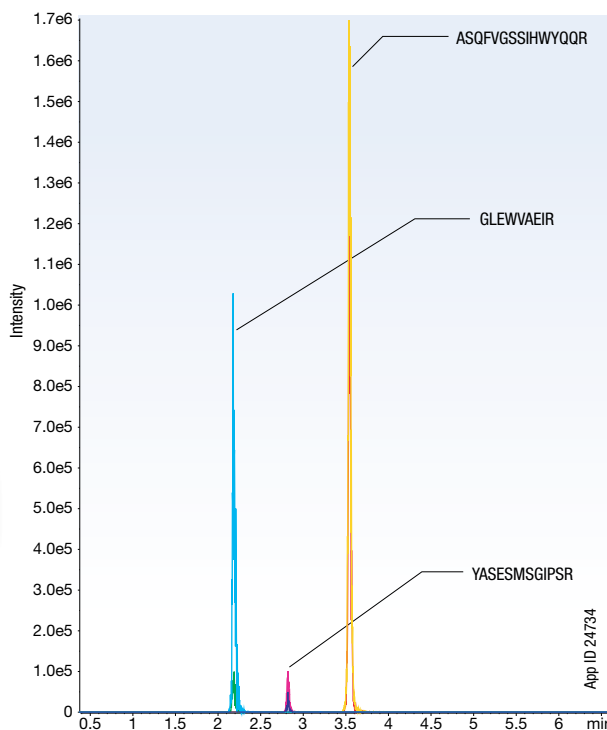
Kadcyla

(4 Signature Peptides)



Infliximab

(3 Signature Peptides)



Conditions same for both samples:

Column: bioZen 3 µm Peptide PS-C18

Dimensions: 50 x 2.1 mm

Part No.: [00B-4771-AN](#)

Mobile Phase: A: 0.1 % Formic Acid in Water

B: 0.1 % Formic Acid in Acetonitrile

Gradient	Time (min)	% B
	0	3
	1	3
	4.5	25

Flow Rate: 0.5 mL/min

Temperature: 22 °C

LC System: ExionLC™ AD HPLC

Detection: MS/MS

Detector: SCIEX QTRAP® 5500

Sample: As noted

bioZen Products - Powered by BioTi™ Biocompatible Hardware

Ordering Information

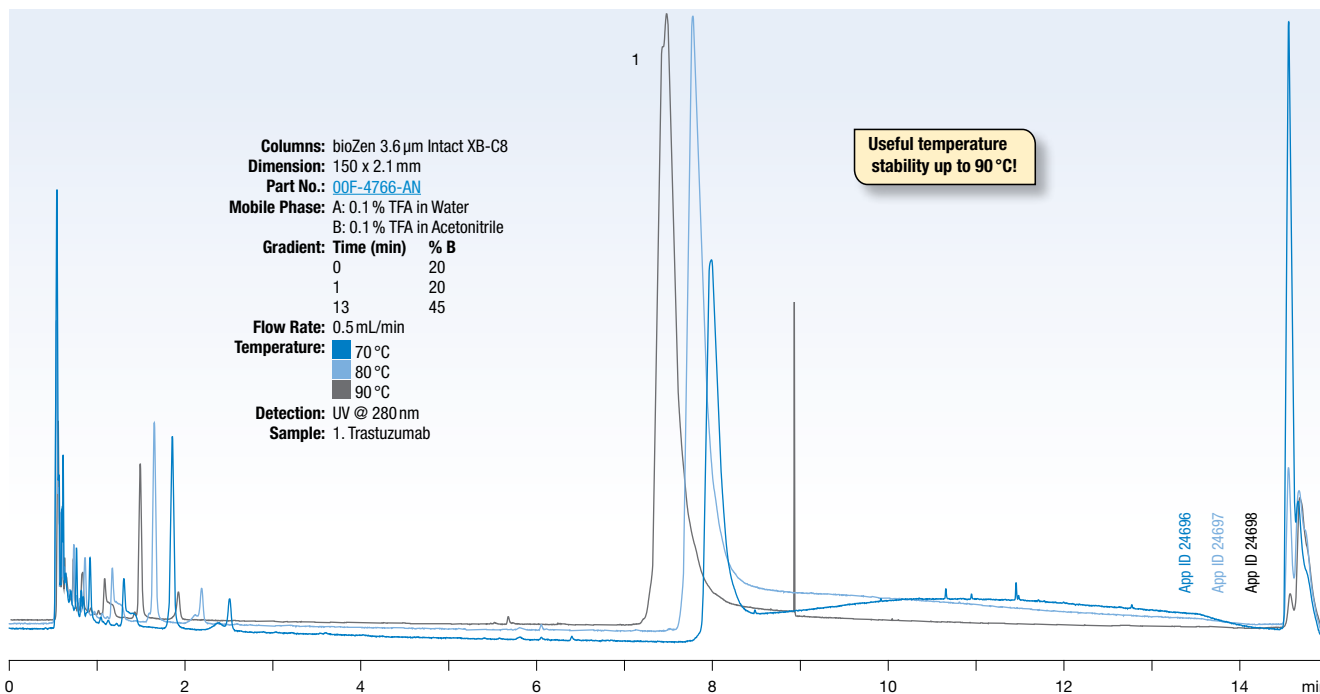
bioZen Columns (mm)						Biocompatible Guard Cartridges		Holder
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	
bioZen 1.6 µm Peptide PS-C18	00B-4770-AN	00D-4770-AN	00F-4770-AN	—	—	AJ0-9803 /3pk	—	AJ0-9000 ea
bioZen 3 µm Peptide PS-C18	00B-4771-AN	—	00F-4771-AN	00B-4771-E0	00F-4771-E0	AJ0-7605 /10pk	AJ0-7606 /10pk	KJ0-4282 ea
bioZen 1.7 µm Peptide XB-C18	00B-4774-AN	00D-4774-AN	00F-4774-AN	—	—	AJ0-9806 /3pk	—	AJ0-9000 ea
bioZen 2.6 µm Peptide XB-C18	00B-4768-AN	00D-4768-AN	00F-4768-AN	00B-4768-E0	00F-4768-E0	AJ0-9806 /3pk	AJ0-9808 /3pk	AJ0-9000 ea

Intact & Fragment Analysis

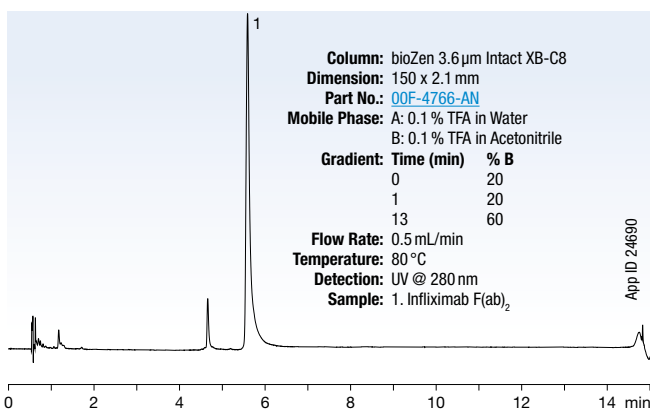
Impurity profiling and characterization of intact biologic fragments is a challenging undertaking because of the need to identify very small differences between variants. Both bioZen Intact columns

contain skillfully manufactured large pore core-shell particles that provide narrower, taller peaks in conjunction with higher resolution between the target HC/LC, Fc/Fab, or isoforms.

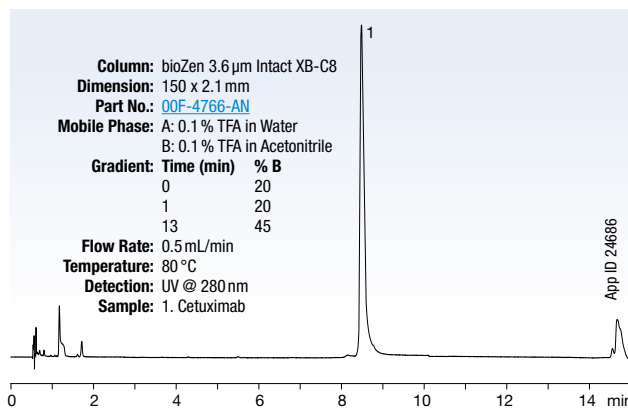
Intact Trastuzumab at 70, 80, and 90 °C



Infliximab F(ab)₂



Cetuximab



bioZen Products - Powered by BioTi™ Biocompatible Hardware

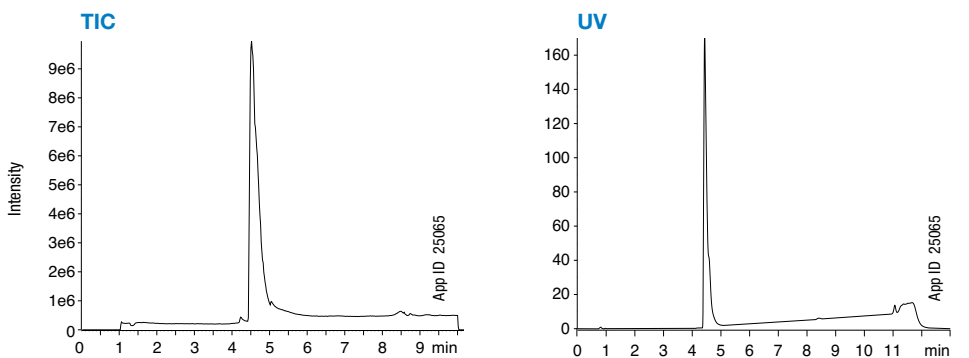
Ordering Information

bioZen Columns (mm)	Biocompatible Guard Cartridges						Holder	
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm /3pk		for 4.6 mm /3pk
bioZen 3.6 µm Intact C4	00B-4767-AN	00D-4767-AN	00F-4767-AN	00B-4767-E0	00F-4767-E0	AJ0-9809	AJ0-9811	AJ0-9000
bioZen 3.6 µm Intact XB-C8	00B-4766-AN	00D-4766-AN	00F-4766-AN	00B-4766-E0	00F-4766-E0	AJ0-9812	AJ0-9814	AJ0-9000

Intact Mass

Intact Mass can give indications not only of relative abundance of glycoforms, but also stability as degraded mAbs will not give good charge envelope by ESI-MS. Intact Mass with a high resolution MS to identify PTMs, especially relative abundance of glycoforms, combines extremely well with the fast run times and tight peak shapes provided by the bioZen Intact C4 and XB-C8.

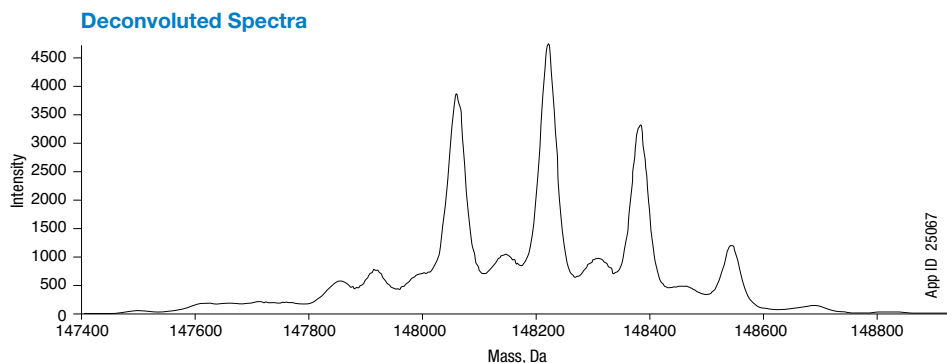
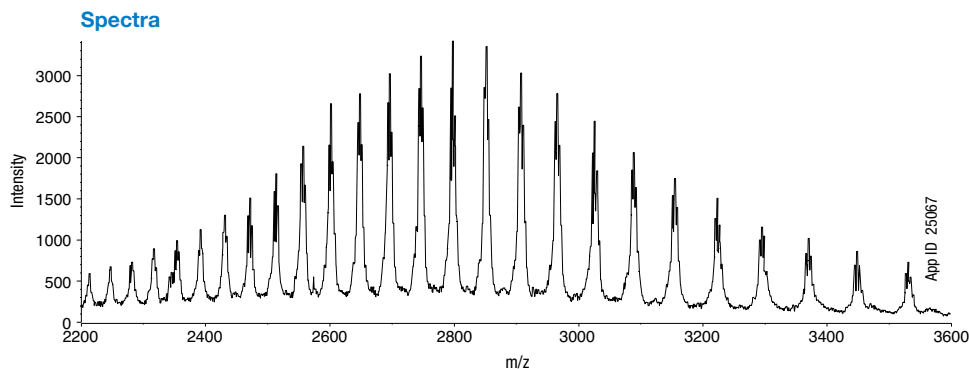
Intact Mass of Trastuzumab Biosimilar using a bioZen Intact XB-C8 and SCIEX® X500B



Columns: bioZen 3.6 µm Intact XB-C8
Dimension: 150 x 2.1 mm
Part No.: [00F-4766-AN](#)
Mobile Phase: A: 0.1% Formic Acid in Water
 B: 0.1% Formic Acid in Acetonitrile / Isopropyl alcohol (50:50)
Gradient:

Time (min)	% B
2.5	20
10	65
10.1	95

Flow Rate: 0.3 mL/min
Temperature: 90 °C
Detection: QTOF (SCIEX X500B)
Sample: Trastuzumab



bioZen Products - Powered by BioTi™ Biocompatible Hardware

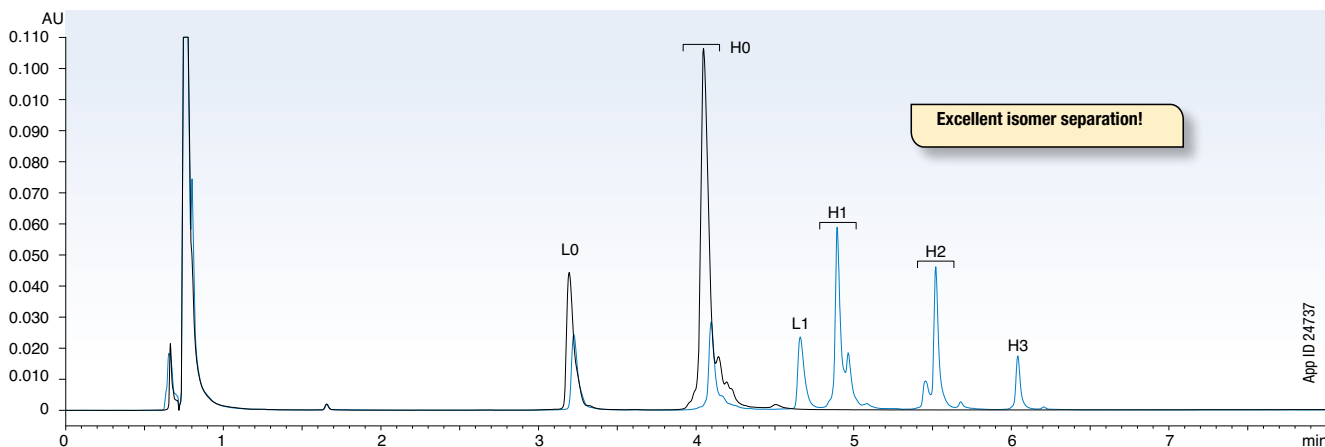
Ordering Information

bioZen Columns (mm)						Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
bioZen 3.6 µm Intact C4	00B-4767-AN	00D-4767-AN	00F-4767-AN	00B-4767-E0	00F-4767-E0	AJ0-9809	AJ0-9811	AJ0-9000
bioZen 3.6 µm Intact XB-C8	00B-4766-AN	00D-4766-AN	00F-4766-AN	00B-4766-E0	00F-4766-E0	AJ0-9812	AJ0-9814	AJ0-9000

Drug Antibody Ratio (DAR)

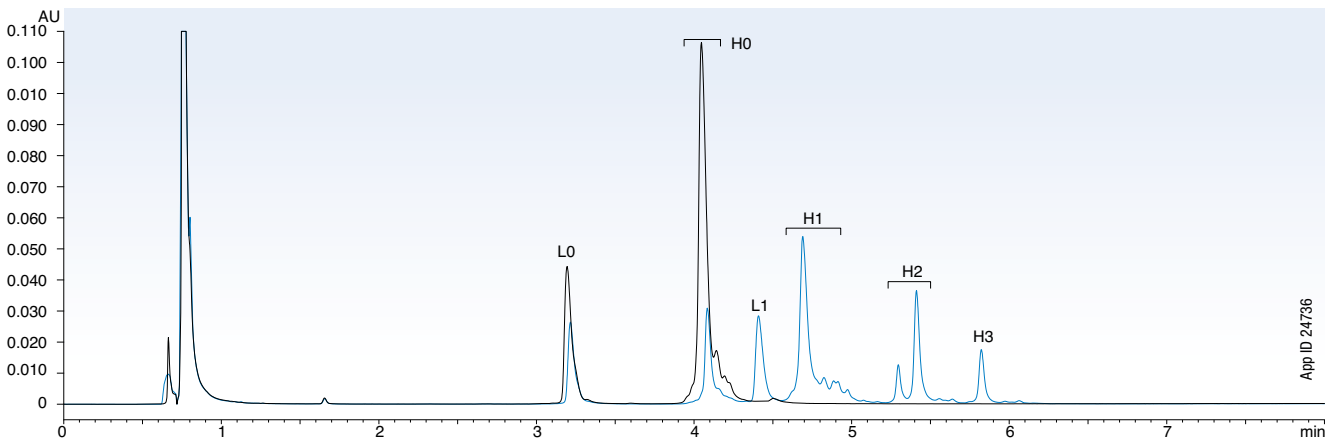
With a direct effect on efficacy and safety, conjugation for each ADC must be well understood. The bioZen Intact XB-C8 provides an excellent vehicle for determining drug load distribution and DAR for ADCs. Its large pore size allows intact ADCs to interact with a moderately retentive stationary phase while the core-shell particle supplies increased efficiency to deliver the required resolution between ADC species with differing drug loads.

Herceptin—vcMMAE using bioZen 3.6 µm Intact XB-C8



App ID 24737

Herceptin—mcMMAF using bioZen 3.6 µm Intact XB-C8



App ID 24736



Acknowledgment
We would especially like to thank Colin McKee and ADC Biotechnology LTD for their support and ADC samples for this application.

bioZen Products - Powered by BioTi™ Biocompatible Hardware

Ordering Information

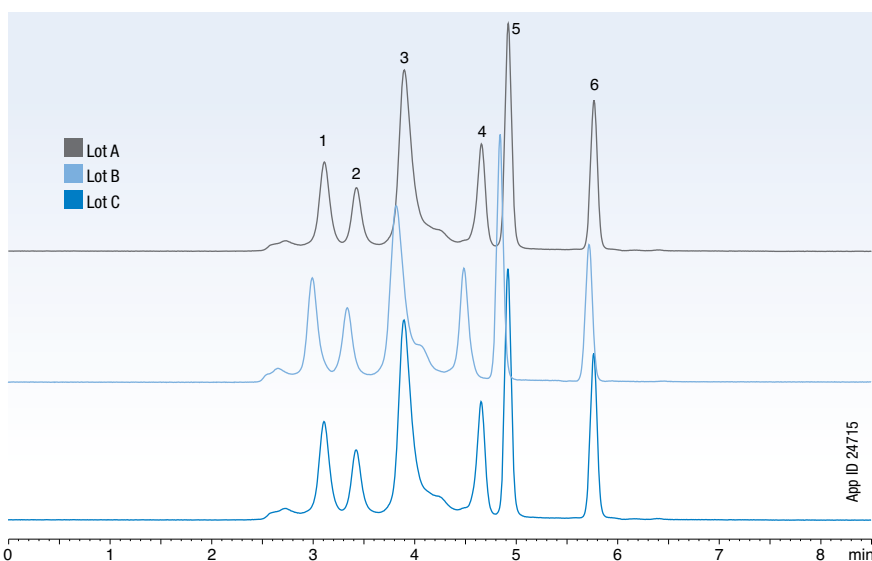
bioZen Columns (mm)						Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
bioZen 3.6 µm Intact C4	00B-4767-AN	00D-4767-AN	00F-4767-AN	00B-4767-E0	00F-4767-E0	AJ0-9809	AJ0-9811	AJ0-9000
bioZen 3.6 µm Intact XB-C8	00B-4766-AN	00D-4766-AN	00F-4766-AN	00B-4766-E0	00F-4766-E0	AJ0-9812	AJ0-9814	AJ0-9000

Bio QC Testing

At every stage of our manufacturing and quality testing we keep you and your biologics analysis in mind. We initially focus on innovative products that will enhance workflows, then we work tirelessly to ensure that those products are reliably made time and time again. To further enrich the quality of these products, we assign very specific application-oriented testing protocols that properly mimic the conditions that you and other customers ultimately require.

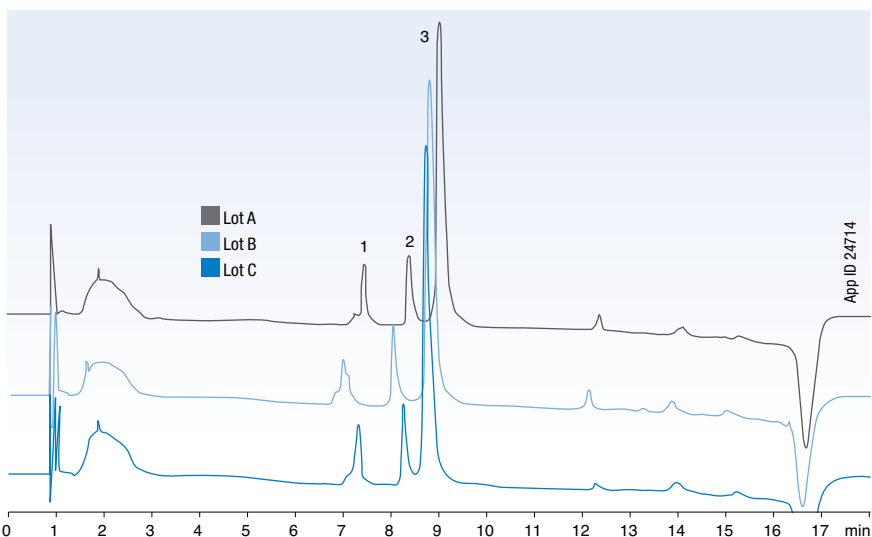
Each batch of media and each column goes through a gambit of testing to ensure that you're getting our highest level of science, so that you can kick down the door of progress.

Batch-to-Batch Results—bioZen 1.8µm SEC-3



Column: bioZen 1.8µm SEC-3
Dimensions: 150 x 4.6 mm
Part No.: [00F-4772-E0](#)
Mobile Phase: 100 mM Sodium Phosphate in Water pH 6.8
Flow Rate: 0.3 mL/min
Temperature: Ambient
Detection: UV @ 280 nm
Sample: 1. Thyroglobulin (669 kDa)
 2. IgA (300 kDa)
 3. IgG (150 kDa)
 4. Ovalbumin (44 kDa)
 5. Myoglobin (17 kDa)
 6. Uridine

Batch-to-Batch Results—bioZen 3.6µm Intact C4



Columns: bioZen 3.6µm Intact C4
Dimension: 150 x 2.1 mm
Part No.: [00F-4767-AN](#)
Mobile Phase: A: 0.1 % TFA in Water
 B: 0.1 % TFA in Acetonitrile

Gradient Time (min)	% B
0	10
1	30
20	50
20.1	10

Flow Rate: 1.5 mL/min
Temperature: 40 °C
Detection: UV @ 280 nm
Sample: 1. Light Chain
 2. Heavy Chain
 3. Intact mAb

Guaranteed Replacement to μBondapak®

- Highly reproducible
- Long column life
- Mimics performance of Waters® μBondapak®

Phenomenex Bondclone columns have been developed to provide chromatographic behavior that mimics that of Waters μBondapak columns. For comparative applications, please contact your local Phenomenex representative.

Bondclone Silica Physical Properties

Nominal Particle Size	BET Surface Area	Pore Volume*	Pore Size**
10 μm	296.0 m ² /g	1.1 cc/g	148.7 Å

*Single point total pore volume.

**Average pore diameter (4V/A by BET).

Data provided by an independent laboratory.

Ordering Information and Cross-Reference Chart

Ordering Information and Cross-Reference Chart				SecurityGuard™ Cartridges (mm)
Waters		Phenomenex		4 x 3.0
Description (mm)	Part No.	Part No.	Description (mm)	/ 10pk
μBondapak C18 300 x 3.9	WAT027324	00H-2117-C0	Bondclone C18 300 x 3.9	AJ0-4287
μBondapak C18 150 x 3.9	WAT086684	00F-2117-C0	Bondclone C18 150 x 3.9	AJ0-4287
—	—	00G-2117-E0	Bondclone C18 250 x 4.6	AJ0-4287
μBondapak C18 Radial-Pak Cartridge 100 x 8	WAT085721	00D-2117-L0	Bondclone C18 100 x 8 (S.S. Column)	AJ0-4287
μBondapak Phenyl 300 x 3.9	WAT027198	00H-3129-C0	Bondclone Phenyl† 300 x 3.9	AJ0-4351
—	—	00H-3127-C0	Bondclone CN 300 x 3.9	AJ0-4305
μBondapak NH ₂ 300 x 3.9	WAT084040	00H-3128-C0	Bondclone NH ₂ 300 x 3.9	AJ0-4302
μPorasil Silica 300 x 3.9	WAT02 7477	00H-2119-C0	Bondclone Silica 300 x 3.9	AJ0-4348

†Bondclone phenyl phase uses a different silica than other phases in the Bondclone series.

for ID: 3.2-8.0 mm

SecurityGuard™ Analytical Cartridges require universal holder Part No.: [KJ0-4282](#)

Guard Column

Size (mm)	C18
Conventional Guard Column	03A-2117-C0
30 x 3.9	

- **High enantioselectivity**
- **Fast run times**
- **Rugged, long-lived columns**
- **Easy scale-up to preparative**
- **Allow direct/indirect resolution of enantiomeric amines, amino acids, hydroxy acids, alcohols, carboxylic acids, ketones, ethers, and esters**



Hundreds of applications demonstrate the performance of Chirex phases for a multitude of pharmaceutical and agrochemical compounds. For a complete list, please contact your Phenomenex technical consultant.

Chiral separations are extremely important to the pharmaceutical and biotechnology industries, as well as most other areas of natural products chemistry. Optically active therapeutic drugs require selective and sensitive techniques. Government regulations also continue to spur and require the development of rapid, accurate and reproducible methods for the analysis and purification of enantiomeric compounds.

The challenge is to provide selective yet versatile HPLC columns for both trace analysis and the purification of bulk drug.

Phenomenex meets these challenges with Chirex brand HPLC columns. Chirex is available in 10 different stationary phases. These chemically rugged, versatile columns are used for the direct and indirect resolution of enantiomeric amines, alcohols, carboxylic acids, hydroxy acids, amino acids, ketones, lactones, ethers, esters, and other biologically active compounds.

Which Chirex Stationary Phase?

Stationary phase selection depends on presence/absence of chemical groupings in the chiral molecule.

Chirex Column Selection Guide

Presence of Chemical Groupings in Chiral Molecule							Recommended Columns:	
Class	Aromatic	-N-	-COOH	-OH	Other	Comment	First Choice	Second Choice
Group 1	Y	Y	Y			Aromatic α -amino acids, α -hydroxy acids	3126	3001
Group 2	Y	Y		Y			3022 or 3020	3014
Group 3	Y	Y			Y		3014 or 3020	3022
Group 4	Y		Y					3001
Group 5	Y			Y			3001 or 3014	3020 or 3022
Group 6	Y				Y		3001	3019 or 3020
Group 7		Y	Y			Aliphatic α -amino acids, α -hydroxy acids and their derivatives	3126	
Group 8				Y			3126	
Group 9					Y		3014	3019 or 3020
Group 10					Y	Asymmetric other than carbon. Chiral center at N,S,P,B, etc	3014	



For broader enantioselectivity, see Lux on p. 282

Ordering Information

5 μ m Starter Columns (mm)				
Phase	Chirex Phase Description	Bond Type	Linkage Type	50 x 4.6
3014	(S)-VAL and (R)-NEA	Covalent	Urea	00B-3014-E0
3020	(S)-LEU and (R)-NEA	Covalent	Urea	00B-3020-E0
3126	(D)-Penicillamine	Ion-Metal	Lig Exchange	00B-3126-E0



Preparative Columns and Bulk Media are available in 15 and 30 μ m particle sizes. Call for information on pricing and availability. Detailed notes on Care and Use, as well as performance testing, are provided with each column.



For Chiral Column Performance Check Standards, see p. 399

5 μ m Analytical and Guard Columns (mm)					Guards		
Phase	Chirex Phase Description	Bond Type	Linkage Type	150 x 4.6	250 x 4.6	30 x 4.6	
3001	(R)-PGLY and DNB	Covalent	Amide	00F-3001-E0	—	—	
3011	(S)-LEU and DNAN	Covalent	Urea	—	00G-3011-E0	—	
3014	(S)-VAL and (R)-NEA	Covalent	Urea	—	00G-3014-E0	—	
3019	(S)-LEU and (S)-NEA	Covalent	Urea	—	00G-3019-E0	—	
3022	(S)-ICA and (R)-NEA	Covalent	Urea	00F-3022-E0	00G-3022-E0	—	
3126	(D)-Penicillamine	Ion-Metal	Lig Ex	00F-3126-E0	00G-3126-E0	03A-3126-E0	



Chiral HPLC of Amino Acids

- Pirkle-concept and Ligand Exchange type columns
- High enantioselectivity
- Excellent efficiency

Chirex HPLC columns are an excellent choice for underivatized and derivatized amino acids.

Separations of Amino Acid Derivatives

Compound	Chirex Phase	Separation Factor (α)	App ID No.
N-FMOC Derivatives (9-Fluorenylmethoxycarbonyl)			
N-FMOC-Leucine	3011	1.20	13800
N-FMOC-Phenylalanine	3011	1.10	13796
N-FMOC-Valine	3011	1.12	13798
Z-Derivatives (Benzylloxycarbonyl)			
Z-Alanine	3011	1.16	13729
Z-Leucine	3011	1.17	13731
Z-Norvaline	3011	1.13	13755
Z-Serine	3011	1.09	13758
Z-Valine	3011	1.13	13753
N-Acetyl Derivatives			
N-Acetylalanine	3126	1.17	14052
N-Acetylleucine	3126	1.39	14058
N-Acetylmethionine	3126	1.27	13728
N-Acetylvaline	3126	1.50	14055
N-Formyl Derivatives			
N-Formylvaline	3126	1.37	13721
N-Formylmethionine	3126	1.25	13722
N-Dansyl Derivatives (5-5-Dimethyl-aminonaphthalene-1-sulfonyl derivative)			
N-Dansylnorvaline	3011	1.24	13766
N-Dansylphenylalanine	3011	1.27	13771
N-Dansylvaline	3011	1.28	13763
PTH Derivatives (Phenylthiohydantoin)			
PTH-Valine	3014	1.12	13921

i Separation potential of some other amino acid derivatives:
 (Recommended columns: Chirex 3011, 3014)
 CBZ-Derivatives (carbobenzoxy; benzylloxycarbonyl);
 IC-Derivatives (phenylisocyanate);
 Dabsyl Derivatives (4-4-dimethylaminoazobenzene-4'-sulfonyl)

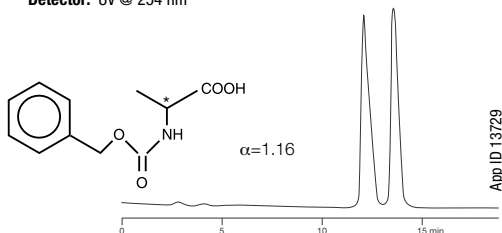
Separations of Underivatized "Free" Amino Acids

Compound	Chirex Phase	Separation Factor (α)	App ID No
Alanine	3126	1.66	14004
Alanylglycine	3126	2.26	14080
Alanylglycyl-glycine	3126	1.62	14082
Alloisoleucine	3126	1.67	14038
Allothreonine	3126	1.19	14046
Arginine	3126	2.15	14027
Asparagine	3126	1.10	14049
Aspartic acid	3126	1.42	14019
Baclofen	3126	1.23	13785
p-Boronophenylalanine	3126	1.36	13790
2-amino-n-Butyric acid	3126	1.80	14034
Cystine	3126	2.47	14085
2,6-Diaminopimelic acid	3126	2.77	14066
3-(3,4-Dihydroxyphenyl)-alanine (DOPA)	3126	1.22	13750
Glutamic acid	3126	1.11	14047
Glutamine	3126	1.71	14022
Glycylalanine	3126	1.78	14079
Glycylvaline	3126	1.69	14081
Histidine	3126	1.32	13745
Isoleucine	3126	1.70	14035
Leucine	3126	1.56	14009
Leucylglycyl-glycine	3126	1.36	14083
Lysine	3126	1.83	14018
Methionine	3126	1.42	14024
α -Methyl Leucine	3126	1.59	14457
α -Methyl Tryptophan	3126	1.18	14456
Naphthylglycine	3126	1.42	13789
Norvaline	3126	1.95	14029
Ornithine	3126	1.38	14041
Phenylalanine	3126	1.44	13740
Phenylglycine	3126	1.78	13748
Pipecolic acid	3126	1.77	14031
Proline	3126	2.50	14011
Serine	3126	1.17	14016
Threonine	3126	1.20	14043
dl-Threo-3-phenylserine	3126	1.15	13787
Tryptophan	3126	1.11	13737
Tyrosine	3126	1.34	13743
Valine	3126	1.91	14006

i Alpha (α)= Separation Factor = k_2/k_1

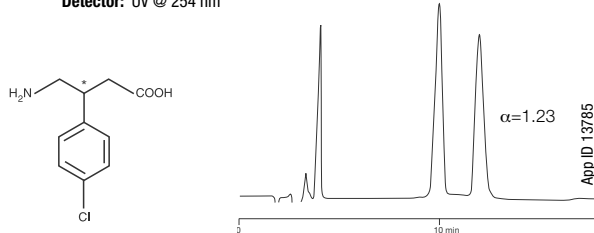
Z-Alanine

Column: Chirex 3011
Dimensions: 250 x 4.0 mm
Part No.: 00G-3011-00
Mobile Phase: 0.01 M Ammonium Acetate in Methanol
Flow Rate: 1.0 mL/min
Detector: UV @ 254 nm



Baclofen

Column: Chirex 3126
Dimensions: 150 x 4.6 mm
Part No.: 00F-3126-E0
Mobile Phase: 2 mM Copper (II) sulfate in water / Isopropanol (85:15)
Flow Rate: 1.0 mL/min
Detector: UV @ 254 nm



U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

pH Flexibility Expands Robustness and Reproducibility

Gemini columns are rugged reversed phase HPLC columns that offer extended lifetime at extreme pH conditions and excellent stability for reproducible, high efficiency separations.

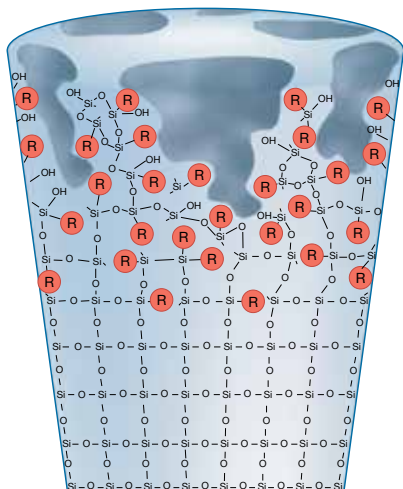
- Take full advantage of high and low pH conditions (pH 1-12) to manipulate selectivity
- Expect longer column lifetime with patented TWIN-NX[™] technology
- For analytical and preparative separations of basic and acidic compounds

Phase	Description	USP Classification
NX-C18	The most rugged Gemini column, offering 5 times the durability of previous generation hybrid columns	L1
C6-Phenyl	A low bleed phenyl phase. For UV and MS detection, which offers an aromatic selectivity complementary to C18 phases	L11
C18	Selectivity, high structural integrity and increased loadability for preparative and purification applications in pre-packed columns and bulk media	L1

TWIN[™] (Two-In-One) Technology

Gemini C18 and C6-Phenyl

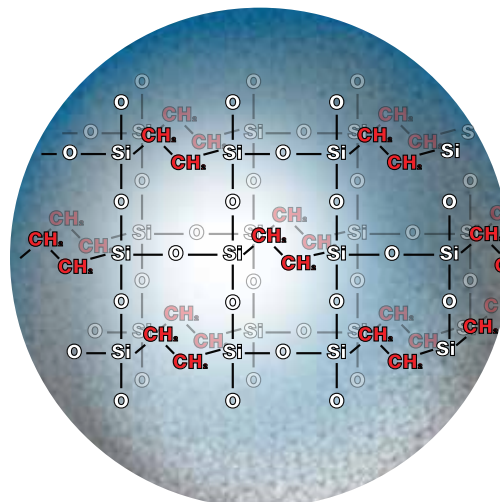
During the final stage of silica manufacturing a unique silica-organic layer is grafted to create a completely new composite particle. Since the internal base silica is unaltered by this manufacturing process, the particle retains its mechanical strength and rigidity along with excellent efficiency, while the silica-organic shell protects the particle from chemical attack.



Second-Generation TWIN-NX Technology

Gemini NX-C18

TWIN-NX technology uses an improved patented organo-silica grafting process which incorporates highly stabilizing ethylene cross-linking. These organic groups are evenly incorporated into the grafted layers on the silica surface while maintaining a pure silica core. This not only provides resistance to high pH attack, but also maintains the high efficiency and mechanical strength of a silica particle.



U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini NX-C18

- pH stable 1-12 for durability
- Consistent performance in both volatile and non-volatile buffers
- High sample loading capacity for metabolite identification and preparative purification

Gemini NX-C18

USP: L1

LC-MS Certified

pH Stability: 1.0 – 12.0

Particle Size: 3 µm, 5 µm, and 10 µm

Phase: C18

Application: Small molecules, basic compounds

Strength: Extremely durable pH stable particle

Pore Size (Å): 110

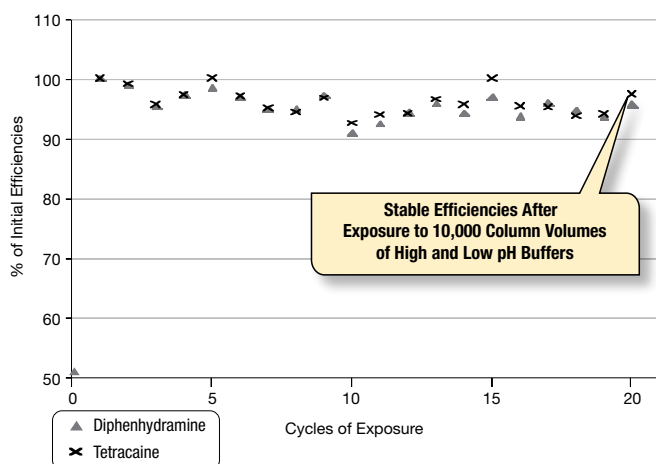
Surface Area (m²/g): 375

Carbon Load %: 14

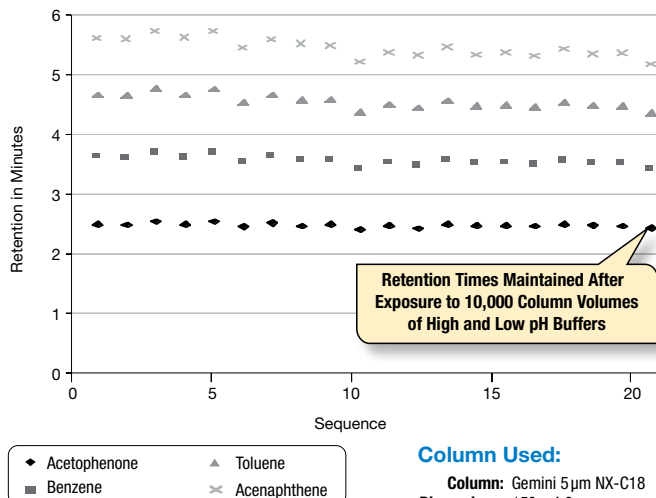
End Capping: TMS

Gemini NX-C18 Tested for Extreme Durability in Changing Mobile Phase pH

Column Efficiencies Maintained in High pH Testing for 20 Cycles



Retention Times of Four Probes Maintained in Neutral pH Testing for 20 Cycles



Column Used:

Column: Gemini 5 µm NX-C18
 Dimensions: 150 x 4.6 mm
 Part No.: 00F-4454-E0

Column Testing Cycle

Step 1

24x High pH Flush Procedures

Mobile Phase: A: 10 mM Ammonium Bicarbonate pH 10.5
 B: Acetonitrile

Gradient: 5% to 95% B in 6 min Hold at 95% B for 2 min

Re-equilibrate: 5% B for 2 min

Flow Rate: 1.5 mL/min

Step 2

High pH Testing

Isocratic: 10 mM Ammonium Bicarbonate pH 10.5 / Acetonitrile (50:50)

Flow Rate: 1.5 mL/min

Detection: UV @ 230 nm

Samples: 1. Tetracaine
 2. Diphenhydramine

Step 3

1x Neutral Flush Procedure

Mobile Phase: A: Water
 B: Acetonitrile

Gradient: 5% B for 2 min

5% to 100% B in 3 min Hold at 100% B for 5 min

Flow Rate: 1.5 mL/min

Step 4

Neutral pH Testing

Isocratic: Water / Acetonitrile (35:65)

Flow Rate: 1.0 mL/min

Detection: UV @ 254 nm

Samples: 1. Acetophenone
 2. Benzene
 3. Toluene
 4. Acenaphthene

Step 5

24x Low pH Flush Procedure

Mobile Phase: A: 0.5% Formic Acid in Water
 B: 0.5% Formic Acid in Acetonitrile, pH 2.0

Gradient: 5% to 95% B in 6 min Hold at 95% B for 2 min

Re-equilibrate: 5% B for 2 min

Flow Rate: 1.5 mL/min

Step 6

Neutral pH Flush Repeats Repeats for 20 Cycles

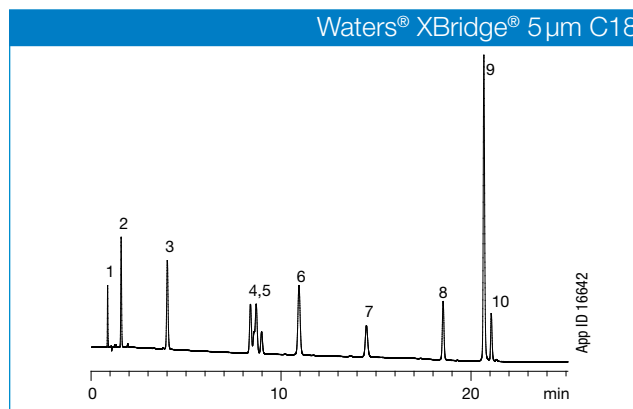
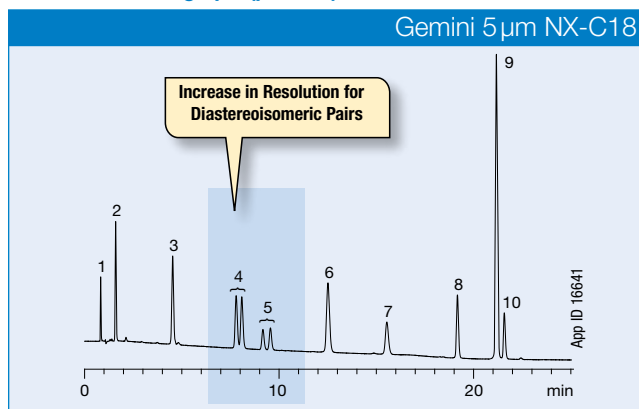


Gemini[®] pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini NX-C18 (cont'd)

Polar Bases at High pH (pH 10.5)



Y-axis normalized for all chromatograms.

Polar Bases (Beta Blockers) at High pH

Conditions for all columns:

Dimensions: 150 x 4.6 mm

Mobile Phase: A: 10 mM Ammonium Bicarbonate pH 10.5
B: Acetonitrile

Gradient: A/B (85:15) to (70:30) in 15 min to (50:50) in 5 min, Hold for 5 min

Flow Rate: 1.5 mL/min

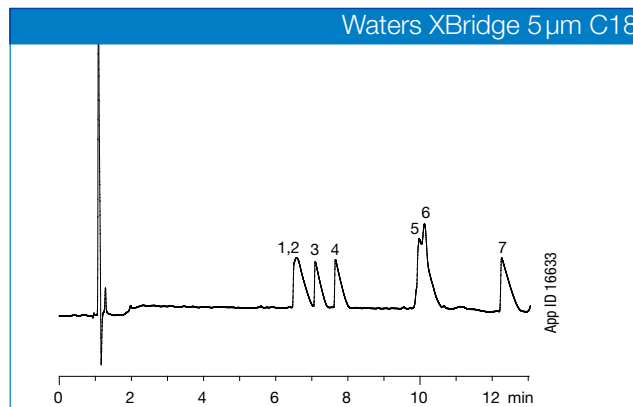
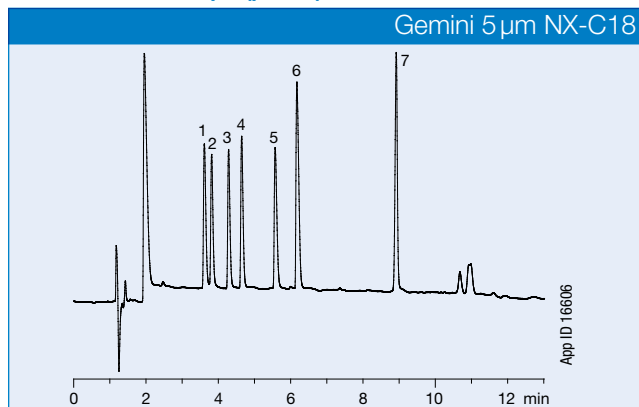
Temperature: Ambient

Detection: UV @ 230 nm

- Sample:**
1. Bisoprolol Contaminant
 2. Sotalol
 3. Atenolol
 4. Labetalol (Diastereoisomeric Pair)
 5. Nadolol (Diastereoisomeric Pair)
 6. Pindolol
 7. Metoprolol
 8. Bisoprolol
 9. Propranolol
 10. Alprenolol



Polar Bases at Low pH (pH 2.7)



Y-axis normalized for all chromatograms.

Polar Bases (Antihistamines) in Formic Acid

Conditions for all columns:

Dimensions: 150 x 4.6 mm

Mobile Phase: A: 0.1% Formic Acid in Water
B: 0.1% Formic Acid in Acetonitrile

Gradient: A/B (90:10) to (50:50) in 10 min

Flow Rate: 1.5 mL/min

Temperature: Ambient

Detection: UV @ 210 nm

- Sample:**
1. Pyrilamine
 2. Triplennamine
 3. Chlorpheniramine
 4. Brompheniramine
 5. Chloropyramine
 6. Diphenhydramine
 7. Loratadine

Comparative chromatograms may not be representative of all applications.

Gemini[®] pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini C18

- Increased loading and retention of basic compounds
- Silica efficiency and mechanical strength
- pH stable 1-12 for durability

Gemini C18

USP: L1

LC-MS Certified

pH Stability: 1.0 – 12.0

Particle Size: 3 µm, 5 µm, and 10 µm

Phase: C18

Application: Small molecules, basic compounds

Strength: Wide pH stability, high efficiency

Pore Size (Å): 110

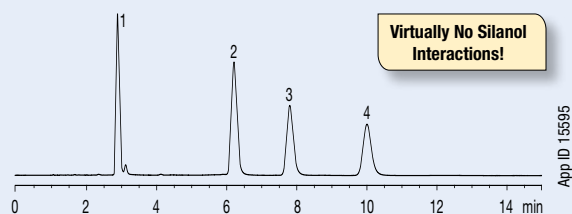
Surface Area (m²/g): 375

Carbon Load %: 14

End Capping: TMS

Chromatographic Comparisons

Gemini 5 µm C18 110 Å



Tricyclic Antidepressants at Neutral pH

Conditions for all columns:

Dimensions: 150 x 4.6 mm

Mobile Phase: 20 mM Phosphate buffer pH 7.0/Acetonitrile/
Methanol (30:35:35)

Flow Rate: 1.5 mL/min

Detection: UV @ 254 nm

Sample: 1. Nortriptyline

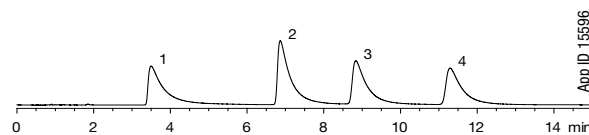
2. Imipramine

3. Amitriptyline

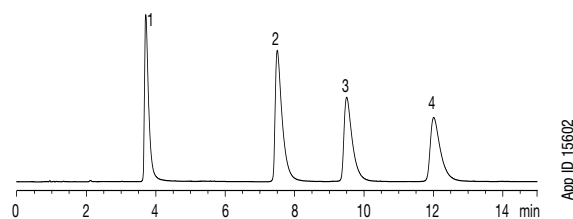
4. Clomipramine



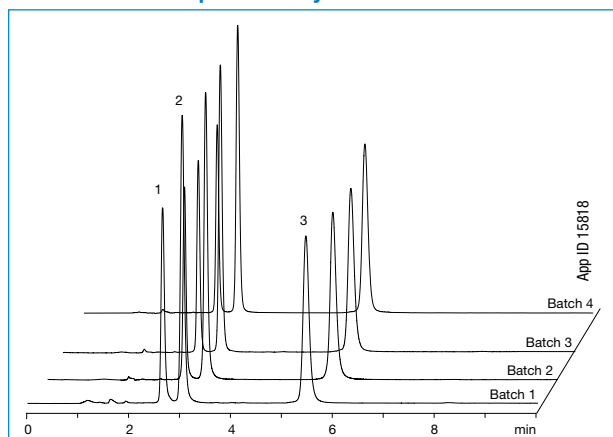
Agilent Technologies[®] ZORBAX[®] 5 µm Extend-C18 80 Å



Advanced Chromatography Technologies[®] ACE[®] 5 µm C18 100 Å



Batch-to-Batch Reproducibility



Conditions for all separations:

Column: Gemini 5 µm C18

Dimension: 150 x 4.6 mm

Part No.: 00F-4435-E0

Mobile Phase: 10 mM Ammonium Bicarbonate,
pH 10.5/Acetonitrile (50:50)

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detection: UV @ 230 nm

Sample: 1. Pindolol

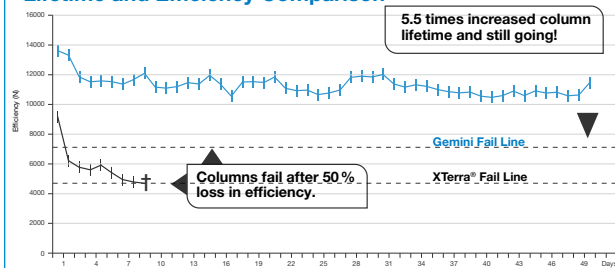
2. Metoprolol

3. Propranolol

Extended Column Lifetime

The TWIN™ Technology engineering of Gemini provides stability and increased column lifetime. Whether used under isocratic or gradient conditions, Gemini columns out-perform and outlasts pH stable columns. This is illustrated below.

Lifetime and Efficiency Comparison**



**Efficiency and lifetime comparison based on average of two columns each run in parallel.

Conditions for all columns:

Columns: Gemini 5 µm C18

Waters[®] XTerra[®] 5 µm MS C18

Dimensions: 150 x 4.6 mm

Mobile Phase: Acetonitrile/50 mM Methylpyrrolidine
Buffer, pH 11.5 (50:50)

Flow Rate: 1 mL/min

Temperature: Ambient

Detection: UV @ 254 nm

Sample: Diphenhydramine

■ Gemini C18
■ Waters[®] XTerra[®] MS C18

The comparative data presented here may not be representative for all applications.

Gemini[®] pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini C6-Phenyl

- pH stable 1-12 for durability
- Great aromatic selectivity
- Extremely low UV and MS bleed

Gemini C6-Phenyl

USP: L11

LC-MS
Certified

pH Stability: 1.0 – 12.0

Particle Size: 3 µm and 5 µm

Phase: Phenyl with C6 linker

Application: Aromatic, polar, or basic compounds

Strength: High aromatic selectivity with exceptional peak shape even in neutral conditions. Extremely low bleed phenyl column.

Pore Size (Å): 110

Surface Area (m²/g): 375

Carbon Load %: 12

End Capping: TMS

Enhanced Performance for Aromatic Compounds

Sulfa Drug Application

Resolution	Pursuit 5 µm DiPhenyl	Gemini 5 µm C6-Phenyl
RS _{1,2}	1.0	4.0
RS _{2,3}	9.8	16.0

Conditions for all columns:

Dimensions: 150 x 4.6 mm

Mobile Phase: 0.1 % Formic Acid in Water/
Methanol (70:30)

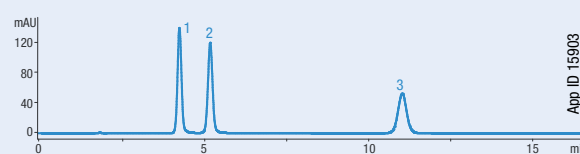
Flow Rate: 1.0 mL/min

Temperature: Ambient

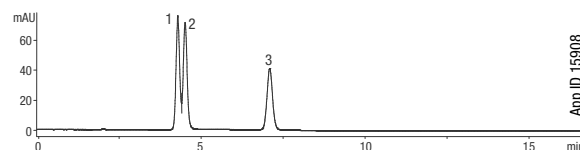
Detection: UV @ 254 nm

Sample: 1. Sulfathiazole
2. Sulfamerazine
3. Sulfamethoxazole

Phenomenex Gemini 5 µm C6-Phenyl

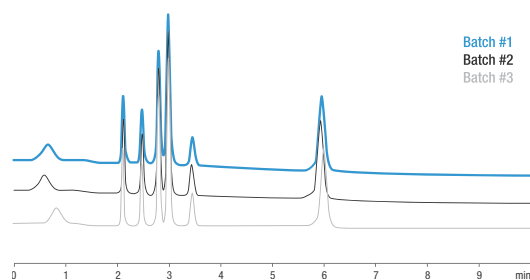


Agilent Technologies[®] Pursuit[®] 5 µm DiPhenyl



Reproducible Phenyl Phase

Aliphatic Acid Application



Conditions for all columns:

Column: Gemini 5 µm C6-Phenyl

Dimensions: 150 x 4.6 mm

Part No.: 00F-4444-EO

Mobile Phase: 20 mM Phosphate buffer,
pH 2.5/Methanol (97:3)

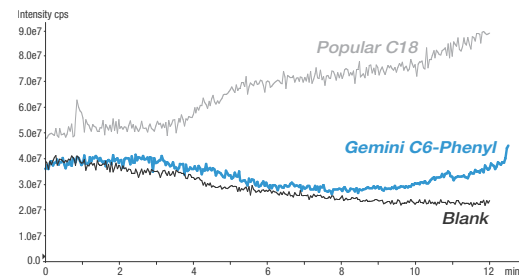
Flow Rate: 1.0 mL/min

Temperature: Ambient

Detection: UV @ 220 nm

Sample: 1. Tartaric Acid 4. Acetic Acid
2. Malic Acid 5. Citric Acid
3. Lactic Acid 6. Propionic Acid

Low Bleed Phenyl Phase



Conditions for all columns:

Dimensions: 150 x 3.0 mm

Mobile Phase: A: 0.1 % Formic acid in Water

B: 0.1 % Formic acid in Acetonitrile
Gradient: 5 % B to 95 % B in 10 min, then hold
95 % B for 2 min

Flow Rate: 0.6 mL/min

Temperature: Ambient

MS Detection: ESI + ion mode,
M/Z 100-700

Comparative chromatograms may not be representative for all applications.

Gemini[®] pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini C8(3)

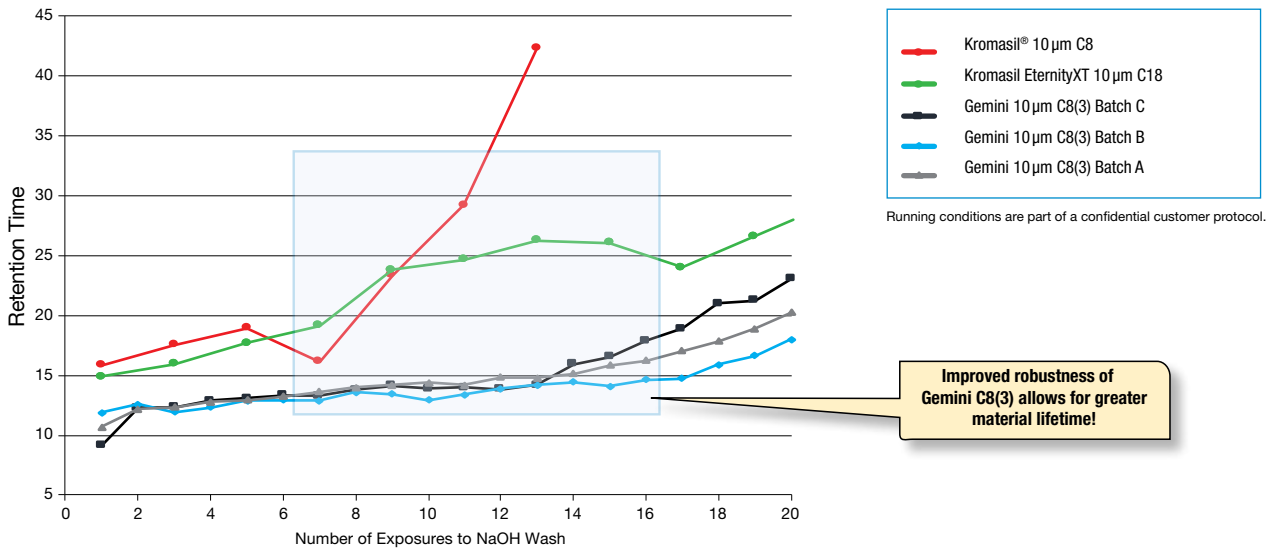
The Material Developed for High pH Insulin Purification

Many products can separate human insulin and its degradant, while few can withstand high pH caustic washes for aggregate removal. Now, there is a clear media choice. Gemini C8(3) provides the needed separation, the needed low/high pH robustness, and the overall consistency in terms of efficiency and retention cycle to cycle. You don't have to choose between consistent performance or robustness; Gemini C8(3) was developed to give you the best of both worlds.

Gemini C8(3)

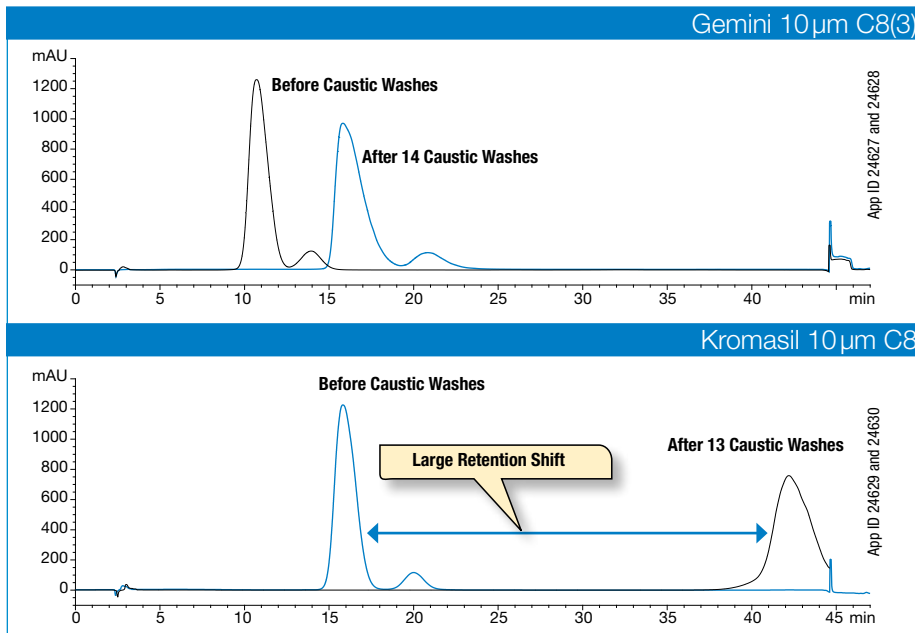
pH Stability:	1.0 – 12.0
Particle Size:	10 µm
Phase:	C8
Application:	Small molecules, peptides, proteins, oligonucleotides
Strength:	Elevated pH stability; Increased reproducibility; Enhanced robustness
Pore Size (Å):	100
Surface Area (m ² /g):	400
Carbon Load %:	13
End Capping:	TMS

Insulin Retention vs. Exposures to NaOH Wash



Improved robustness of Gemini C8(3) allows for greater material lifetime!

Insulin Retention Comparison



Comparative separations may not be representative of all applications.



Gemini[®] pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Ordering Information

3 µm Capillary Columns (mm)			
Phases	50 x 0.30	150 x 0.30	50 x 0.50
C18	00B-4439-AC	00F-4439-AC	00B-4439-AF

3 µm Microbore, Minibore and MidBore™ Columns (mm)										SecurityGuard™ Cartridges (mm)	
Phases	50 x 1.0	20 x 2.0	30 x 2.0	50 x 2.0	100 x 2.0	150 x 2.0	50 x 3.0	100 x 3.0	150 x 3.0	4 x 2.0* /10pk	
C18	00B-4439-A0	00M-4439-B0	00A-4439-B0	00B-4439-B0	00D-4439-B0	00F-4439-B0	00B-4439-Y0	00D-4439-Y0	00F-4439-Y0	AJ0-7596	
C6-Phenyl	—	—	—	00B-4443-B0	00D-4443-B0	00F-4443-B0	00B-4443-Y0	00D-4443-Y0	00F-4443-Y0	AJ0-7914	
NX-C18	00B-4453-A0	00M-4453-B0	00A-4453-B0	00B-4453-B0	00D-4453-B0	00F-4453-B0	00B-4453-Y0	00D-4453-Y0	00F-4453-Y0	AJ0-8367	

for ID: 2.0-3.0 mm

3 µm Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0* /10pk
C18	00A-4439-E0	00B-4439-E0	00D-4439-E0	00F-4439-E0	00G-4439-E0	AJ0-7597
C6-Phenyl	00A-4443-E0	00B-4443-E0	00D-4443-E0	00F-4443-E0	00G-4443-E0	AJ0-7915
NX-C18	—	00B-4453-E0	00D-4453-E0	00F-4453-E0	00G-4453-E0	AJ0-8368

for ID: 3.2-8.0 mm



5 µm Minibore and MidBore Columns (mm)								SecurityGuard™ Cartridges (mm)	
Phases	30 x 2.0	50 x 2.0	150 x 2.0	250 x 2.0	50 x 3.0	100 x 3.0	150 x 3.0	250 x 3.0	4 x 2.0* /10pk
C18	00A-4435-B0	00B-4435-B0	00F-4435-B0	00G-4435-B0	00B-4435-Y0	00D-4435-Y0	00F-4435-Y0	00G-4435-Y0	AJ0-7596
C6-Phenyl	—	00B-4444-B0	00F-4444-B0	—	—	—	—	00G-4444-Y0	AJ0-7914
NX-C18	00A-4454-B0	00B-4454-B0	00F-4454-B0	—	00B-4454-Y0	00D-4454-Y0	00F-4454-Y0	00G-4454-Y0	AJ0-8367

for ID: 2.0-3.0 mm

5 µm Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0* /10pk
C18	00A-4435-E0	00B-4435-E0	00D-4435-E0	00F-4435-E0	00G-4435-E0	AJ0-7597
C6-Phenyl	—	00B-4444-E0	00D-4444-E0	00F-4444-E0	00G-4444-E0	AJ0-7915
NX-C18	—	00B-4454-E0	00D-4454-E0	00F-4454-E0	00G-4454-E0	AJ0-8368

for ID: 3.2-8.0 mm



For Gemini Capillary HPLC Columns and Guards, contact your Phenomenex technical consultant or local distributor.

5 µm Semi-Prep Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	150 x 10	250 x 10	10 x 10 ³ /3pk
C18	00F-4435-N0	00G-4435-N0	AJ0-7598
C6-Phenyl	—	00G-4444-N0	AJ0-9156
NX-C18	00F-4454-N0	00G-4454-N0	AJ0-8369

for ID: 9-16 mm



Axia™ Packed Preparative Columns (mm)							SecurityGuard™ Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	50 x 30	75 x 30	15 x 21.2**	15 x 30.0*
5 µm							/ea	/ea
C18	00B-4435-P0-AX	00D-4435-P0-AX	00F-4435-P0-AX	00G-4435-P0-AX	00B-4435-U0-AX	—	AJ0-7846	AJ0-8308
C6-Phenyl	—	00D-4444-P0-AX	00F-4444-P0-AX	00G-4444-P0-AX	—	—	AJ0-9157	AJ0-9158
NX-C18	00B-4454-P0-AX	00D-4454-P0-AX	00F-4454-P0-AX	00G-4454-P0-AX	00B-4454-U0-AX	00C-4454-U0-AX	AJ0-8370	AJ0-8371
10 µm							/ea	/ea
C18	—	00D-4436-P0-AX	00F-4436-P0-AX	00G-4436-P0-AX	—	—	AJ0-7846	AJ0-8308
NX-C18	00B-4455-P0-AX	00D-4455-P0-AX	00F-4455-P0-AX	00G-4455-P0-AX	—	—	AJ0-8370	AJ0-8371
C8(3)	—	—	—	00G-4763-P0-AX	—	—	—	—

for ID: 18-29 mm

30-49 mm

Axia™ Packed Preparative Columns (mm) continued						SecurityGuard™ Cartridges (mm)	
Phases	100 x 30	150 x 30	250 x 30	100 x 50	150 x 50	250 x 50	15 x 30.0*
5 µm							/ea
C18	00D-4435-U0-AX	00F-4435-U0-AX	00G-4435-U0-AX	—	—	—	AJ0-8308
NX-C18	00D-4454-U0-AX	00F-4454-U0-AX	00G-4454-U0-AX	—	—	—	AJ0-8371
10 µm							/ea
C18	00D-4436-U0-AX	00F-4436-U0-AX	00G-4436-U0-AX	—	00F-4436-V0-AX	00G-4436-V0-AX	AJ0-8308
NX-C18	00D-4455-U0-AX	00F-4455-U0-AX	00G-4455-U0-AX	00D-4455-V0-AX	00F-4455-V0-AX	00G-4455-V0-AX	AJ0-8371
C8(3)	—	—	00G-4763-U0-AX	—	—	00G-4763-V0-AX	—

for ID: 30-49 mm



For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 317-318

For PREP Columns & Bulk Media, see pp. 351-369

For SecurityGuard Holders and Cartridges, see pp. 311-316

For MercuryMS LC-MS Columns, Cartridges, and Cartridge Holders, Inquire.

*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

†SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJ0-9281](#)

**PREP SecurityGuard™ Cartridges require holder, Part No.: [AJ0-8223](#)

◆PREP SecurityGuard™ Cartridges require holder, Part No.: [AJ0-8277](#)

Guaranteed Replacement to Hypersil®

- Highly reproducible
- Long column life
- Mimics performance of Thermo Hypersil-Keystone Hypersil
- Economically priced

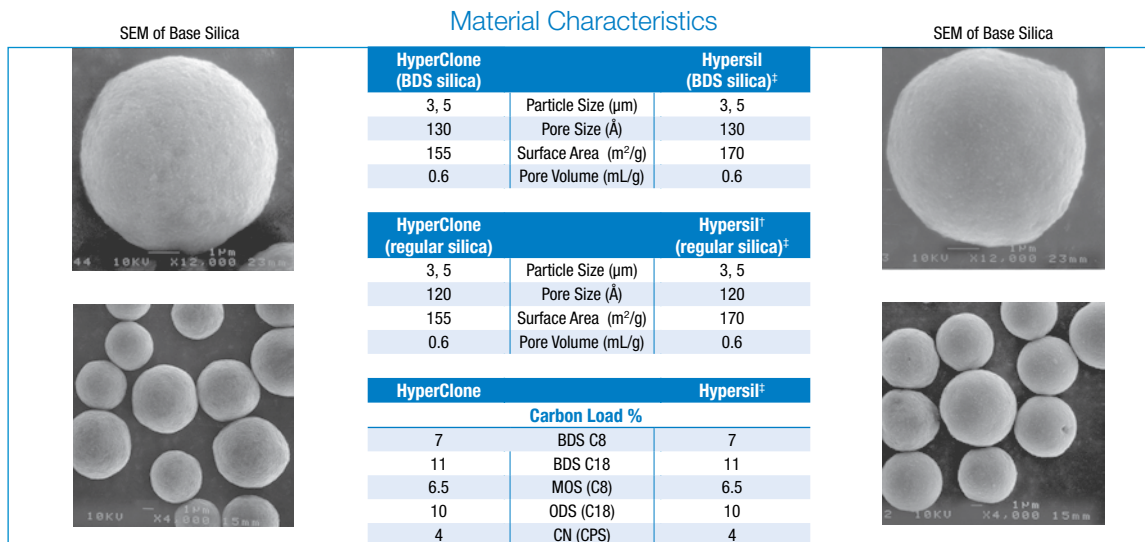
Phenomenex HyperClone columns have been developed to provide chromatographic behavior that mimics that of Thermo Hypersil columns. For comparative applications, please contact your local Phenomenex representative.

Comparisons of physical and chemical characteristics of HyperClone and Hypersil are listed below. As you can see, HyperClone and Hypersil compare very well for important specifications such as particle size, pore size, and carbon load.

HyperClone

VS.

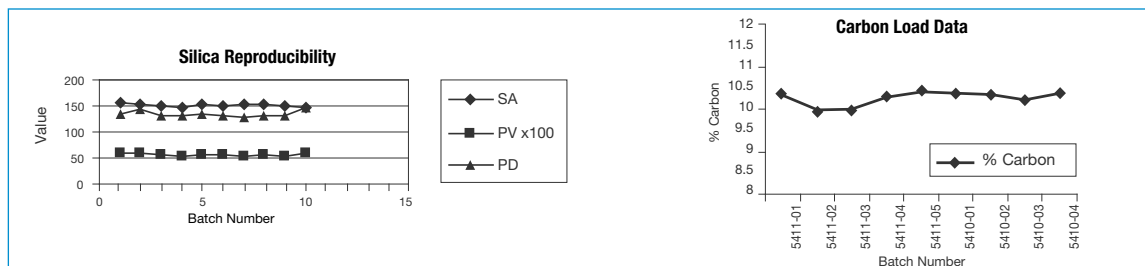
Hypersil



Particle Size Distribution†

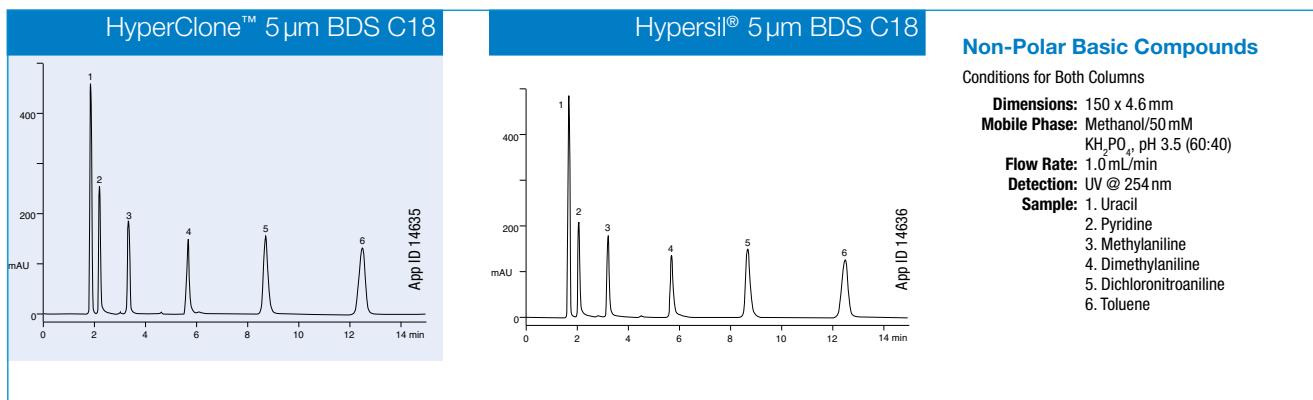


HyperClone Reproducibility



† All Hypersil information obtained from (then) Thermo Electron Corporation 2006-2007 catalog and 2012-2013 Thermo Scientific Chromatography Columns catalog.

VS.



Ordering Information

3 µm Minibore and Analytical Columns (mm)					SecurityGuard™ Cartridges (mm)		
Phases	50 x 2.0	150 x 2.0	100 x 4.6	125 x 4.0	150 x 4.6	4 x 2.0*	4 x 3.0*
ODS (C18)	—	00F-4356-B0	00D-4356-E0	00E-4356-D0	00F-4356-E0	/10pk AJ0-4286	/10pk AJ0-4287
BDS C8	00B-4417-B0	—	—	—	00F-4417-E0	AJ0-4289	AJ0-4290
BDS C18	00B-4419-B0	00F-4419-B0	00D-4419-E0	—	00F-4419-E0	AJ0-4286	AJ0-4287

for ID: 2.0-3.0 mm 3.2-8.0 mm

5 µm Minibore and Analytical Columns (mm)							SecurityGuard™ Cartridges (mm)			
Phases	150 x 2.0	150 x 3.2	250 x 3.2	125 x 4.0	250 x 4.0	100 x 4.6	150 x 4.6	250 x 4.6	4 x 2.0*	4 x 3.0*
Silica	—	—	—	—	—	—	00F-4358-E0	00G-4358-E0	/10pk AJ0-4347	/10pk AJ0-4348
MOS (C8)	—	—	—	00E-4359-D0	—	00D-4359-E0	00F-4359-E0	00G-4359-E0	AJ0-4289	AJ0-4290
ODS (C18)	—	00F-4361-R0	00G-4361-R0	00E-4361-D0	00G-4361-D0	00D-4361-E0	00F-4361-E0	00G-4361-E0	AJ0-4286	AJ0-4287
CN (CPS)	—	—	—	—	—	—	00F-4422-E0	00G-4422-E0	AJ0-4304	AJ0-4305
BDS C8	—	—	—	—	—	—	00F-4418-E0	00G-4418-E0	/10pk AJ0-4289	/10pk AJ0-4290
BDS C18	00F-4420-B0	00F-4420-R0	—	00E-4420-D0	00G-4420-D0	00D-4420-E0	00F-4420-E0	00G-4420-E0	AJ0-4286	AJ0-4287

for ID: 2.0-3.0 mm 3.2-8.0 mm

5 µm SemiPrep Columns (mm)		SecurityGuard™ Cartridges (mm)
Phases	250 x 10	10 x 10 †
ODS (C18)	00G-4361-N0	/3pk AJ0-7221

for ID: 9-16 mm

*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)
 †SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJ0-9281](#)



Other dimensions available upon request.



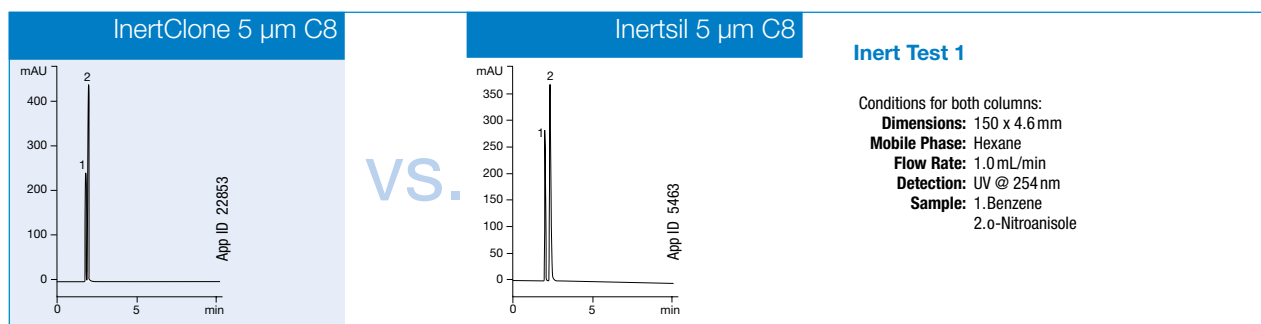
For SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315.

Comparative separations may not be representative of all applications.

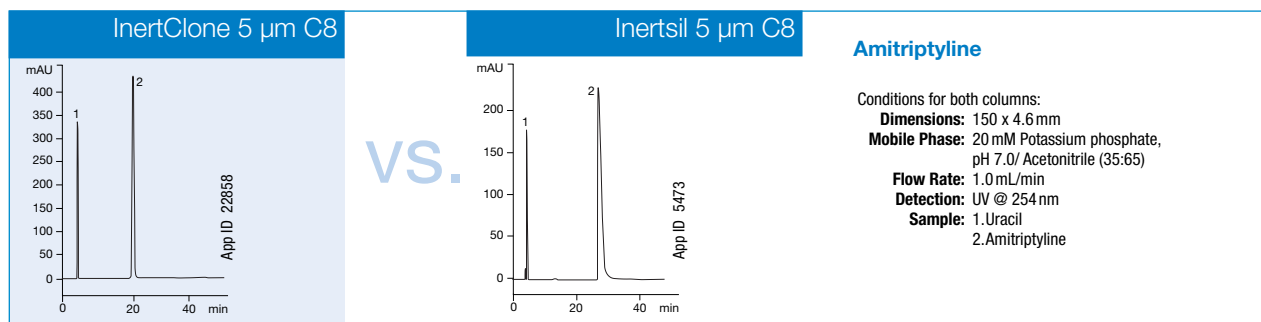
Guaranteed Replacement to Inertsil®

InertClone VS. Inertsil Material Characteristics

InertClone		Inertsil
Particle Size (µm) and Shape		
3, Spherical		3, Spherical
5, Spherical		5, Spherical
Pore Size (Å)		
150	Ph (Phenyl), C8, ODS-2	150
100	ODS-3	100
Surface Area (m²/g)		
310	Ph (Phenyl), C8, ODS-2	320
450	ODS-3	450
Carbon Load %		
12.6	C8	10.5
18.5	ODS-2	18.5
15.5	ODS-3	15.0
10.0	Ph (Phenyl)	10.0



Note: Inertsil columns were manufactured by GL Sciences, Inc., Japan



Comparative separations may not be representative of all applications.

Ordering Information

3 µm Analytical Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phase	100 x 4.6	150 x 4.6	4 x 3.0*		
ODS-3	100Å	00D-4340-E0	00F-4340-E0	/10 pk AJ0-4287	

for ID: 3.2-8.0 mm

5 µm Analytical Columns (mm)					
Phases	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*	
ODS-2	150Å	00D-4342-E0	00F-4342-E0	/10pk AJ0-4287	
C8	150Å	—	00F-4391-E0	AJ0-4290	
Ph (Phenyl)	150Å	—	00F-4352-E0	AJ0-4351	
ODS-3	100Å	—	00F-4341-E0	/10pk AJ0-4287	

for ID: 3.2-8.0 mm

*SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJO-4282

RP-HPLC for Protein/Peptide Analysis and Purification

The Jupiter HPLC column portfolio, including Jupiter 300 and Jupiter Proteo, offers optimized reversed phase solutions for protein and peptide characterization and purification. With these columns, one can identify, purify, and analyze almost any protein.

Jupiter 300 – 300 Å columns designed to analyze and purify intact proteins

- For separation of intact proteins > 10,000 MW
- Available with C18, C5, and C4 bonded phases
- 1.5 – 10 pH stability for method ruggedness and easy protein removal
- Direct scale up to preparative and bulk materials

Jupiter Proteo – 90 Å columns engineered for increased peak capacity and resolution of peptide maps as well as peptide separations

- For separation of intact proteins and peptides < 10,000 MW
- Available with novel C12 bonded phase for excellent selectivity
- Identify post-translational modifications
- Capillary columns available for increased sensitivity

Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m ²)	End Capping
C4	Spher. 5, 10, 15	300	170	5.0	6.30	Yes
C5	Spher. 5, 10	300	170	5.5	5.30	Yes
C18	Spher. 3, 5, 10, 15	300	170	13.3	5.50	Yes
Proteo	Spher. 4, 10	90	475	15.0	—	Yes

Engineered for Robustness, Reproducibility, and Quality

It is tough to compete with Jupiter standards. Each column has consistent specifications and thus consistent performance.

- pH 1.5-10 stability gives robust, method development opportunities
- Over 25 individual quality control tests performed on every batch of Jupiter material
- Every column reproducibility aspect is specified, tested, and reported in Materials Validation Document (MVD)

pH 1.5 – 10 Stability

A wide pH range means opportunity for method development, in addition to longer column life. Jupiter columns are stable for over 2500 hours at pH extremes. Jupiter 300 and Jupiter Proteo provide excellent separations using various MS compatible buffers and provide good resolution down to 0.01 % TFA.

Quality Proven

A Materials Validation Document (MVD) accompanies every Jupiter column. Each certificate documents the rigorous testing procedures performed on each batch of Jupiter material to ensure column-to-column and batch-to-batch reproducibility.

Silica physical tests and specifications

Pore size, particle size and distribution, metal content, surface area, carbon load and surface coverage specifications and results are all reported.

SEM analysis

Scanning Electron Microscopy (SEM) photos show surface smoothness and particle consistency as well as a visual representation of particle size distribution.

Diagnostic chromatography tests

Monitoring chromatographic specifications for silanol activity, hydrogen bonding capacity, hydrophobicity and peptide standards.

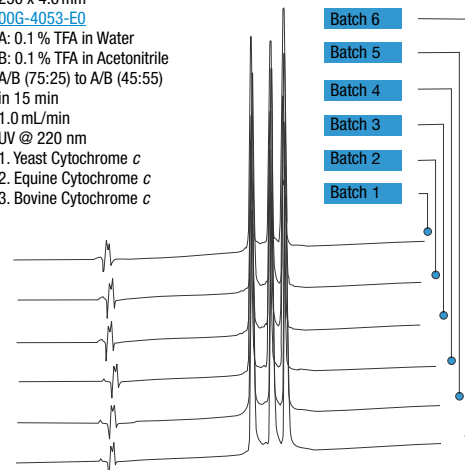
pH stability

Every batch goes through 1.5 and 10.0 pH testing before release, the results of which are reported on each MVD.

Reproducibility Assured

Batch-to-batch and column-to-column is critical to HPLC column performance. Through great advances in silica, bonding, and material characterization technology, Jupiter columns set a benchmark in reproducibility.

Column: Jupiter 5 µm C18 300 Å
Dimensions: 250 x 4.6 mm
Part No.: [00G-4053-E0](#)
Mobile Phase: A: 0.1 % TFA in Water
 B: 0.1 % TFA in Acetonitrile
Gradient: A/B (75:25) to A/B (45:55) in 15 min
Flow Rate: 1.0 mL/min
Detection: UV @ 220 nm
Sample: 1. Yeast Cytochrome c
 2. Equine Cytochrome c
 3. Bovine Cytochrome c



App ID 16658

Jupiter[®] LC Columns for Proteins & Peptides

Ordering Information

4 µm & 5 µm Capillary Columns (mm)					Trap Column	Trap Column
Phases	50 x 0.30	150 x 0.30	50 x 0.50	150 x 0.50	20 x 0.30	20 x 0.50
5 µm C4 300 Å	00B-4167-AC	—	00B-4167-AF	—	05M-4167-AC	05M-4167-AF
5 µm C18 300 Å	00B-4053-AC	—	00B-4053-AF	—	—	—
4 µm Proteo 90 Å	00B-4396-AC	00F-4396-AC	—	00F-4396-AF	—	—

3 µm, 4 µm & 5 µm Microbore and Minibore Columns (mm)					SecurityGuard™ Cartridges (mm)		
Phases	50 x 1.0	150 x 1.0	250 x 1.0	50 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0*
							/10pk
5 µm C4 300 Å	00B-4167-A0	00F-4167-A0	00G-4167-A0	00B-4167-B0	00F-4167-B0	00G-4167-B0	AJ0-4329
5 µm C5 300 Å	—	—	—	—	00F-4052-B0	—	AJ0-4326
5 µm C18 300 Å	—	—	—	00B-4053-B0	00F-4053-B0	00G-4053-B0	AJ0-4320
4 µm Proteo 90 Å	00B-4396-A0	00F-4396-A0	—	00B-4396-B0	00F-4396-B0	00G-4396-B0	AJ0-6073
							/10pk
3 µm C18 300 Å	—	—	—	00B-4263-B0	00F-4263-B0	—	AJ0-4320

for ID: 2.0-3.0 mm

3 µm, 4 µm & 5 µm Analytical, Semi-Prep, and Preparative Columns (mm)						SecurityGuard™ Cartridges (mm)		
Phases	50 x 4.6	150 x 4.6	250 x 4.6	250 x 10	250 x 21.2	4 x 3.0*	10 x 10†	15 x 21.2**
						/10pk	/3pk	/ea
5 µm C4 300 Å	00B-4167-E0	00F-4167-E0	00G-4167-E0	00G-4167-N0	00G-4167-P0	AJ0-4330	AJ0-7225	AJ0-7231
5 µm C5 300 Å	00B-4052-E0	00F-4052-E0	00G-4052-E0	00G-4052-N0	00G-4052-P0	AJ0-4327	AJ0-7371	—
5 µm C18 300 Å	00B-4053-E0	00F-4053-E0	00G-4053-E0	00G-4053-N0	00G-4053-P0	AJ0-4321	AJ0-7224	AJ0-7230
4 µm Proteo 90 Å	00B-4396-E0	00F-4396-E0	00G-4396-E0	00G-4396-N0	—	AJ0-6074	AJ0-7275	—
						/10pk	—	—
3 µm C18 300 Å	—	00F-4263-E0	00G-4263-E0	—	—	AJ0-4321	—	—

for ID: 3.2-8.0 mm 9-16 mm 18-29 mm

10 µm Analytical, Semi-Prep, and Preparative Columns (mm)				SecurityGuard™ Cartridges (mm)		
Phases	250 x 4.6	250 x 10	250 x 21.2	4 x 3.0*	10 x 10 †	15 x 21.2**
				/10pk	/3pk	/ea
C4 300 Å	00G-4168-E0	00G-4168-N0	00G-4168-P0	AJ0-4330	AJ0-7225	AJ0-7231
C18 300 Å	00G-4055-E0	00G-4055-N0	00G-4055-P0	AJ0-4321	AJ0-7224	AJ0-7230
Proteo 90 Å	00G-4397-E0	00G-4397-N0	—	AJ0-6074	AJ0-7275	—

for ID: 3.2-8.0 mm 9-16 mm 18-29 mm

15 µm Analytical, Semi-Prep, and Preparative Columns (mm)						SecurityGuard™ Cartridges (mm)			
Phases	250 x 4.6	250 x 10	250 x 21.2	250 x 30	250 x 50	4 x 3.0*	10 x 10†	15 x 21.2**	15 x 30.0*
						/10pk	/3pk	/ea	/ea
C4 300 Å	00G-4169-E0	00G-4169-N0	00G-4169-P0	—	00G-4169-V0	AJ0-4330	AJ0-7225	AJ0-7231	—
C18 300 Å	00G-4057-E0	—	00G-4057-P0	00G-4057-U0	00G-4057-V0	AJ0-4321	AJ0-7224	AJ0-7230	AJ0-8313

for ID: 3.2-8.0 mm 9-16 mm 18-29 mm 30-49 mm



For Jupiter Proteo Axia™ Packed Preparative columns, see p. 361

Ordering Information

Bulk Material

10 µm Bulk Packings			
Phases	100 g	1 kg	10 kg
C4 300 Å	04G-4168	04K-4168	04M-4168
C5 300 Å	—	04K-4054	—
C18 300 Å	04G-4055	04K-4055	04M-4055
Proteo 90 Å	04G-4397	04K-4397	—

15 µm Bulk Packings				
Phases	100 g	1 kg	5 kg	10 kg
C4 300 Å	04G-4169	04K-4169	04L-4169	04M-4169
C18 300 Å	04G-4057	04K-4057	—	04M-4057



Effectively desalt acidic, basic, and neutral peptides with Strata®-X. See p. 61 for more information.



For SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315



For Column Heater (25-90 °C), see p. 390

*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJO-4282](#) **PREP SecurityGuard™ Cartridges require holder, Part No.: [AJ0-8223](#)
 †SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJ0-9281](#) ††PREP SecurityGuard™ Cartridges require holder, Part No.: [AJ0-8277](#)



Performance Gains on Any LC System

- Obtain higher throughput without sacrificing resolution
- Easy method transfer across LC system platforms
- Reduce solvent consumption with faster analysis
- Reach lower levels of detection and quantitation



Complete scalable solution from UHPLC to HPLC to PREP LC

	UHPLC	HPLC	PREP	
	██████████			Incredible UHPLC efficiency and performance gains
	██████████			20% higher efficiency than fully porous 1.7 µm columns
	██████████	██████████		Achieve sub-2 µm performance on HPLC and UHPLC systems
		██████████		Instantly improve your pharmacopoeia (Ph. Eur. & USP) monographs that require 3.5 µm particle size
		██████████	██████████	3 µm or better efficiencies at 5 µm pressures for HPLC and PREP LC methods

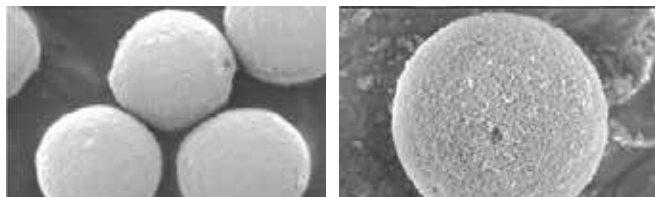


For more information on Kinetex PREP LC applications, see p. 359

Innovation in Particle Technology

Using sol-gel processing techniques that incorporate nano-structuring technology, a durable, homogenous porous shell is grown on a solid silica core. This highly optimized process combined with industry leading packing technology produces highly reproducible columns that generate extremely high plate counts.

SEM of Kinetex Core-Shell Particles



Cross Section of Kinetex Core-Shell Particle



Optimized for Ultra-High Performance

High Efficiency, High Density Particle

Kinetex particles are built with a solid high density core that promotes the particles to settle into an optimal bed structure. This reduces the band broadening effects of Eddy Diffusion since the interstitial space between the particles is virtually homogeneous and results in ultra-high column efficiency and excellent reproducibility.

High Efficiency over Extended Range of Flow Rates

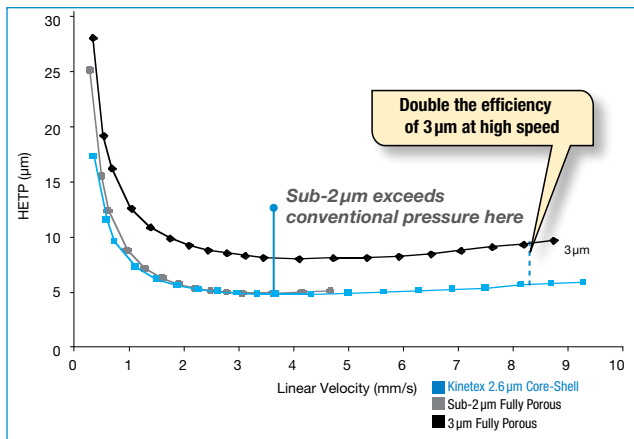


Illustration of Eddy Diffusion Effects

Kinetex Core-Shell

Fully Porous

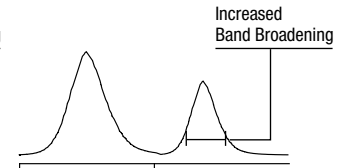
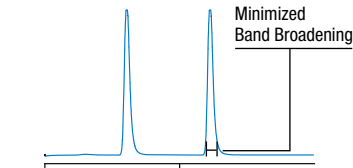
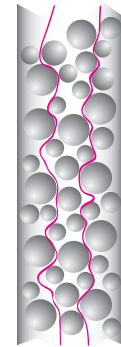
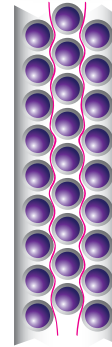
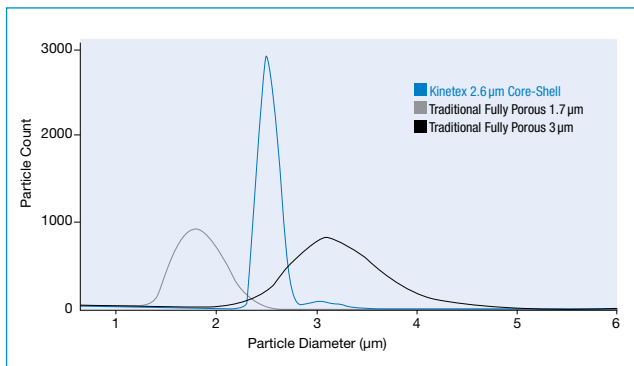


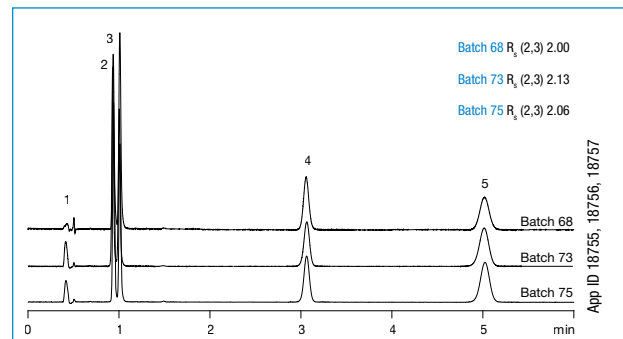
Illustration - not actual test data.

Kinetex particles are nearly monodispersed. This extremely narrow particle size distribution results in increased column efficiency and excellent reproducibility.

Uniform Particle Size Distribution



Batch-to-Batch Reproducibility Overlay

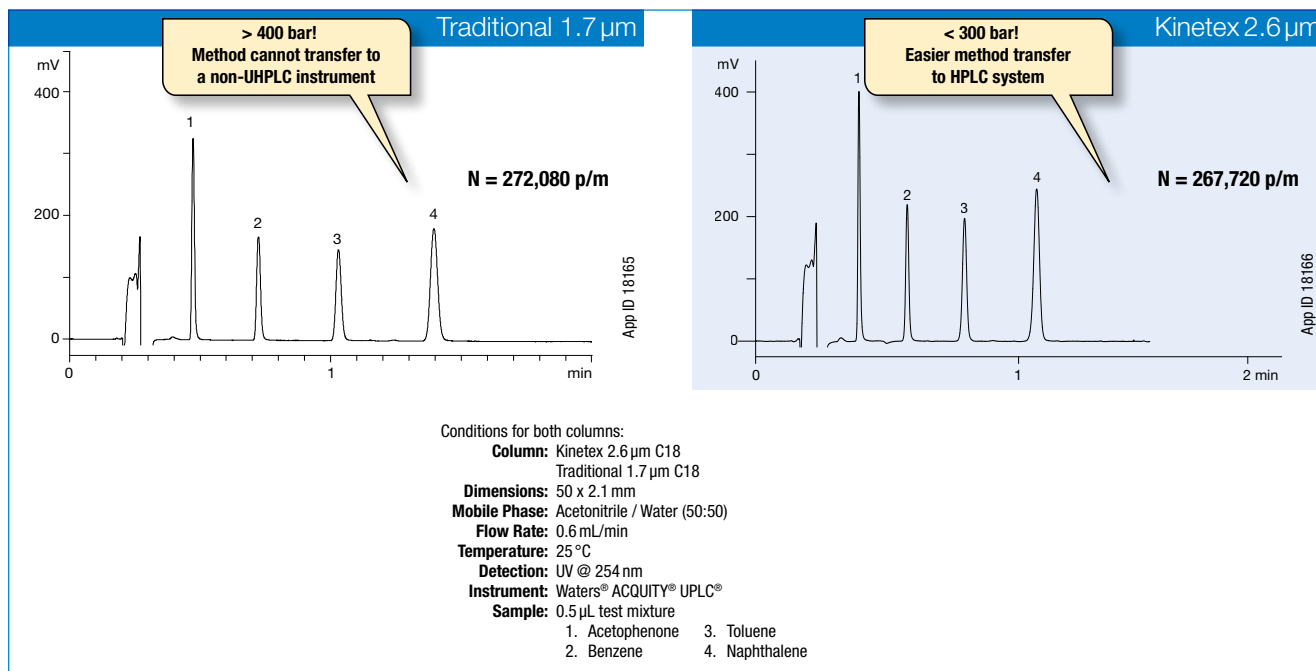


Conditions same for all batches:

- Column:** Kinetex 2.6 µm C18
- Dimensions:** 50 x 4.6 mm
- Part No.:** 00B-4462-E0
- Mobile Phase:** Water / Acetonitrile (65:35)
- Flow Rate:** 1.0 mL/min
- Detection:** UV @ 254 nm
- Sample:**
 1. Uracil
 2. Hydroxycortisone
 3. Cortisone
 4. Cortisone acetate
 5. 17-Hydroxyprogesterone

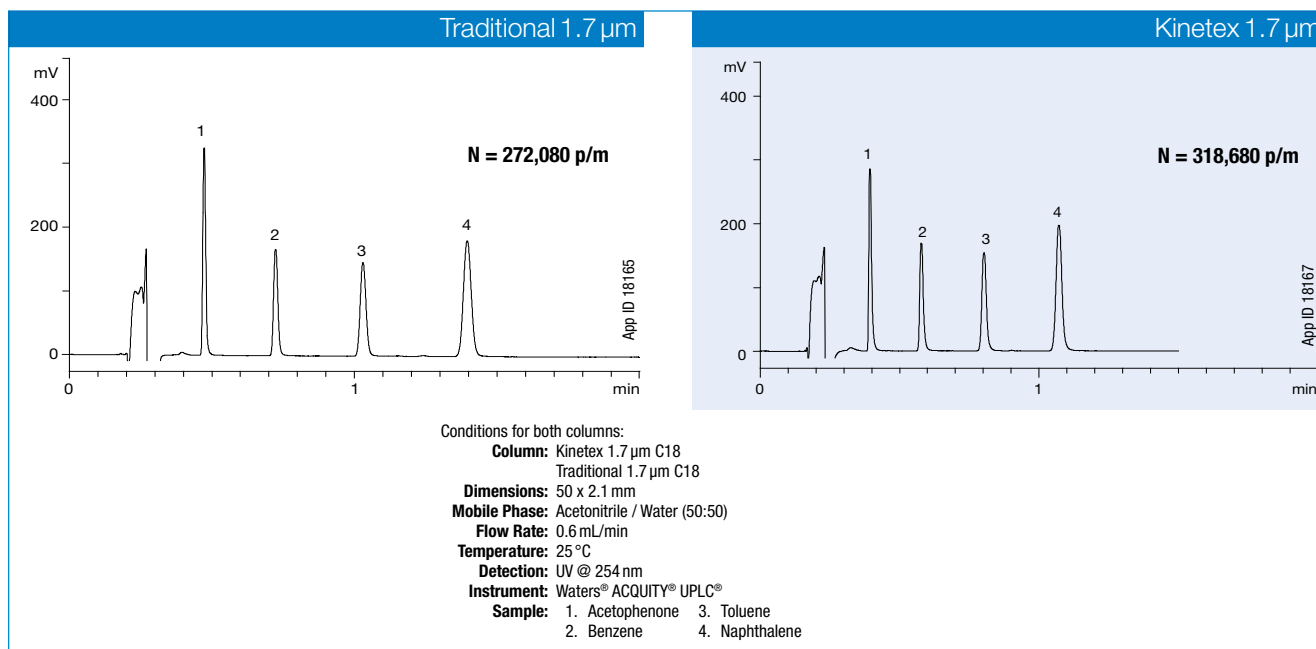
Achieve Sub-2 μ m Performance within HPLC Backpressure Limitations

With the efficiency of a sub-2 μ m column and typical operating backpressure less than 400 bar[†], you can achieve the promise of ultra-high performance on **any LC system**.



Unparalleled Levels of Ultra-High Performance

For users of higher pressure capable instruments who want increased levels of efficiency, we offer the Kinetex 1.7 μ m column—the first sub-2 μ m core-shell particle to be available on the market.

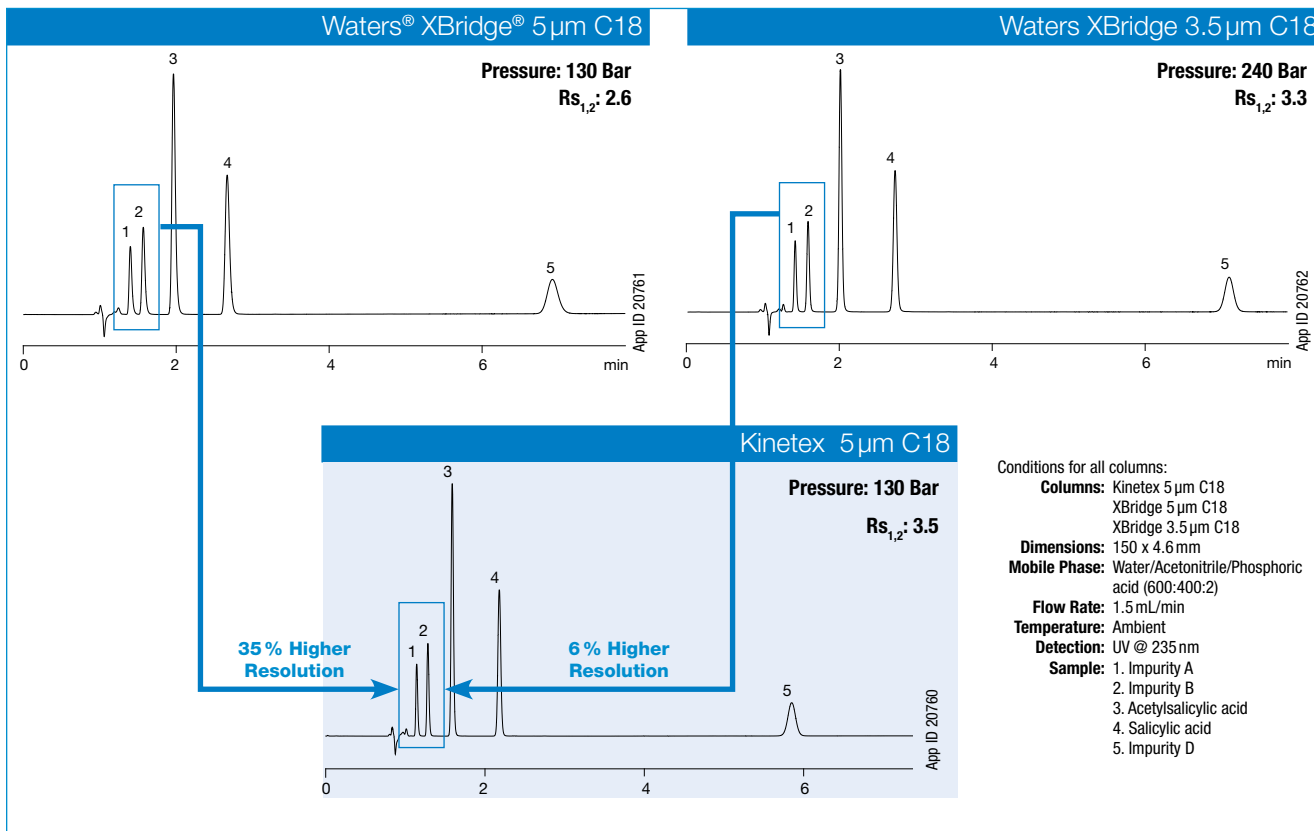


[†] Kinetex 2.6 μ m columns, 2.1 mm ID, are pressure rated to 1000 bar use on both HPLC and UHPLC instrumentation.

Comparative separations may not be representative of all applications.

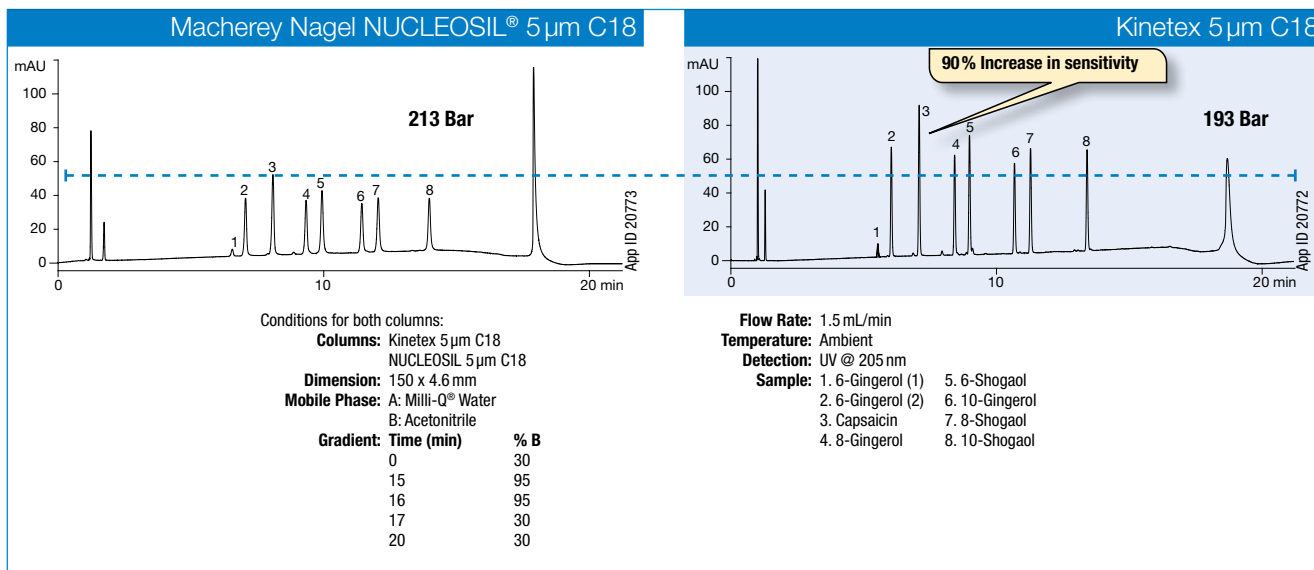
Higher Resolution with No Pressure Increase

Replace traditional 3 and 5 μm columns with Kinetex 5 μm core-shell columns for immediate improvements in resolution, productivity, and sensitivity.



Enhanced Sensitivity at 5 μm Pressure

Kinetex 5 μm core-shell columns easily provide enhanced sensitivity on any HPLC system without an increase in backpressure.



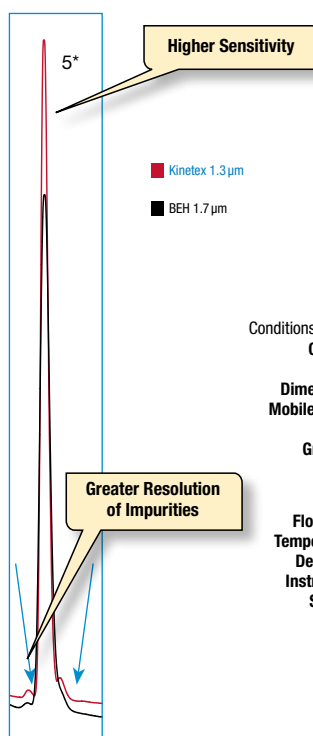
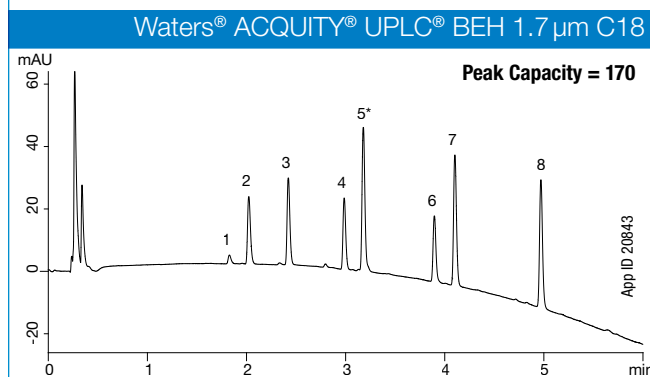
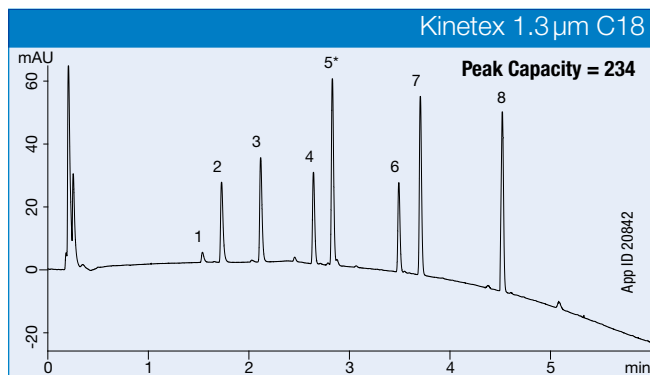
Comparative separations may not be representative of all applications.

Get the Most Performance Out of Your UHPLC System

Kinetex 1.3 μm , 1.7 μm , and 2.6 μm core-shell particles were engineered to provide incredible efficiency gains and improved performance compared to traditional fully porous sub-2 μm particles on UHPLC systems.

- Increase resolution, throughput, and sensitivity
- Save time and money
- 1.3 μm , 1.7 μm and 2.6 μm particles are directly scalable
- Available in C18, XB-C18, EVO C18, Polar C18, PS C18, C8, Biphenyl, HILIC, Phenyl-Hexyl, and F5 phases (1.3 μm available in C18)

1.3 μm and 1.7 μm Kinetex core-shell columns are scalable sub-2 μm core-shell particles, and produce up to 50 % and 20 % higher efficiencies respectively than sub-2 μm fully porous particles, taking UHPLC to the next level.



Conditions for both columns:

Column: Kinetex 1.3 μm C18
ACQUITY UPLC BEH 1.7 μm C18

Dimensions: 50 x 2.1 mm

Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Acetonitrile

Gradient:

Time (min)	% B
0	30
5	95

Flow Rate: 0.5 mL/min

Temperature: Ambient

Detection: UV @ 214 nm

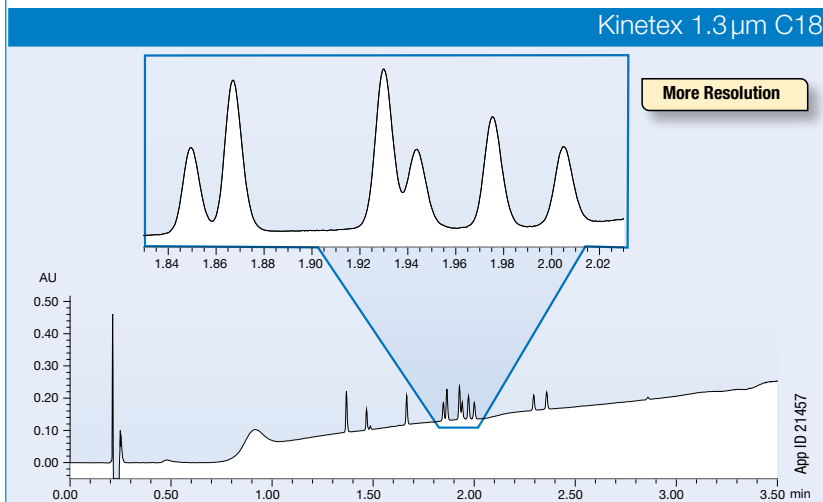
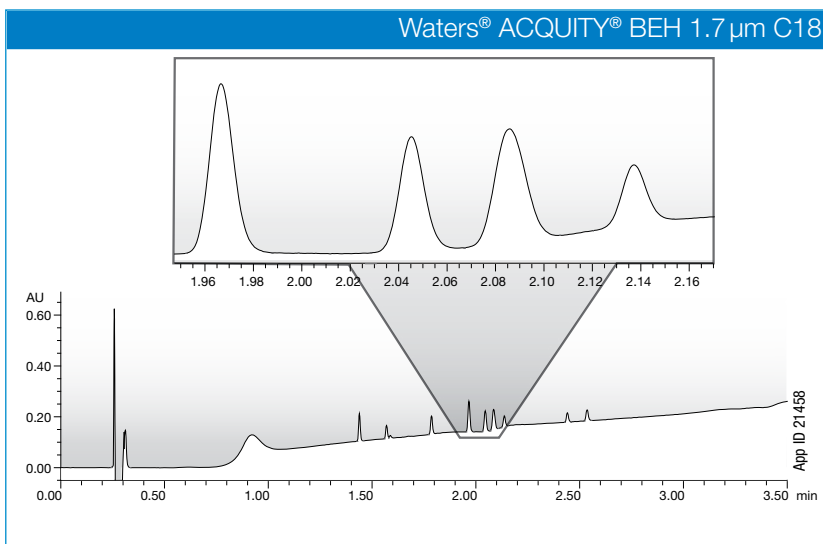
Instrument: Waters ACQUITY UPLC

Sample: 1. 6-Gingerol (1)
2. 6-Gingerol (2)
3. Capsaicin
4. 8-Gingerol
5. 6-Shogaol
6. 10-Gingerol
7. 8-Shogaol
8. 10-Shogaol

Comparative separations may not be representative of all applications.

Our New Standard for UHPLC

Bring your UHPLC analyses to the next level with the resolving power of Kinetex 1.3 μm Core-Shell Technology. It's time you were able to see MORE!



Conditions for all columns same except where noted:

Columns: Waters ACQUITY UPLC[®] BEH 1.7 μm C18
Kinetex 1.3 μm C18

Dimensions: 50 x 2.1 mm

Mobile Phase: A: 0.1% Formic acid in Water
B: 0.1% Formic acid in Acetonitrile

Gradient:	Time (min)	% B
	0	5
	3.0	95
	3.5	95
	3.6	5

Flow Rate: 0.5 mL/min

Temperature: Ambient

Detection: UV @ 254 nm

Instrument: Waters ACQUITY UPLC

Sample:

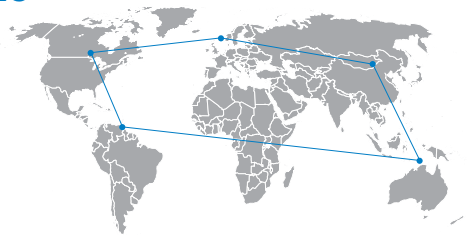
1. Estriol
2. Hydrocortisone
3. Corticosterone
4. Cortisone acetate
5. 17-beta-estradiol
6. 17-alpha-estradiol
7. 21-OH-progesterone
8. 17-alpha-ethynylestradiol
9. Estrone
10. Deoxycorticosterone acetate
11. Progesterone

Comparative separations may not be representative of all applications.

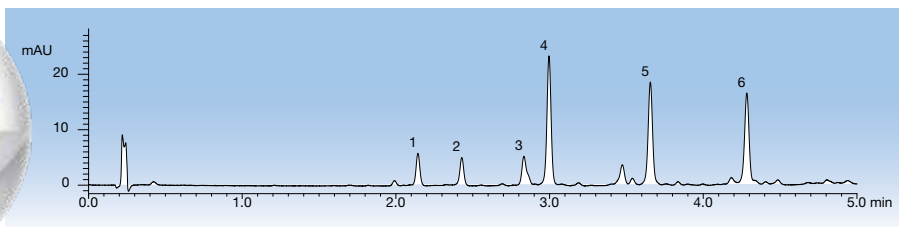
Kinetex[®] Core-Shell LC Columns

Analytical Scalability and Portability HPLC to UHPLC

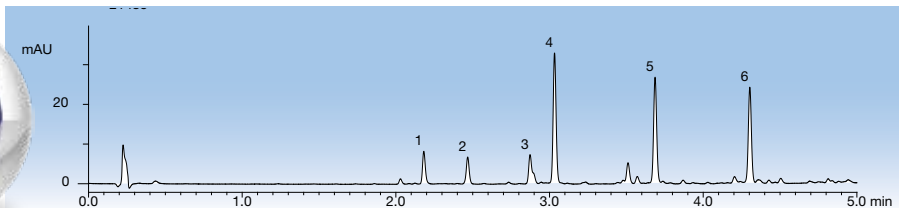
UHPLC methods developed with fully porous sub-2 μm columns often generate backpressure higher than HPLC system limitations. With Kinetex 5 μm , 2.6 μm , 1.7 μm , and 1.3 μm core-shell technology, you are no longer restricted from developing high performance LC methods and transferring them anywhere. These four scalable Kinetex particle sizes offer you the ability to develop and transfer your method effortlessly from system to system.



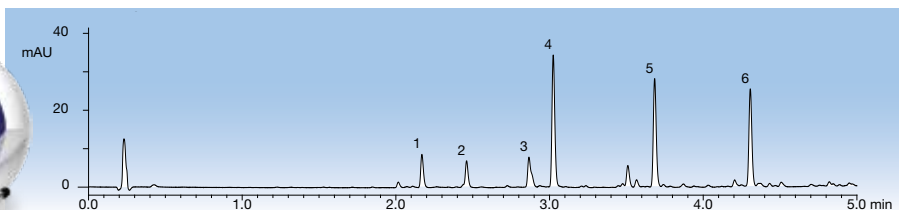
4 Kinetex particles give you full scalability HPLC \leftrightarrow UHPLC



Kinetex 5 μm : 3 μm or better efficiencies at 5 μm pressures for HPLC and PREP LC methods



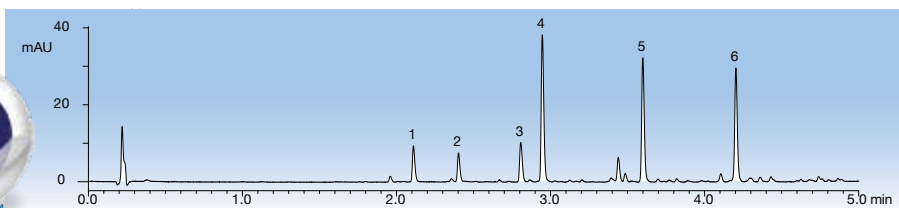
Kinetex 2.6 μm : Achieve sub-2 μm performance on HPLC and UHPLC systems



Kinetex 1.7 μm : 20% higher efficiency than fully porous 1.7 μm columns



for Kinetex 1.3 μm UHPLC columns



Kinetex 1.3 μm : Incredible UHPLC efficiency and performance gains

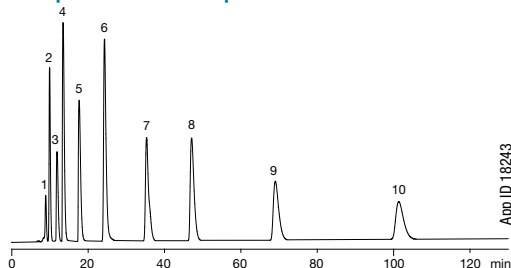
*Gingerols analyzed on 50x2.1 mm columns

Improve Performance, Save Solvent

When chromatographic column performance improves you can not only decrease your analysis time but also decrease your overall solvent consumption without compromising your separations. Use Kinetex core-shell technology to dramatically decrease the solvent consumption in your laboratory and increase sample throughput.

Column: Traditional 5 µm C18
Dimensions: 250 x 4.6 mm
Flow Rate: 1.0 mL/min

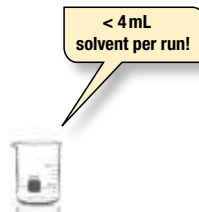
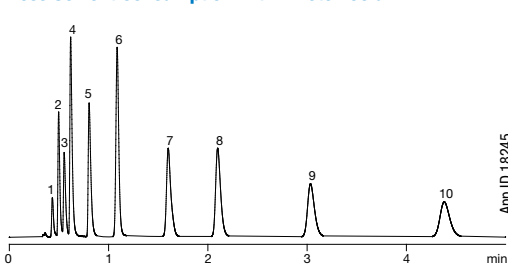
Example Method Consumption



110 mL solvent per run!

Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Flow Rate: 0.6 mL/min

Less Solvent Consumption with Kinetex Column



< 4 mL solvent per run!

Conditions for both columns:

Mobile Phase: A: 20 mM Potassium phosphate pH 7
 B: Methanol / Acetonitrile (50:50)
 A/B (48:52)

Temperature: 40 °C

Detection: UV @ 254 nm

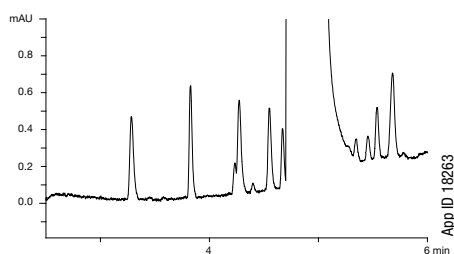
Sample:

- | | |
|---------------------|------------------|
| 1. Tianeptine | 6. Amoxapine |
| 2. Desmethyldoxepin | 7. Doxepin |
| 3. Protriptyline | 8. Nortriptyline |
| 4. Desipramine | 9. Amitriptyline |
| 5. Imipramine | 10. Clomipramine |

Reach Lower Levels of Detection and Quantitation

The combination of the small particle size, narrow particle size distribution, and the significantly shorter diffusion path results in much higher column efficiencies and increased chromatographic resolution. The increased efficiencies provide an immediate benefit on sensitivity since higher chromatographic efficiencies translate into significantly narrower and taller peaks, making it easier to detect low level impurities.

Agilent Technologies[®] ZORBAX[®] 3.5 µm SB-C18



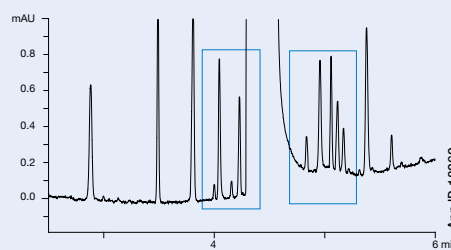
Conditions for both columns:

Dimensions: 150 x 4.6 mm
Mobile Phase: A: Water
 B: Acetonitrile
Gradient: (95:5) A/B for 1.16 min, then to (5:95) A/B
Flow Rate: 1.5 mL/min
Temperature: 45 °C
Detection: UV @ 254 nm
Instrument: Agilent 1200

Sample:

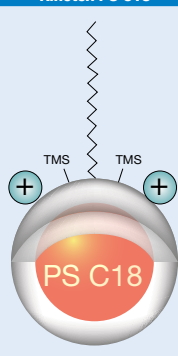
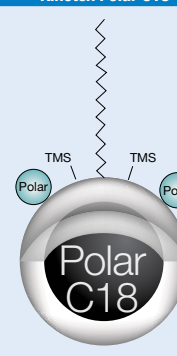
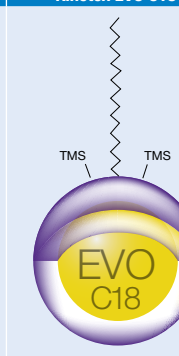
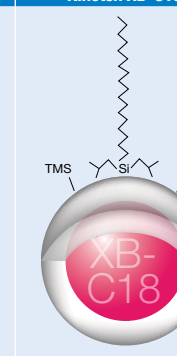
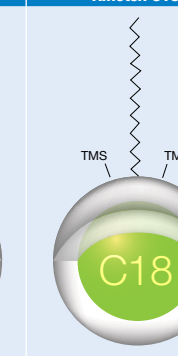
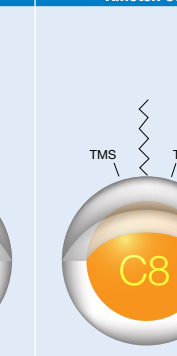
- | | |
|---------------------|-------------------------------------|
| 1. Pyridine | 9. Nortriptyline |
| 2. Acetaminophen | 10. 4-Chlorobenzoic acid |
| 3. Pindolol | 11. 5-Methyl-2-hydroxy benzaldehyde |
| 4. Quinine | 12. 4-Chlorocinnamic acid |
| 5. Acebutolol | 13. Diazepam |
| 6. Chlorpheniramine | 14. Diflunisal |
| 7. Triprolidine | 15. Niflumic acid |
| 8. Prednisolone | 16. Hexanophenone |

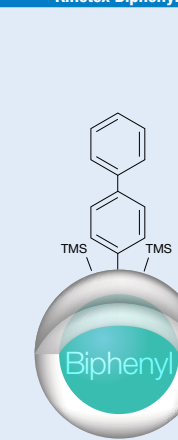
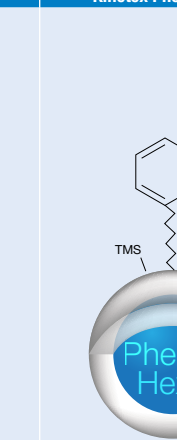

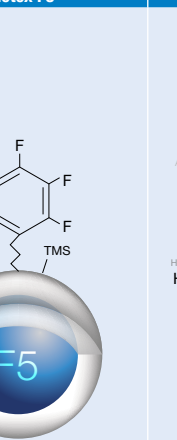
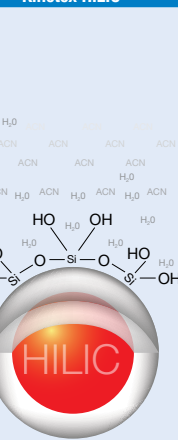
Kinetex 2.6 µm C18



Complementary and Orthogonal Selectivities

To provide alternative and orthogonal selectivity phases, Kinetex columns are available in 11 selectivities: Polar C18, PS C18, EVO C18, XB-C18, C18, C8, Biphenyl, Phenyl-Hexyl, F5, PAH, and HILIC (Hydrophilic Interaction Liquid Chromatography), for resolution of a wide range of compounds from polar to hydrophobic, aromatic, and isomers.

Kinetex PS C18	Kinetex Polar C18	Kinetex EVO C18	Kinetex XB-C18	Kinetex C18	Kinetex C8
					
A multi-modal, 100% aqueous C18 column with a positive surface modification that demonstrates unique selectivity and improved peak shape for basic compounds	Combined C18 and polar modified surface that provides polar and non-polar retention alongside 100% aqueous stability	Novel pH 1-12 stable C18 that delivers robust methods and improved peak shape for bases	This unique C18 phase yields increased hydrogen bonding with hydrophobic selectivity, resulting in improved peak shape for basic compounds and increased retention of acidic compounds	Balanced C18 phase that provides the highest degree of hydrophobic selectivity relative to the other Kinetex phases	Moderate hydrophobic and steric selectivity is offered, bringing ultra-high performance to USP L7 and other octyl silane methods
pH Range: 1.5 – 8.5* USP Classification: L1 Effective Carbon Load: 9%	pH Range: 1.5 – 8.5* USP Classification: L1 Effective Carbon Load: 9%	pH Range: 1 – 12 USP Classification: L1 Effective Carbon Load: 11%	pH Range: 1.5 – 8.5* USP Classification: L1 Effective Carbon Load: 10%	pH Range: 1.5 – 8.5* USP Classification: L1 Effective Carbon Load: 12%	pH Range: 1.5 – 8.5* USP Classification: L7 Effective Carbon Load: 8%

Kinetex Biphenyl	Kinetex Phenyl-Hexyl	Kinetex F5	Kinetex HILIC	Kinetex PAH
				
100% aqueous stable reversed phase chemistry with hydrophobic, aromatic, and enhanced polar selectivity	Aromatic and moderate hydrophobic selectivity results in the great retention and separation of aromatic hydrocarbons	Highly reproducible pentafluorophenylpropyl phase, exceptional for halogenated, conjugated, isomeric, or highly polar compounds	Used under HILIC running conditions, this phase provides the highest polar selectivity for retention and separation of hydrophilic compounds	Polymerically bonded C18 phase specifically developed for the separation of EU and EPA priority PAHs
pH Range: 1.5 – 8.5* USP Classification: L11 Effective Carbon Load: 11%	pH Range: 1.5 – 8.5* USP Classification: L11 Effective Carbon Load: 11%	pH Range: 1.5 – 8.5 USP Classification: L43 Effective Carbon Load: 9%	pH Range: 2.0 – 7.5 USP Classification: L3 Carbon Load: –	pH Range: 1.5 – 8.5* USP Classification: L118 Carbon Load: 12%

*Columns are pH stable from 1.5-10 under isocratic conditions. Columns are pH stable 1.5-8.5 under gradient conditions.

Selecting The Right Chemistry

Use the charts below to determine the best Kinetex core-shell chemistry for your work.

Recommended Selectivities By Compound Classes:

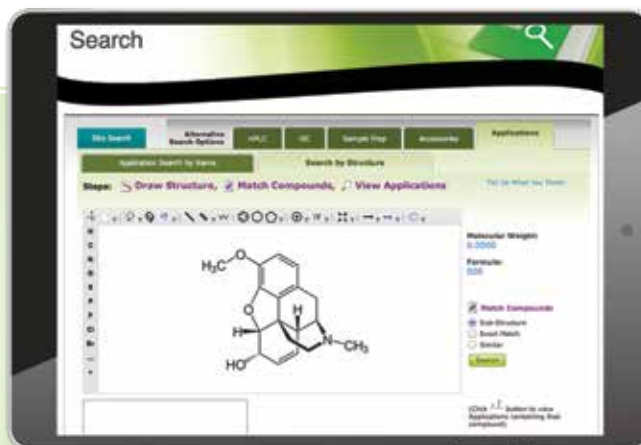
Acids	Bases	Neutrals	Aromatics	Acids, Bases, and Neutrals	Highly Polar Compounds	High pH	Isomers
Polar C18	PS C18	C18/C8	Biphenyl	EVO C18	Polar C18	EVO C18	F5
F5	XB-C18	Biphenyl	Phenyl-Hexyl	Polar C18	F5		
HILIC			F5	PS C18	Biphenyl		
				XB-C18	HILIC		

Column Characteristics

Kinetex Phases	Shipping Solvent [†]	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load (%)	pH Stability	Reversed Phase	Normal Phase	HILIC	100% Aqueous Stable
Polar C18	Acetonitrile/Water (50:50)	2.6	100	200	9	1.5-8.5*	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
PS C18	Acetonitrile/Water (50:50)	2.6	100	200	9	1.5-8.5*	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
C18	Acetonitrile/Water (50:50)	1.3, 1.7, 2.6, 5	100	200	12	1.5-8.5*	<input checked="" type="checkbox"/>			
EVO C18	Acetonitrile/Water (45:55)	1.7, 2.6, 5	100	200	11	1-12	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
XB-C18	Acetonitrile/Water (50:50)	1.7, 2.6, 3.5, 5	100	200	10	1.5-8.5*	<input checked="" type="checkbox"/>			
C8	Acetonitrile/Water (45:55)	1.7, 2.6, 5	100	200	8	1.5-8.5*	<input checked="" type="checkbox"/>			
Biphenyl	Acetonitrile/Water w/ 0.1 % Formic Acid (50:50)	1.7, 2.6, 5	100	200	11	1.5-8.5*	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
Phenyl-Hexyl	Acetonitrile/Water (45:55)	1.7, 2.6, 5	100	200	11	1.5-8.5*	<input checked="" type="checkbox"/>			
F5	Acetonitrile/Water (40:60)	1.7, 2.6, 5	100	200	9	1.5-8.5*	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
HILIC	Acetonitrile / 100 mM Ammonium Formate (93:7)	1.7, 2.6, 5	100	200	0	2.0-7.5		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
PAH	Acetonitrile/Water (65:35)	3.5	—	—	12	1.5-8.5*	<input checked="" type="checkbox"/>			

[†] Shipping conditions may vary slightly in terms of organic to aqueous ratio, depending on column dimensions.
* pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

Draw it. Find it.
Application search by compound structure!

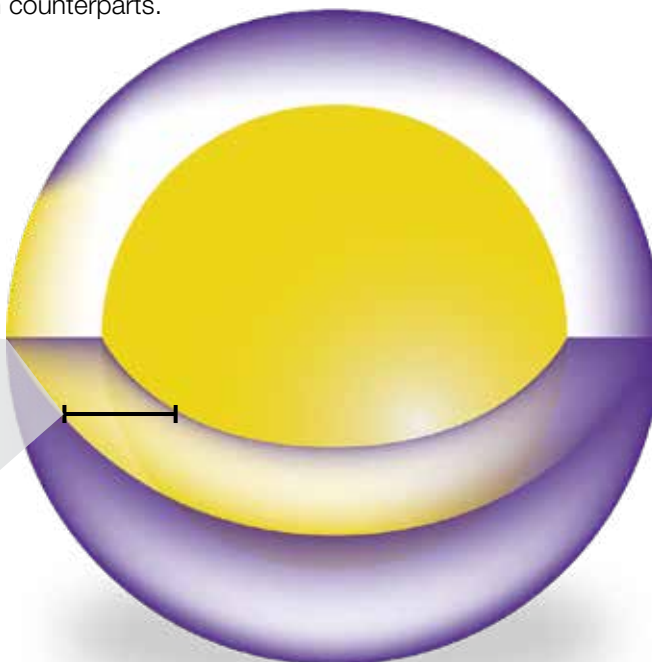
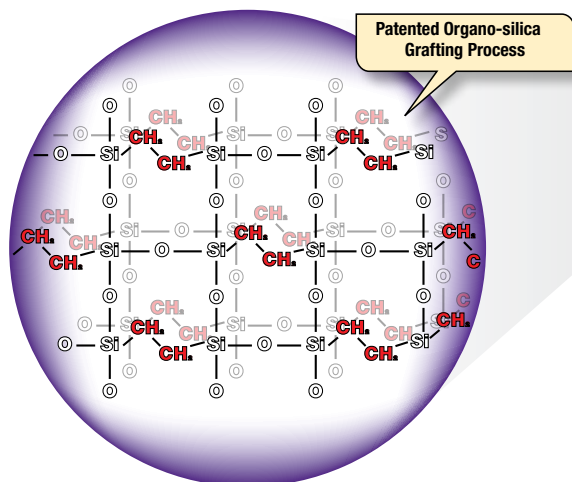


Kinetex[®] Core-Shell LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Kinetex EVO C18

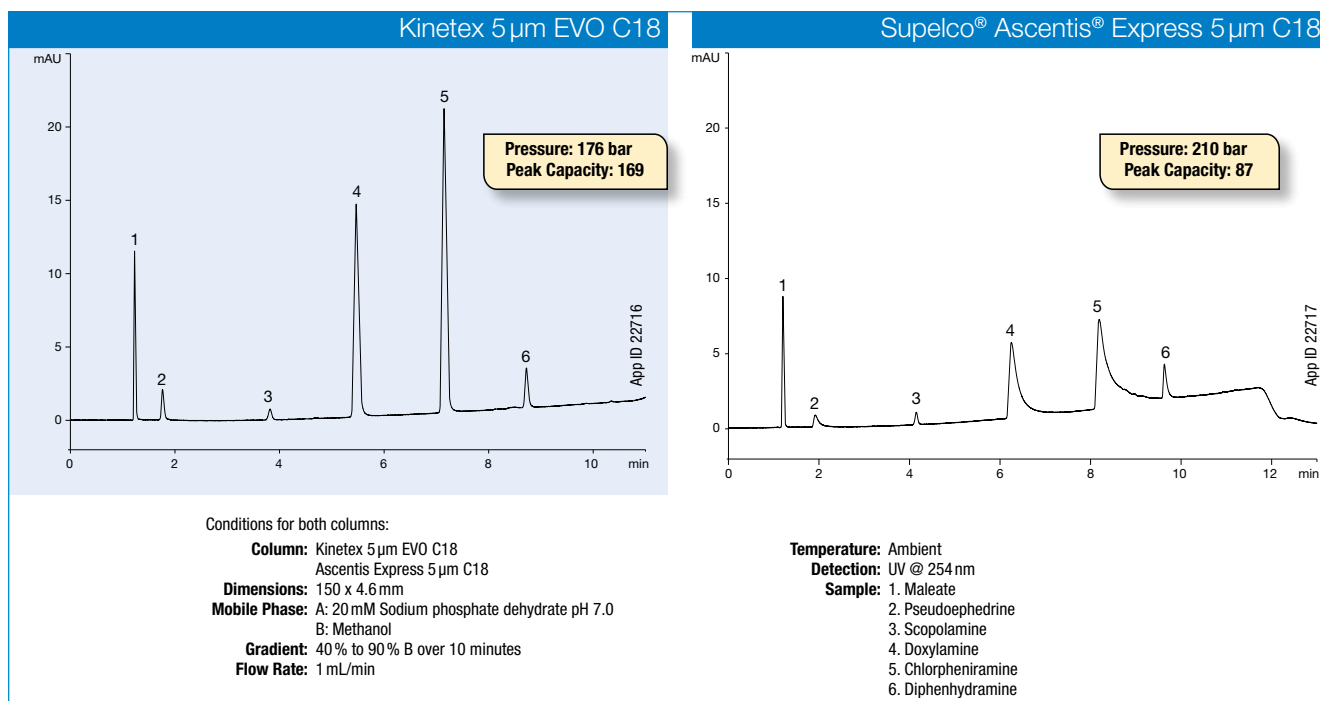
- Develop robust methods from pH 1-12
- Get improved peak shape for bases
- Easily reduce run times and increase sensitivity



Kinetex EVO C18 uses a patented organo-silica grafting process which incorporates uniform stabilizing ethane cross-linking to provide resistance to high pH attack while maintaining mechanical strength of the core-shell particle.

Improved Peak Shape for Bases Under Alkaline Conditions

The unique organo-silica layer of ethane cross-linking found within each Kinetex EVO C18 particle creates a highly inert surface which provides the additional benefit of better peak shape for bases.



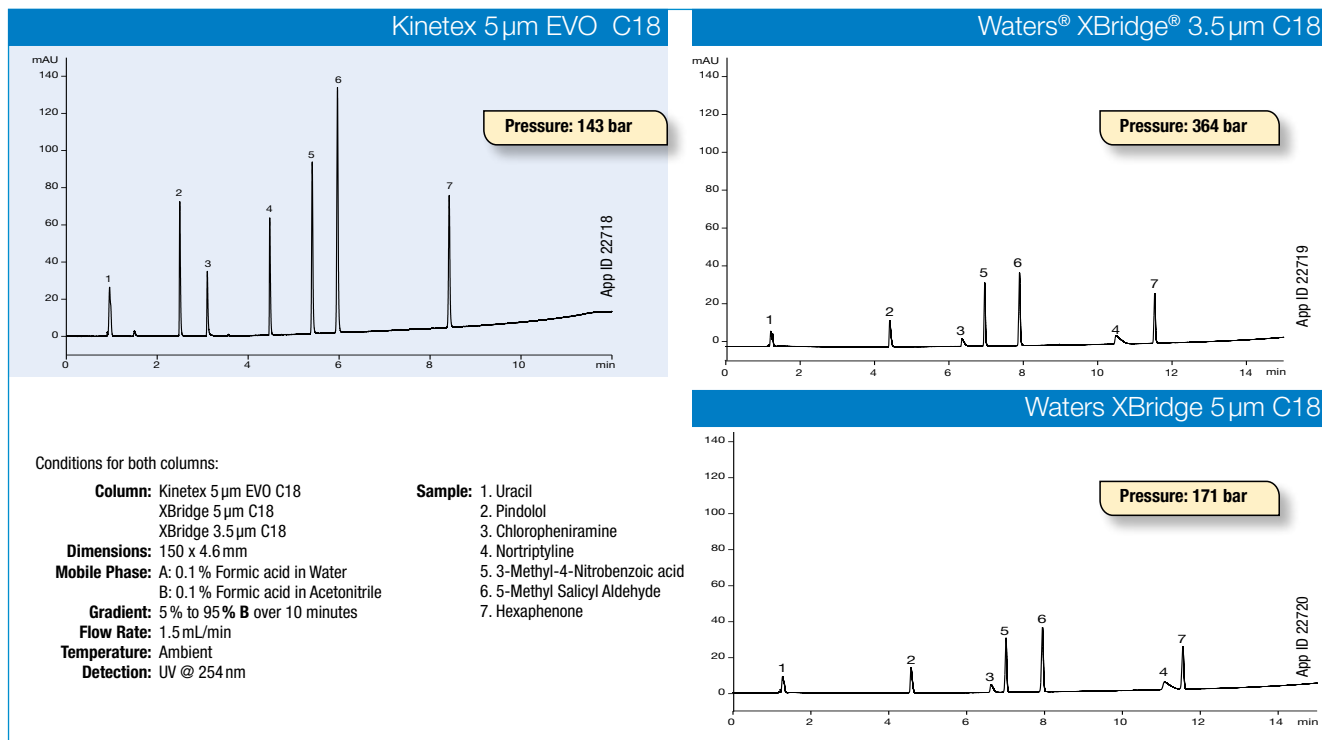
Comparative separations may not be representative of all applications.

Kinetex[®] Core-Shell LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Drop in a Kinetex EVO 5µm Column to Start Smiling

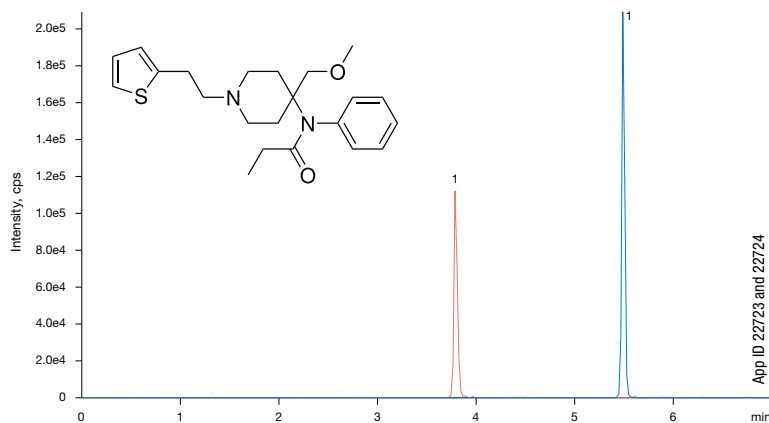
With the combination of rugged pH stability from 1-12 and the core-shell performance advantage, you can easily replace old hybrid silica columns and gain immediate method improvements without increasing backpressure.



Comparative separations may not be representative of all applications.

Increased Sensitivity for LC-MS Applications

Alongside LC-UV analyses, the high performance and low pressure of the Kinetex EVO 5µm make it a tremendous tool for LC-MS and LC-MS/MS. Increased polar basic retention provided by the Kinetex EVO allows for greater use of organic within the mobile phase, subsequently leading to improved ionization and increased sensitivity.



Column: Kinetex 5µm EVO C18
Dimensions: 50 x 2.1 mm
Part No.: [00B-4633-AN](#)
Mobile Phase: A: 0.1% Formic acid in Water
 B: 0.1% Formic acid in Methanol
Mobile Phase: A: 10 mM Ammonium Bicarbonate (pH 8.2)
 B: Methanol

Gradient: Time (min)	% B
0	10
0.5	10
2	25
4.5	80
4.51	85
5.5	85
5.51	10
7	10

Flow Rate: 0.5 mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX[®]API 4000[™])
Sample: 1. Sufentanil

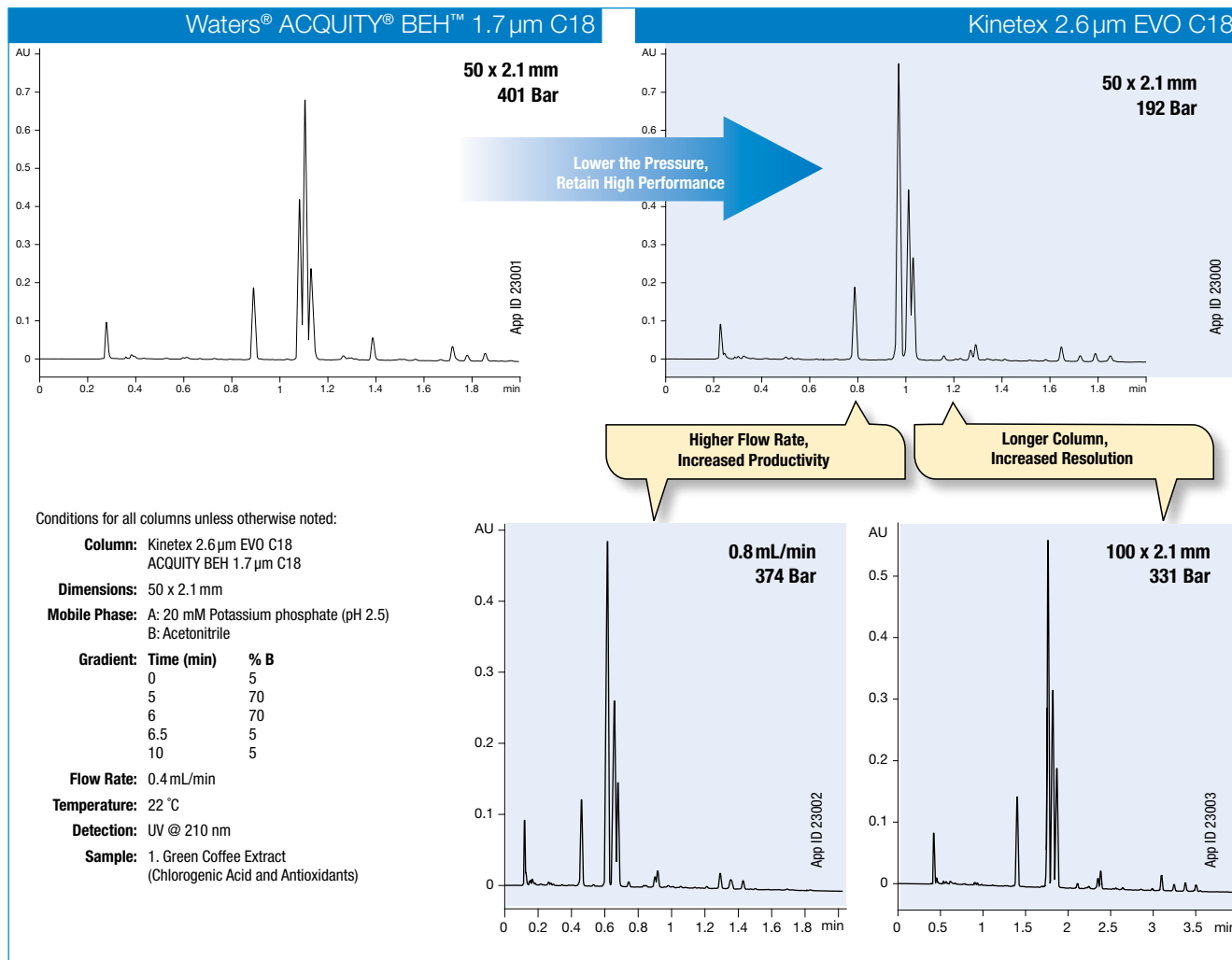
Kinetex[®] Core-Shell LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

A Simple Upgrade for Potential Greater Performance!

For scientists who are interested in high performance and fast run times, 2.6 μ m Kinetex EVO C18 columns are an amazing UHPLC solution. Start by matching a Kinetex 2.6 μ m column to the sub-2 μ m column you're currently using. With lower backpressure

and similar or better performance, you'll then have three options: keep the lower pressure for less system strain, increase the flow for higher productivity, or utilize a longer column length to increase potential resolving power.



Comparative separations may not be representative of all applications.

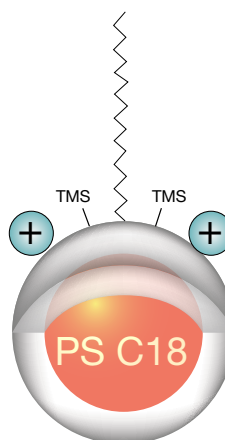
Kinetex PS C18

- Enhanced polar retention
- Improved peak shape for bases
- Multi-modal interaction selectivity

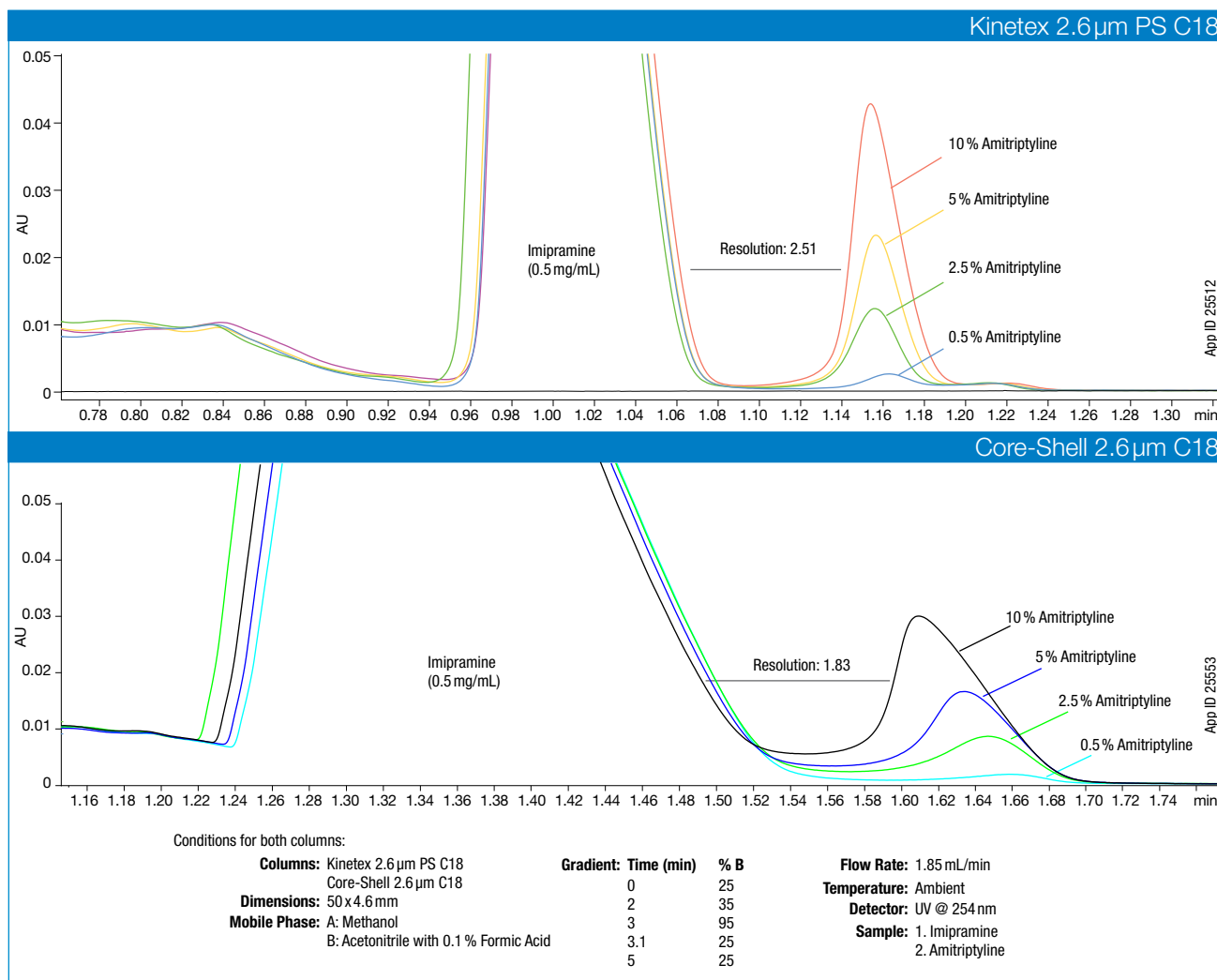
A Versatile C18

A multi-modal, 100 % aqueous C18 column with a positive surface modification that demonstrates unique selectivity and improved peak shape for basic compounds.

Kinetex PS C18



Enhanced Peak Shape for Basic Compounds



Comparative separations may not be representative of all applications.

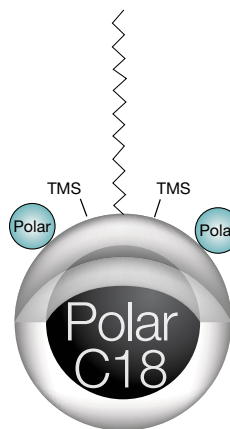
Kinetex Polar C18

- 100% aqueous stable
- Enhanced selectivity for polar analytes
- Orthogonal selectivity to traditional C18 phases

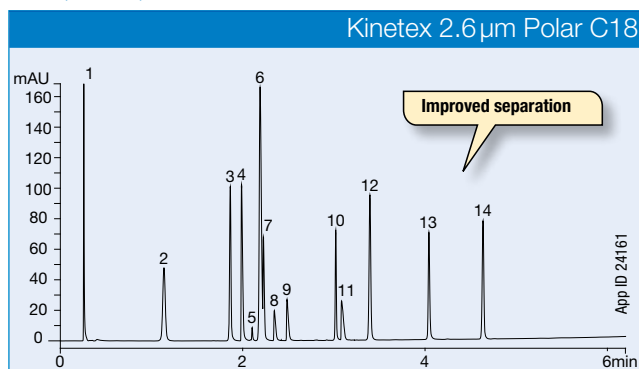
A Versatile C18

Who said all C18's are the same? By combining C18 ligands with a polar-modified surface, you can now achieve greater retention of polar and nonpolar compounds while ensuring 100% aqueous stability.

Kinetex Polar C18



Acids, Bases, and Neutrals



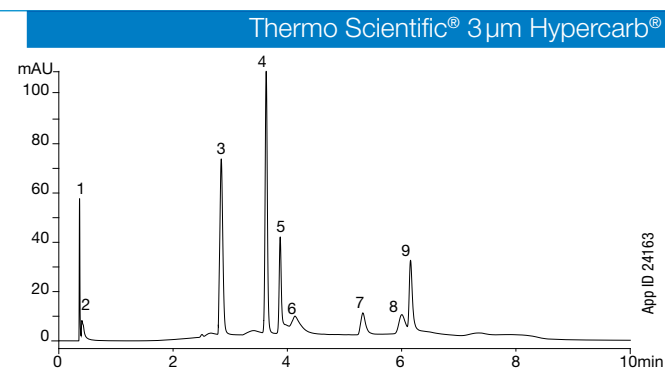
Conditions for both columns:

Columns: Kinetex 2.6 μm Polar C18
Thermo Scientific 3 μm Hypercarb

Dimensions: 50 x 4.6 mm

Mobile Phase: A: 0.1% Formic acid in Water
B: 0.1% Formic acid in Acetonitrile

Gradient:	Time (min)	% B
	0	5
	0.5	5
	5.5	95
	7.51	5
	10	5



Flow Rate: 1.85 mL/min

Temperature: Ambient

Detection: UV @ 254 nm

Sample:	1. Pyridine	8. Chlorpheniramine
	2. Acetaminophen	9. Triprolidine
	3. Sulfathiazole	10. Prednisolone
	4. Quinidine	11. Nortriptyline
	5. Quinidine Impurity	12. 5-Methyl Salicyl Aldehyde
	6. Phenol	13. Diflunisal
	7. Acebutolol	14. Hexanophenone

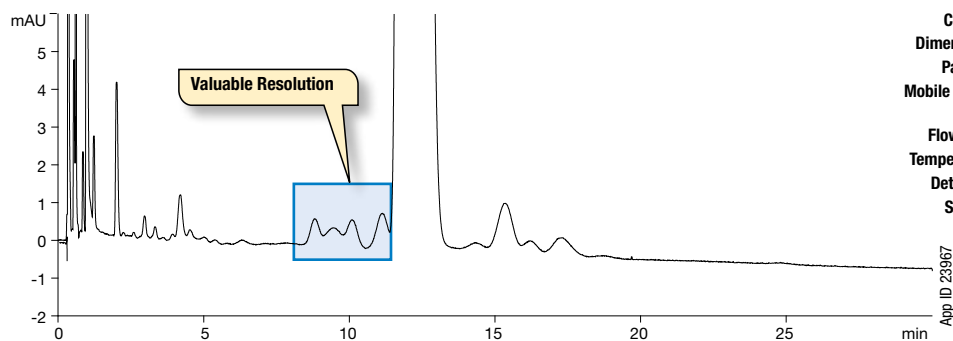
Comparative separations may not be representative of all applications.

Enhanced Polar Selectivity

The Kinetex Polar C18 contains a C18 ligand alongside a polar modified surface that increases polar compound retention and improves resolution values. Additionally, the advanced proprietary bonding technology used with this phase ensures 100% aqueous stability as well as balanced retention on non-polar compounds.

This is an excellent all purpose phase for use with multi-compound mixes that contain polar and nonpolar compounds, or even single class methods that have closely related compounds, impurities, or metabolites.

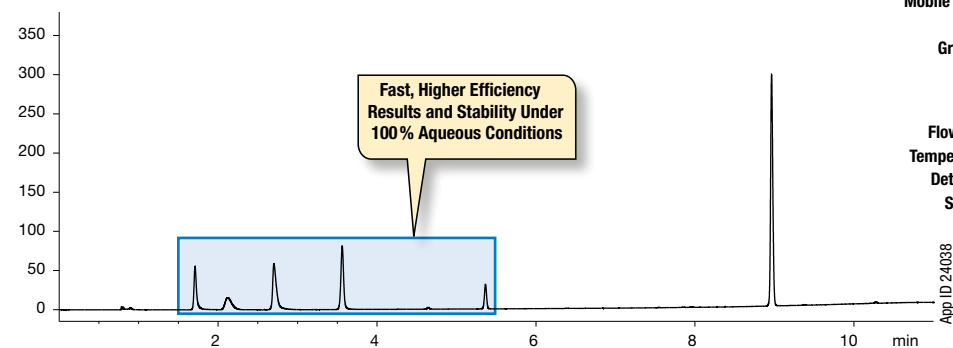
UHPLC Analysis of Cyclosporine and Impurities



Column: Kinetex 2.6 μm Polar C18
Dimensions: 50 x 2.1 mm
Part No.: [00B-4759-AN](#)
Mobile Phase: Acetonitrile/Tert-butyl methyl ether/
Water/Phosphoric acid (430:50:520:1)
Flow Rate: 0.30 mL/min
Temperature: 80 °C
Detection: UV @ 210 nm
Sample: Cyclosporine

App ID 23967

Water Soluble Vitamins



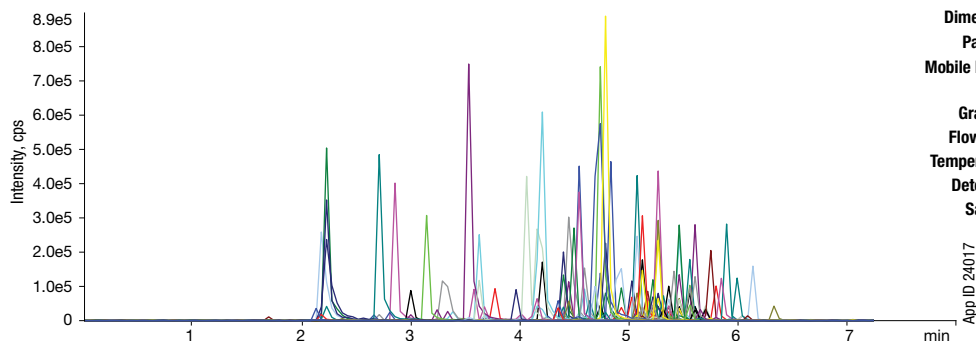
Column: Kinetex 2.6 μm Polar C18
Dimensions: 100 x 4.6 mm
Part No.: [00D-4759-E0](#)
Mobile Phase: A: 20 mM Potassium Phosphate
B: Methanol

Gradient	Time (min)	% B
	0	0
	1	0
	10	60

Flow Rate: 1.2 mL/min
Temperature: Ambient
Detection: UV @ 210 nm
Sample: 1. Thiamine
2. Nicotinamide
3. Pyridoxal
4. Pyridoxine
5. Pantothenic Acid
6. Riboflavin

App ID 24038

Multi-Class 206 Pesticide Panel Screen



Column: Kinetex 2.6 μm Polar C18
Dimension: 50 x 4.6 mm
Part No.: [00B-4759-E0](#)
Mobile Phase: A: Water
B: 0.1 % Formic acid in Methanol
Gradient: 5-100% B in 5 min, hold 1 min
Flow Rate: 0.7 mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX[®]API 4000[™])
Sample: 206 Pesticides.

App ID 24017

Kinetex Biphenyl

- Remarkable separation power
- Rugged and reliable
- 100% aqueous stable

Selectivity That a C18 Just Can't Give You!

Think high performance, enhanced retention, and the ability to go where a traditional C18 can't. The Kinetex Biphenyl offers the high performance benefits of a core-shell particle with a unique stationary phase capable of becoming the go-to selectivity for reversed phase method development. Use Kinetex Biphenyl columns to get enhanced retention, higher sensitivity, and overall better results; especially for aromatic compounds.

Aromatic Pi-Pi Interactions

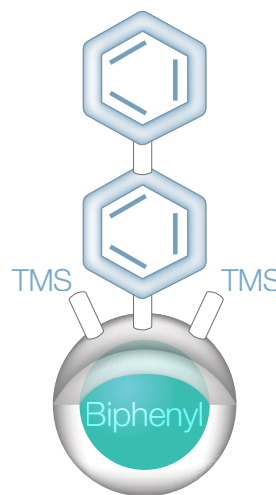
Between aromatic rings and pi electrons of target molecule and the double aromatic rings of the Biphenyl ligand

Hydrophobic Interactions

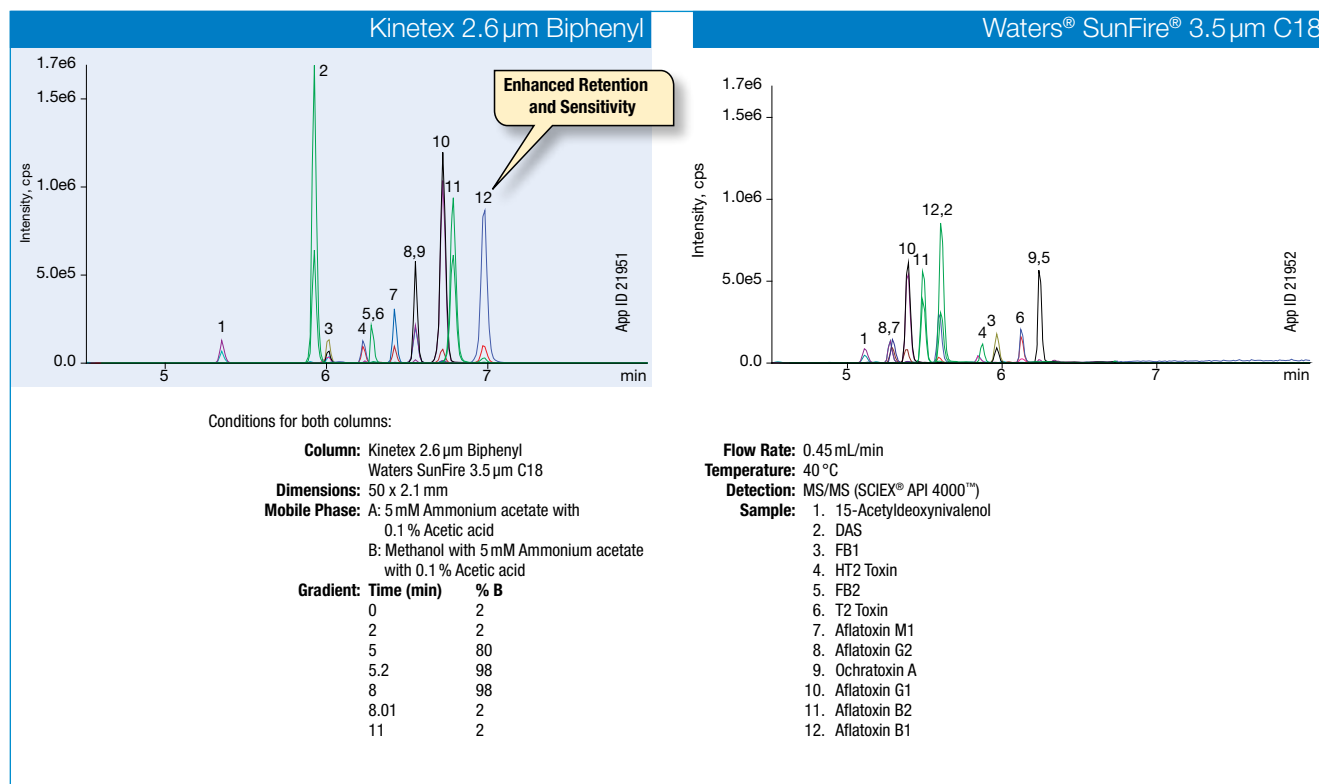
Between carbon skeleton of Biphenyl ligand and target analytes

Weak Ionic or Dipole-Dipole Interactions

High electron density created by dual ring structure behaves similar to a weak cation exchanger, giving enhanced retention for basic analytes



Mycotoxins

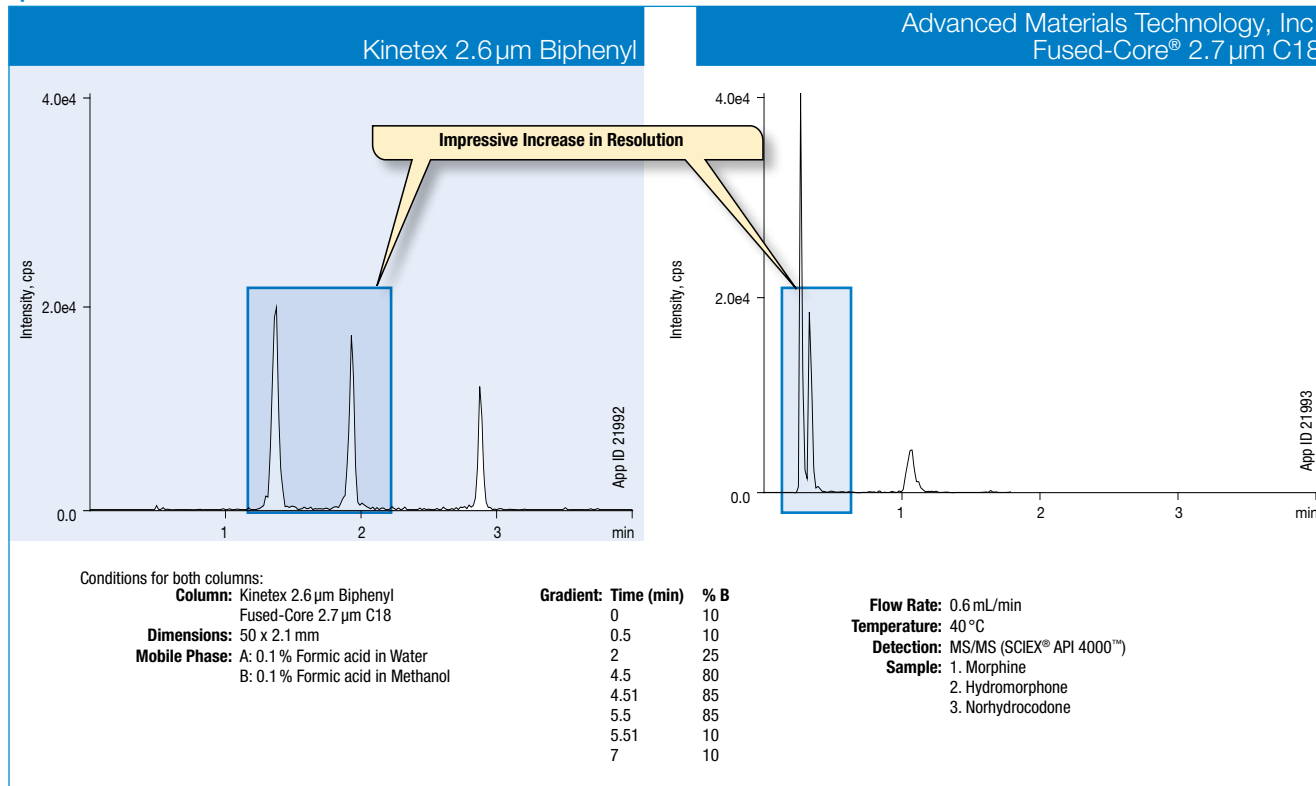


Comparative separations may not be representative of all applications.

Enhanced Separation Power

Kinetex Biphenyl is a high efficiency core-shell product capable of adding extra separation power to your analysis of non-polar and polar compounds.

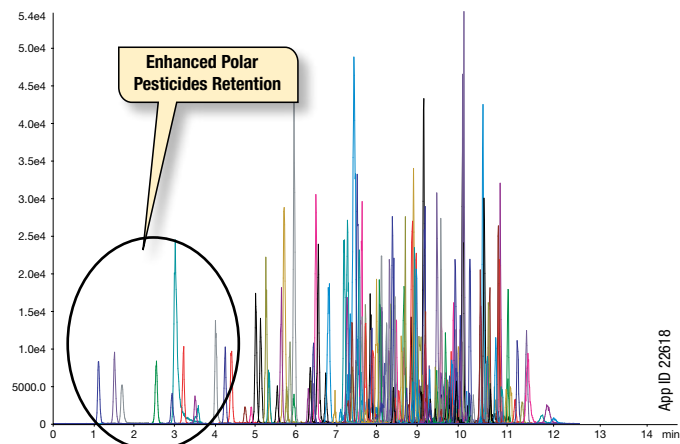
Opiate Isomers



Comparative separations may not be representative of all applications.

Excel With Your Multi-Compound, Multi-Class Screening

Increase the separation and analytical power of your HPLC/UHPLC compound screens with the multi-functional Kinetex Biphenyl stationary phase.



Column: Kinetex 5 μm Biphenyl
Dimensions: 100 x 2.1 mm
Part No.: [00D-4627-AN](#)
Mobile Phase: A: 5 mM Ammonium formate in Water
 B: 5 mM Ammonium formate in Methanol

Gradient:	Time (min)	% B
	0.01	10
	1	10
	10	90
	15	90
	15.1	10
	20	10

Flow Rate: 0.5 mL/min
Temperature: 35 °C
Detection: Tandem Mass Spectrometer (MS/MS)
Detector: SCIEX[®] 4500 QTRAP[®]
Sample: 175+ Pesticide Mix

Kinetex F5

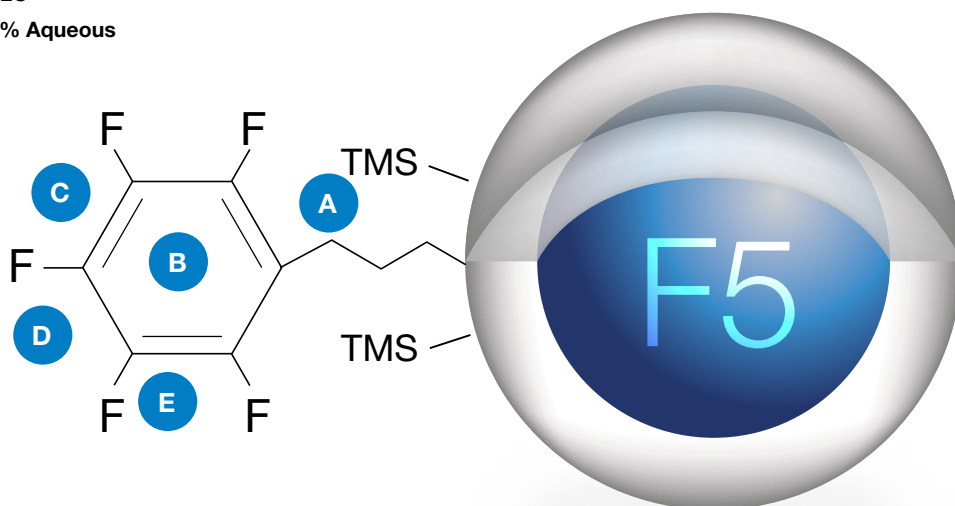
- Reduce method development time by days
- Greater reproducibility than other PFPs
- 5 glorious interaction mechanisms
- 5 valuable LC separation modes

How I Work

With the astonishing combination of core-shell performance and 5 interaction mechanisms, Kinetex F5 columns will effortlessly drive your orthogonal HPLC/UHPLC development!

Method Development Versatility— 5 Separation Modes

- Reversed Phase
- HILIC
- SFC
- 2D-LC
- 100% Aqueous



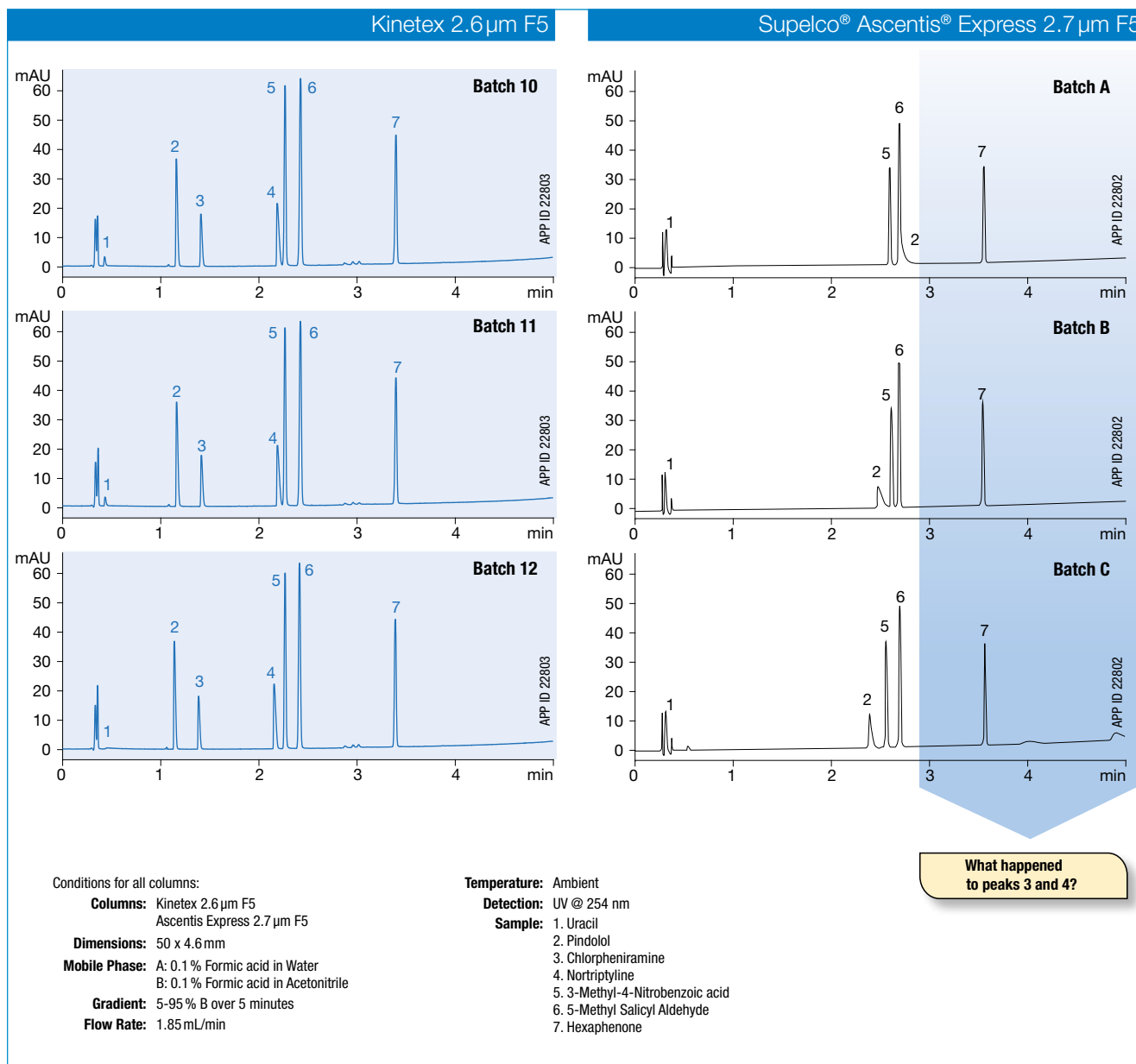
5 Interaction Mechanisms

- A Hydrophobic**
Carbon skeleton of linker and ring encourage neutral/hydrophobic retention
- B Aromatic**
In non-acetonitrile mobile phases, π - π electrons of the carbon ring interact with analyte π - π electrons and result in positive retention increase
- C Electrostatic**
High electronegativity of the fluorine groups create dipole moments, aiding in polar compound retention. Induced dipole moments can also aid neutral compound retention.
- D Steric/Planar**
Shape selectivity allows for isomeric separations that are otherwise impossible on traditional alkyl phases
- E Hydrogen Bonding**
Extremely effective retention mechanism caused as polar functional groups of analyte interact with the electron greedy fluorine

Dependability

Batch-to-Batch, Column-to-Column

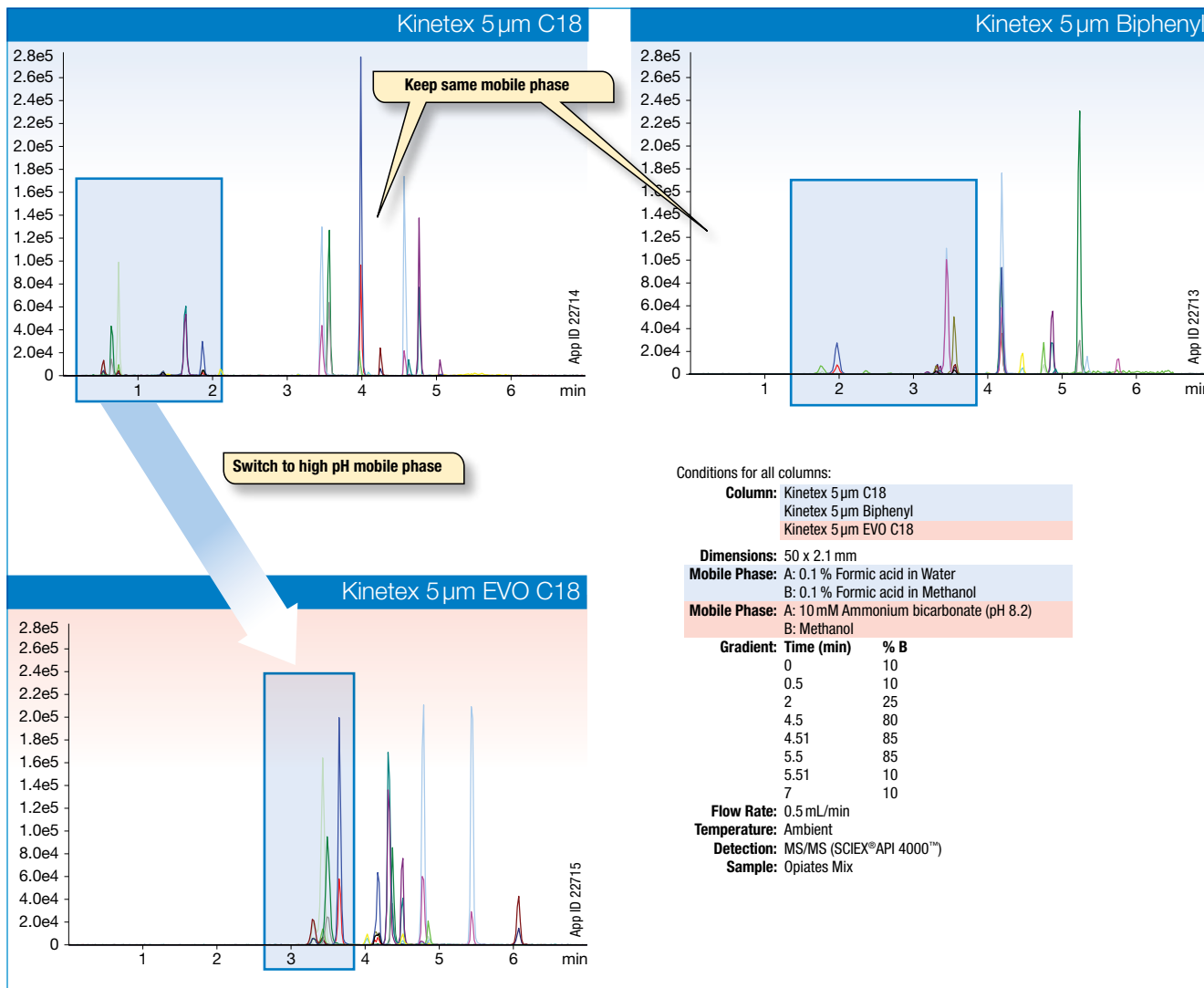
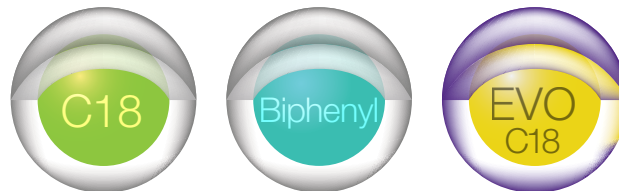
Conventional fully porous and core-shell PFP/F5 columns fail to reach the level of repeatability that you deserve. Inconsistencies in their base silica have led to data inaccuracies that waste your time and money. Kinetex F5 columns were specifically designed to avoid these past problems and provide a high degree of reproducibility.



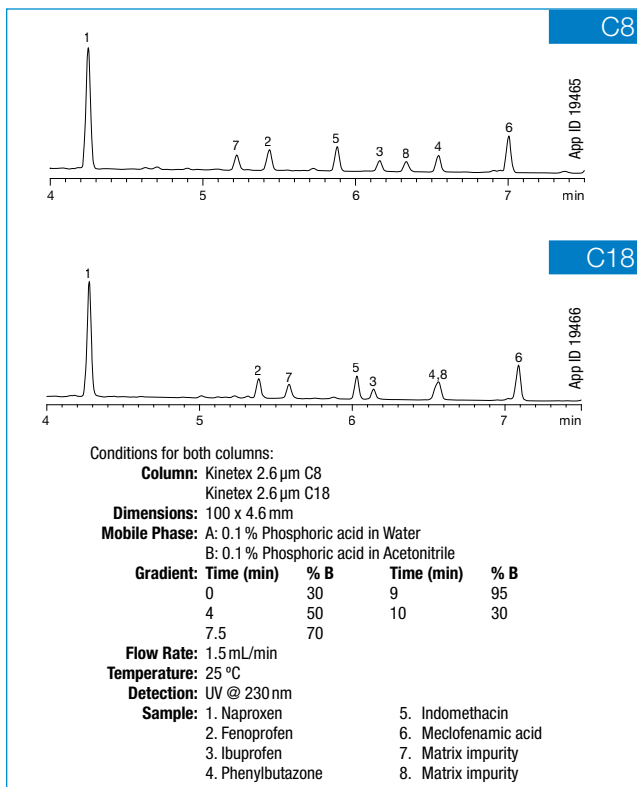
Comparative separations may not be representative of all applications.

Selectivities Built for Your Needs

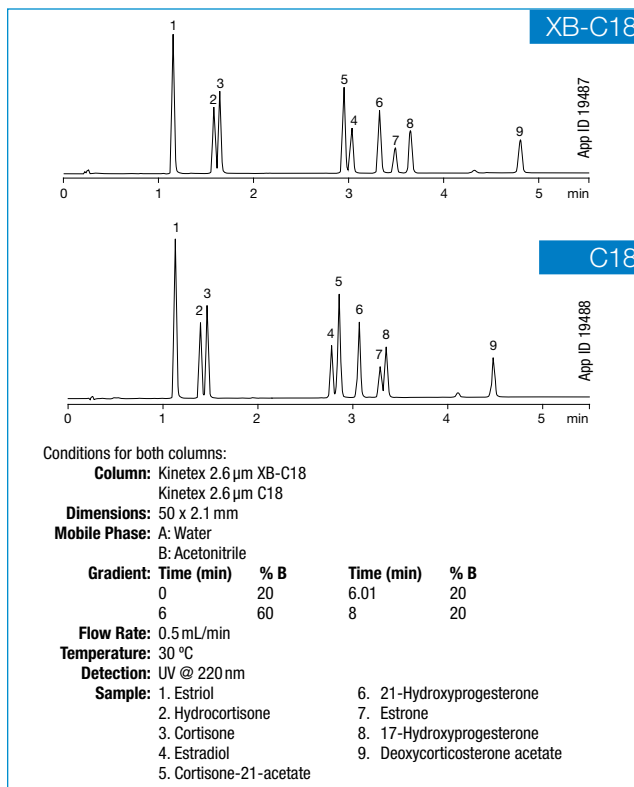
The extensive range of Kinetex stationary phases allows you to get retention enhancement without performance loss. Use the multi-functional Kinetex Biphenyl or pH stable Kinetex EVO C18 to reach the desired solution for your method.



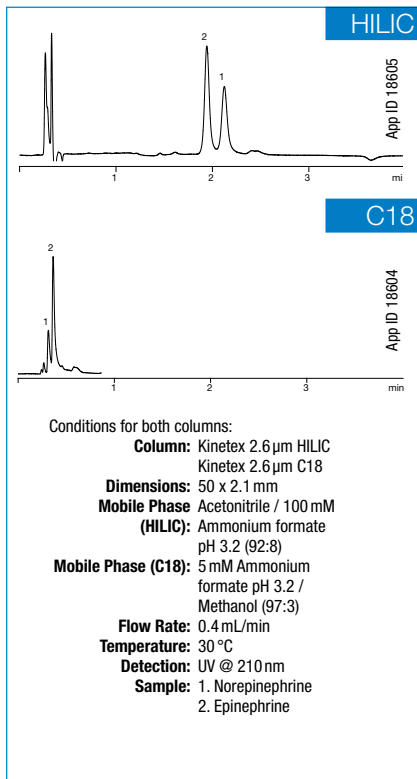
Veterinary Drugs



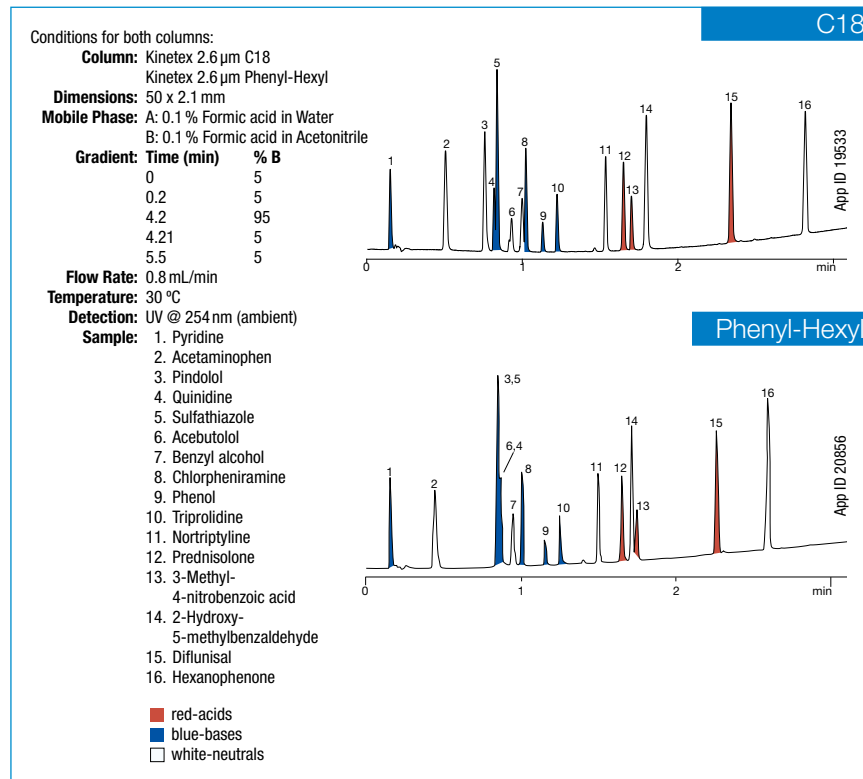
Steroids



Norepinephrine and Epinephrine



Acids, Bases, and Neutrals Mix



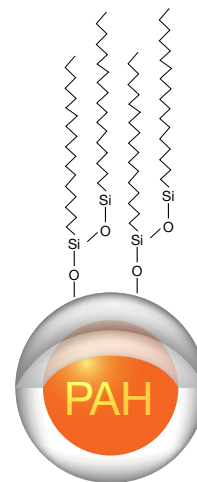
Comparative separations may not be representative of all applications.

Kinetex PAH

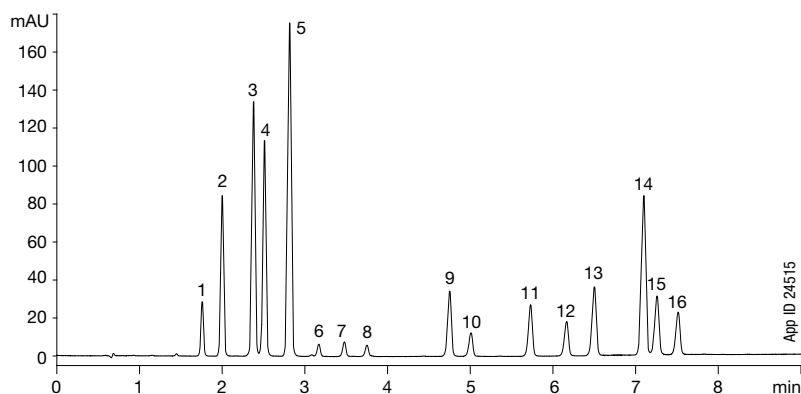
- Expanded resolution with chemical selectivity specifically for PAHs
- Increased throughput and sensitivity with core-shell technology for HPLC/UHPLC

Designed and QC Tested for PAH Analysis by HPLC/UHPLC

Kinetex PAH columns were specifically built for the analysis of PAHs. Controlled pore size processing and a proprietary polymerically bonded stationary phase were developed for this product to ensure excellent resolution between priority polycyclic aromatic hydrocarbons (PAHs). Combined with core-shell particle technology, incredibly high efficiency and sensitivity at comfortable LC pressures is very achievable.



EPA 610 – PAH Analysis



App ID 24515

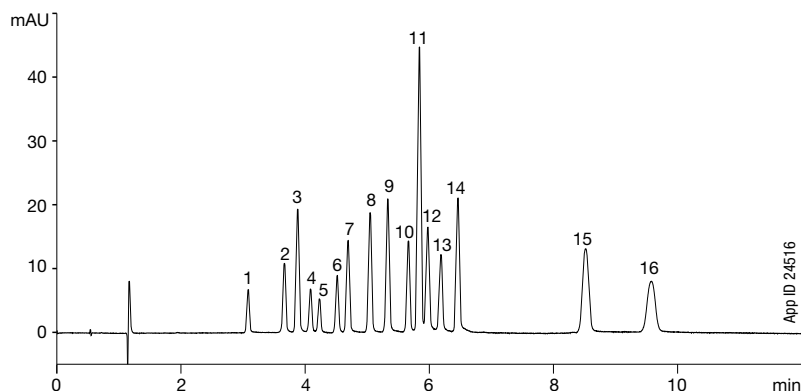
Column: Kinetex 3.5 μ m PAH
Dimensions: 100 x 4.6 mm
Part No.: [00D-4764-E0](#)
Mobile Phase: A: Water
 B: Acetonitrile
Gradient:

Time (min)	% B
0	50
7	100
8	100
9	50
12	50

Flow Rate: 1.2 mL/min
Backpressure: 136 Bar
Temperature: 35 $^{\circ}$ C
Detection: UV @ 292 nm
Sample:

1. Naphthalene	9. Benz[a]anthracene
2. Acenaphthylene	10. Chrysene
3. Acenaphthene	11. Benzo[b]fluoranthene
4. Fluorene	12. Benzo[k]fluoranthene
5. Phenanthrene	13. Benzo[a]pyrene
6. Anthracene	14. Dibenz[a,h]anthracene
7. Fluoranthene	15. Benzo[g,h,i]perylene
8. Pyrene	16. Indeno[1,2,3-cd]pyrene

EU 15+1 PAH Analysis



App ID 24516

Column: Kinetex 3.5 μ m PAH
Dimensions: 100 x 4.6 mm
Part No.: [00D-4764-E0](#)
Mobile Phase: A: Water
 B: Acetonitrile
Gradient:

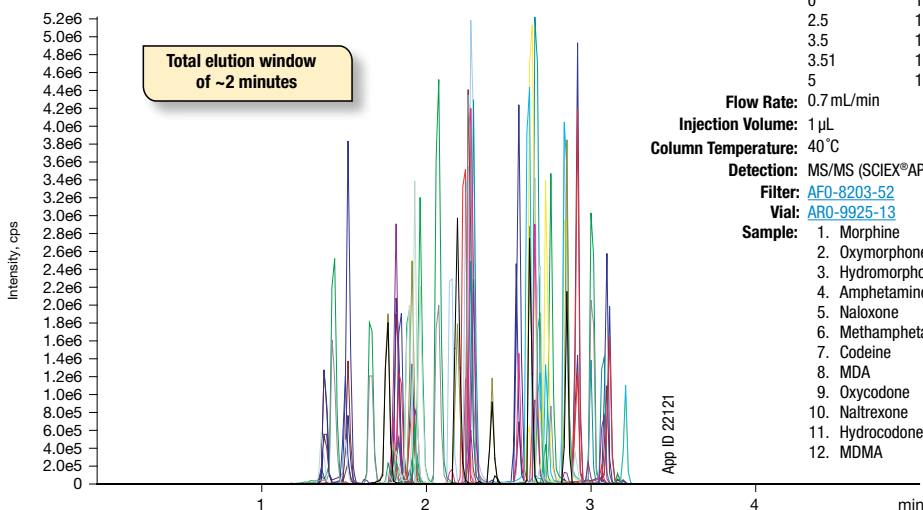
Time (min)	% B
0	50
6	100
11.5	100
12	50
14	50

Flow Rate: 1.5 mL/min
Backpressure: 136 Bar
Temperature: 35 $^{\circ}$ C
Detection: UV @ 292 nm
Sample:

1. Benzo[c]fluorene	9. Benzo[a]pyrene
2. Cyclopenta[cd]pyrene	10. Dibenzo[a,l]pyrene
3. Benzo[a]anthracene	11. Dibenz[a,h]anthracene
4. Chrysene	12. Benzo[g,h,i]perylene
5. 5-Methylchrysene	13. Indeno[1,2,3-cd]pyrene
6. Benzo[j]fluoranthene	14. Dibenzo[a,e]pyrene
7. Benzo[b]fluoranthene	15. Dibenzo[a,i]pyrene
8. Benzo[k]fluoranthene	16. Dibenzo[a,h]pyrene

Applications Clinical Research and Toxicology

Comprehensive Drug Research Panel



Column: Kinetex 2.6µm Biphenyl
Dimensions: 50 x 3.0 mm
Part No.: [00B-4622-Y0](#)
Guard Cartridge: [AJO-9208](#)
Guard Holder: [AJO-9000](#)
Mobile Phase: A: 0.1% Formic acid in Water
 B: 0.1% Formic acid in Methanol
Gradient:

Time (min)	% B
0	10
2.5	100
3.5	100
3.51	10
5	10

Flow Rate: 0.7 mL/min
Injection Volume: 1 µL
Column Temperature: 40°C
Detection: MS/MS (SCIEX[®] API 5000™)
Filter: [AFO-8203-52](#)
Vial: [ARO-9925-13](#)
Sample:

- Morphine
- Oxycodone
- Hydromorphone
- Amphetamine
- Naloxone
- Methamphetamine
- Codeine
- MDA
- Oxycodone
- Naltrexone
- Hydrocodone
- MDMA

- MDEA
- Norfentanyl
- Tramadol
- Benzoylcegonine
- Meperidine
- Meprobamate
- Norbuprenorphine
- Fentanyl
- Buprenorphine
- Flurazepam
- Carisoprodol
- PCP
- Propoxyphene
- Sufentanil
- 6-MAM
- Midazolam
- Normeperidine
- EDDP
- Methadone
- Lorazepam
- Clonazepam
- Norpropoxyphene
- Oxazepam
- Hydroxalprazolam
- Nordiazepam
- Flunitrazepam
- Temazepam
- Alprazolam
- Diazepam

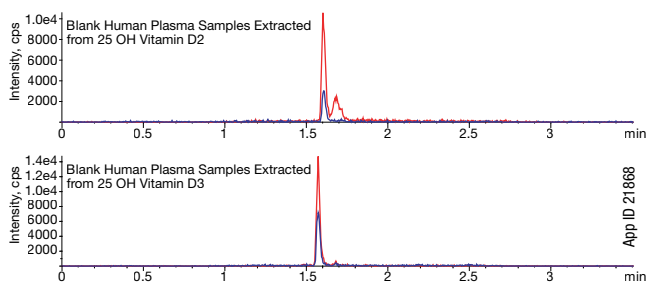
Vitamin D

Column: Kinetex 2.6µm C18
Dimensions: 30 x 3.0 mm
Guard Cartridge: [AJO-8775](#)
Guard Holder: [AJO-9000](#)
Part No.: [00A-4462-Y0](#)
Mobile Phase: A: 0.1% Formic acid in Water
 B: 0.1% Formic acid in Methanol
Gradient:

Time (min)	% B
0	60
0.5	95
2	95
2.01	60
3.5	60

Flow Rate: 0.6 mL/min
Temperature: 22°C
Detection: Tandem Mass Spectrometer (MS/MS) (22°C)
Detector: SCIEX API 5000™ System
Filter: [AFO-8203-52](#)
Vial: [ARO-9925-13](#)
Sample:

- 25-Hydroxy Vitamin D2 (25-OH D2)
- 25-Hydroxy Vitamin D3-2H3
- 25-Hydroxy Vitamin D3-d6 (25-OH D3-d6)



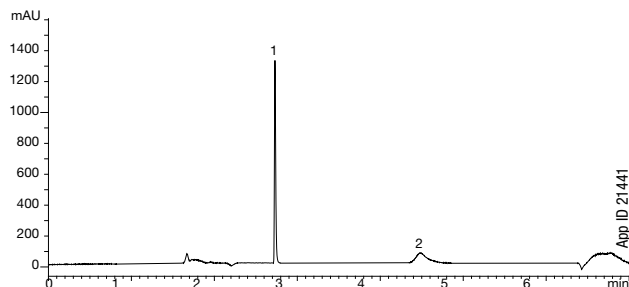
Human Plasma Vitamin C

Column: Kinetex 5µm XB-C18
Dimensions: 150 x 4.6 mm
Guard Cartridge: [AJO-8768](#)
Guard Holder: [AJO-9000](#)
Part No.: [00F-4605-E0](#)
Mobile Phase: A: 0.1% Formic acid in Water
 B: Acetonitrile
Gradient:

Time (min)	% B
0	0
3.5	0
3.6	100
5	100
5.1	0
7	0

Flow Rate: 0.8 mL/min
Temperature: 22°C
Detection: UV @ 245 nm
Filter: [AFO-8103-52](#)
Vial: [ARO-9925-13](#)
Sample:

- Vitamin C (ascorbic acid)
- Uric acid



Applications

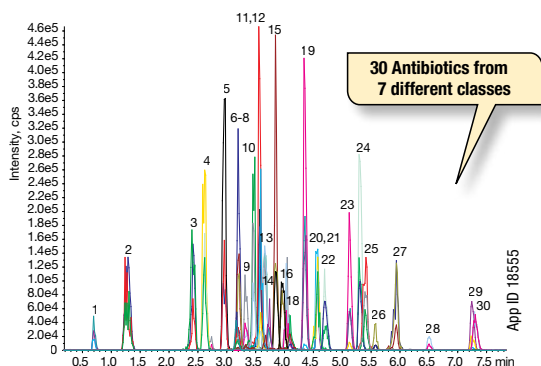
Food Testing

Multi-Class Antibiotics Screening of Meat

Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: [00B-4462-AN](#)
Mobile Phase: A: 0.1 % Formic acid in Water
 B: 0.1 % Formic acid in Methanol

Gradient	Time (min)	% B	Time (min)	% B
	0	2	7.37	99
	0.3	2	8.27	99
	7.27	80	13	2

Flow Rate: 0.5 mL/min
Temperature: 40 °C
Detection: Mass Spectrometer (MS) (300 °C)
Detector: SCIEX[®] API 4000[™] System
Note: Analytes spiked at 100 ng/mL



Azo Dyes

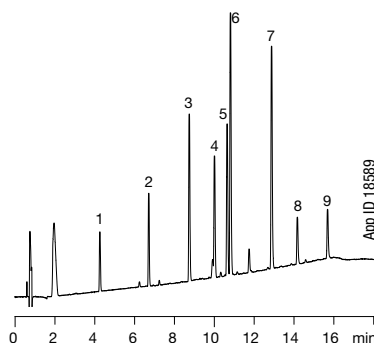
Column: Kinetex 2.6 µm C18
Dimensions: 150 x 4.6 mm
Part No.: [00F-4462-E0](#)
Mobile Phase: A: 0.1 % Phosphoric acid in Water
 B: 0.1 % Phosphoric acid in Acetonitrile

Gradient	Time (min)	% B	Time (min)	% B
	0	25	17.01	25
	15	95	20	25
	17	95		

Flow Rate: 1.8 mL/min
Temperature: 50 °C
Detection: UV @ 215 nm
Backpressure: 380 bar

Sample:

1. Orange II	6. Sudan I
2. Sudan Orange G	7. Sudan II
3. Fast Garnet GBC	8. Sudan III
4. Dimethyl yellow	9. Sudan IV
5. Sudan Red G	



Multi-Toxin Screen

Column: Kinetex 2.6 µm XB-C18 100 Å
Dimensions: 50 x 2.1 mm
Part No.: [00B-4496-AN](#)
Mobile Phase: A: Water with 5 mM Ammonium acetate and 0.5 % Acetic acid
 B: Methanol with 5 mM Ammonium acetate and 0.5 % Acetic acid

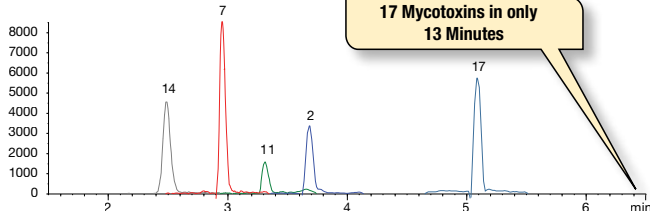
Gradient	Time (min)	% B	Time (min)	% B
	0	2	5.2	98
	2	2	8	98
	5	80		

Flow Rate: 0.45 mL/min
Temperature: Ambient (22 °C)
Detection: Tandem Mass Spectrometer (MS/MS) (550 °C)
Detector: SCIEX API 5500[™]

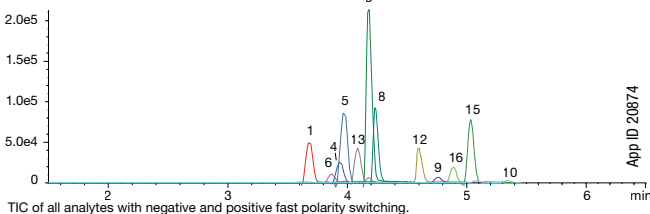
Sample:

1. 15-Acetyldeoxynivalenol	7. Deoxynivalenol	13. Monoacetoxyscirpenol
2. 3-Acetyldeoxynivalenol	8. Diacetoxyscirpenol	14. Nivalenol
3. Aflatoxin B1	9. Fumonisin B1	15. Ochratoxin
4. Aflatoxin B2	10. Fumonisin B2	16. T-2 toxin
5. Aflatoxin G1	11. Fusarenon X	17. Zearalenon
6. Aflatoxin G2	12. HT-2 toxin	

Negative Polarity



Positive Polarity



TIC of all analytes with negative and positive fast polarity switching.

Pharmaceutical

Tricyclic Antidepressants

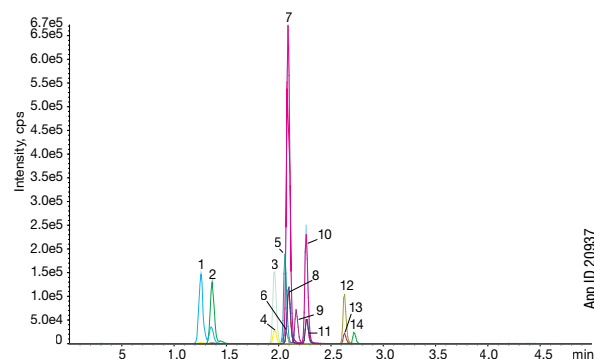
Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: [00B-4462-AN](#)
Mobile Phase: A: 0.1 % Formic acid in Water
 B: 0.1 % Formic acid in Methanol

Gradient	Time (min)	% B	Time (min)	% B
	0	40	4.01	40
	3.5	80	5	40
	4	80		

Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: MS/MS
Detector: SCIEX[®] API 4000[™] System

Sample:

1. Doxepin	8. Nortriptyline
2. DM-Doxepin	9. Amitriptyline
3. Imipramine-D3 (IS)	10. Protriptyline-D3 (IS)
4. Imipramine	11. Protriptyline
5. Desipramine-D3 (IS)	12. Clomipramine-D3 (IS)
6. Desipramine	13. Clomipramine
7. Nortriptyline-D3 (IS)	14. DM-Clomipramine



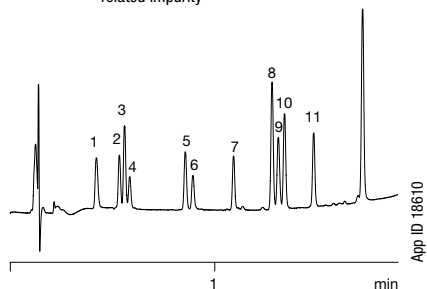
Applications Environmental

Carbamate Pesticides: EPA Method 531.1

Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: [00B-4462-AN](#)
Guard Cartridge: [AJ0-8782](#)
Guard Holder: [AJ0-9000](#)
Mobile Phase: A: 0.1 % Phosphoric acid in Water
 B: 0.1 % Phosphoric acid in Acetonitrile
Gradient: (95:5) A/B to (5:95) A/B over 3 min
Flow Rate: 1.0 mL/min
Temperature: 40 °C
Detection: UV @ 210 nm
Filter: [AF0-8203-52](#)
Vial: [ARO-9925-13](#)

Sample :

1. Aldicarb sulfoxide	7. Aldicarb
2. Oxamyl	8. Baygon [®] (Propoxur)
3. Aldicarb sulfone	9. Carbofuran
4. Methomyl	10. Carbaryl
5. 3-OH-Carbofuran	11. 1-Naphthol
6. Aldicarb sulfone-related impurity	12. Methiocarb

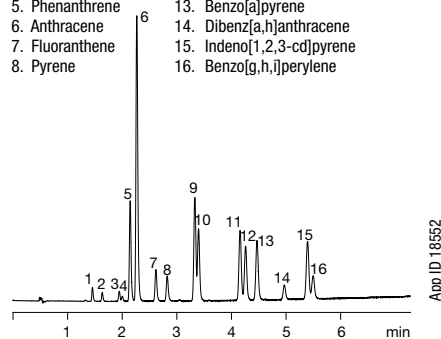


Polyaromatic Hydrocarbons (PAHs): EPA Method 610

Column: Kinetex 2.6 µm C18
Dimensions: 100 x 4.6 mm
Part No.: [00D-4462-E0](#)
Guard Cartridge: [AJ0-8768](#)
Guard Holder: [AJ0-9000](#)
Mobile Phase: A: Water
 B: Acetonitrile
Gradient: (30:70) A/B to (0:100) A/B over 10 min
Flow Rate: 1.5 mL/min
Temperature: 30 °C
Detection: UV @ 254 nm
Filter: [AF0-8203-52](#)
Vial: [ARO-9925-13](#)

Sample:

1. Naphthalene	9. Chrysene
2. Acenaphthylene	10. Benz[a]anthracene
3. Fluorene	11. Benzo[b]fluoranthene
4. Acenaphthene	12. Benzo[k]fluoranthene
5. Phenanthrene	13. Benzo[a]pyrene
6. Anthracene	14. Dibenzo[a,h]anthracene
7. Fluoranthene	15. Indeno[1,2,3-cd]pyrene
8. Pyrene	16. Benzo[g,h,i]perylene



Triazine Pesticides: EPA Method 536

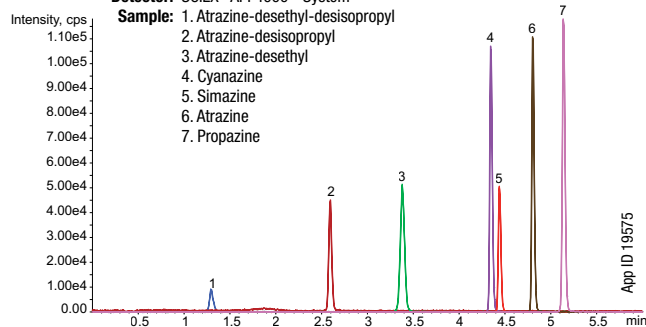
Column: Kinetex 2.6 µm XB-C18
Dimensions: 50 x 2.1 mm
Part No.: [00B-4496-AN](#)
Guard Cartridge: [AJ0-8782](#)
Guard Holder: [AJ0-9000](#)
Mobile Phase: A: 5 mM Ammonium Acetate
 B: Methanol
Gradient:

Time (min)	% B
0	5
0.25	40
2	40
3	75
4	75
4.1	5

Flow Rate: 0.3 mL/min
Temperature: 25 °C
Detection: MS/MS
Filter: [AF0-8203-52](#)
Vial: [ARO-9925-13](#)
Detector: SCIEX[®] API 4000[™] System

Sample:

1. Atrazine-desethyl-desisopropyl
2. Atrazine-desisopropyl
3. Atrazine-desethyl
4. Cyanazine
5. Simazine
6. Atrazine
7. Propazine



Carbonyl Compounds in Drinking Water

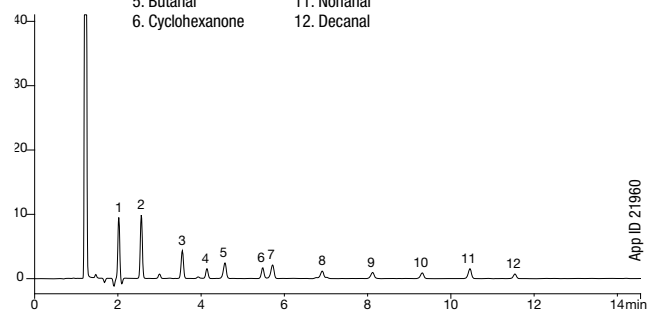
Column: Kinetex 5 µm C18
Dimensions: 150 x 4.6 mm
Part No.: [00F-4601-E0](#)
Guard Cartridge: [AJ0-8768](#)
Guard Holder: [AJ0-9000](#)
Mobile Phase: A: Water
 B: Acetonitrile
Gradient:

Time (min)	% B
0	50
15	100
20	100

Flow Rate: 2 mL/min
Temperature: 30 °C
Detection: UV @ 360 nm (ambient)
Filter: [AF0-8103-52](#)
Vial: [ARO-9925-13](#)

Sample:

1. Formaldehyde	7. Pentanal
2. Acetaldehyde	8. Hexanal
3. Propanal	9. Heptanal
4. Crotonaldehyde	10. Octanal
5. Butanal	11. Nonanal
6. Cyclohexanone	12. Decanal



Kinetex[®] Core-Shell LC Columns

Material Characteristics

Packing Material	pH Stability	Particle Sizes (µm)	Pore Size (Å)	Effective Surface Area (m ² /g)	Effective Carbon Load (%)	USP Classification	Pressure Stability (bar)
Polar C18	1.5-8.5*	2.6	100	200	9	L1	1000/600*
PS C18	1.5-8.5*	2.6	100	200	9	L1	1000/600*
EVO C18	1-12	5, 2.6, 1.7	100	200	11	L1	1000/600*
C18	1.5-8.5**	5, 2.6, 1.7, 1.3	100	200	12	L1	1000/600*
XB-C18	1.5-8.5**	5, 3.5, 2.6, 1.7	100	200	10	L1	1000/600*
C8	1.5-8.5**	5, 2.6, 1.7	100	200	8	L7	1000/600*
Biphenyl	1.5-8.5**	5, 2.6, 1.7	100	200	11	L11	1000/600*
Phenyl-Hexyl	1.5-8.5**	5, 2.6, 1.7	100	200	11	L11	1000/600*
F5	1.5-8.5	5, 2.6, 1.7	100	200	9	L43	1000/600*
HILIC	2.0-7.5	5, 2.6, 1.7	100	200	0	L3	1000/600*
PAH	1.5-8.5*	3.5	100	200	12	L118	1000/600*

*Columns are pH stable from 1.5-10 under isocratic conditions. Columns are pH stable 1.5-8.5 under gradient conditions.

**2.1 mm ID Kinetex columns are pressure stable up to 1000 bar. 3.0 mm and 4.6 mm ID Kinetex 2.6 µm columns are stable up to 600 bar. When using Kinetex 1.3 µm or 1.7 µm, increased performance can be achieved, however high pressure-capable instrumentation is required.



2010 R&D 100 Award Recipient

Ordering Information

5 µm Minibore Columns (mm)					SecurityGuard [™] ULTRA Cartridges [†]
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	00A-4633-AN	00B-4633-AN	00D-4633-AN	00F-4633-AN	AJ0-9298
F5	—	00B-4724-AN	00D-4724-AN	00F-4724-AN	AJ0-9322
Biphenyl	00A-4627-AN	00B-4627-AN	00D-4627-AN	—	AJ0-9209
XB-C18	—	00B-4605-AN	00D-4605-AN	—	AJ0-8782
C18	00A-4601-AN	00B-4601-AN	00D-4601-AN	00F-4601-AN	AJ0-8782
C8	—	00B-4608-AN	00D-4608-AN	—	AJ0-8784
Phenyl-Hexyl	—	00B-4603-AN	—	—	AJ0-8788

for 2.1 mm ID

5 µm MidBore [™] Columns (mm)				SecurityGuard [™] ULTRA Cartridges [†]
Phases	50 x 3.0	100 x 3.0	150 x 3.0	3/pk
EVO C18	00B-4633-Y0	00D-4633-Y0	00F-4633-Y0	AJ0-9297
F5	—	00D-4724-Y0	00F-4724-Y0	AJ0-9321
Biphenyl	00B-4627-Y0	00D-4627-Y0	00F-4627-Y0	AJ0-9208
XB-C18	00B-4605-Y0	00D-4605-Y0	00F-4605-Y0	AJ0-8775
C18	00B-4601-Y0	00D-4601-Y0	00F-4601-Y0	AJ0-8775
C8	00B-4608-Y0	00D-4608-Y0	—	AJ0-8777
Phenyl-Hexyl	00B-4603-Y0	00D-4603-Y0	—	AJ0-8781

for 3.0 mm ID

5 µm Semi-Preparative Columns (mm)			SecurityGuard [™] SemiPrep Cartridges ^{***}
Phases	150 x 10	250 x 10	10 x 10 3/pk
EVO C18	00F-4633-N0	00G-4633-N0	AJ0-9306
F5	—	00G-4724-N0	AJ0-9323
C18	00F-4601-N0	00G-4601-N0	AJ0-9278
Biphenyl	00F-4627-N0	00G-4627-N0	AJ0-9280

for ID: 9-16 mm

5 µm Analytical Columns (mm)					SecurityGuard [™] ULTRA Cartridges [†]
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
EVO C18	00B-4633-E0	00D-4633-E0	00F-4633-E0	00G-4633-E0	AJ0-9296
F5	00B-4724-E0	00D-4724-E0	00F-4724-E0	00G-4724-E0	AJ0-9320
Biphenyl	00B-4627-E0	00D-4627-E0	00F-4627-E0	00G-4627-E0	AJ0-9207
XB-C18	00B-4605-E0	00D-4605-E0	00F-4605-E0	00G-4605-E0	AJ0-8768
C18	00B-4601-E0	00D-4601-E0	00F-4601-E0	00G-4601-E0	AJ0-8768
C8	00B-4608-E0	00D-4608-E0	00F-4608-E0	00G-4608-E0	AJ0-8770
Phenyl-Hexyl	00B-4603-E0	00D-4603-E0	00F-4603-E0	00G-4603-E0	AJ0-8774

for 4.6 mm ID

5 µm Axia [™] Packed Preparative Columns (mm)					SecurityGuard [™] PREP Cartridges [*]
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	15 x 21.2 /ea
EVO C18	00B-4633-P0-AX	00D-4633-P0-AX	00F-4633-P0-AX	00G-4633-P0-AX	AJ0-9304
F5	—	—	00F-4724-P0-AX	00G-4724-P0-AX	AJ0-9324
Biphenyl	00B-4627-P0-AX	00D-4627-P0-AX	00F-4627-P0-AX	00G-4627-P0-AX	AJ0-9272
XB-C18	00B-4605-P0-AX	00D-4605-P0-AX	00F-4605-P0-AX	00G-4605-P0-AX	AJ0-9145
C18	00B-4601-P0-AX	00D-4601-P0-AX	00F-4601-P0-AX	00G-4601-P0-AX	AJ0-9145
C8	00B-4608-P0-AX	00D-4608-P0-AX	00F-4608-P0-AX	00G-4608-P0-AX	AJ0-9205
Phenyl-Hexyl	00B-4603-P0-AX	00D-4603-P0-AX	00F-4603-P0-AX	00G-4603-P0-AX	AJ0-9147
HILIC	—	00D-4606-P0-AX	00F-4606-P0-AX	00G-4606-P0-AX	AJ0-9277

for ID: 18-29 mm

[†]SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

^{***}SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

^{*}PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)

Kinetex[®] Core-Shell LC Columns

Ordering Information (continued)

5 µm Axia Packed Preparative Columns (mm)					SecurityGuard [™] PREP Cartridges**
Phases	50 x 30	100 x 30	150 x 30	250 x 30	15 x 30
EVO C18	00B-4633-UO-AX	00D-4633-UO-AX	00F-4633-UO-AX	00G-4633-UO-AX	AJ0-9305
F5	00B-4724-UO-AX	00D-4724-UO-AX	00F-4724-UO-AX	00G-4724-UO-AX	AJ0-9325
Biphenyl	—	—	00F-4627-UO-AX	—	AJ0-9273
XB-C18	00B-4605-UO-AX	00D-4605-UO-AX	00F-4605-UO-AX	00G-4605-UO-AX	AJ0-9204
C18	00B-4601-UO-AX	00D-4601-UO-AX	00F-4601-UO-AX	00G-4601-UO-AX	AJ0-9204
C8	00B-4608-UO-AX	00D-4608-UO-AX	00F-4608-UO-AX	00G-4608-UO-AX	AJ0-9217
Phenyl-Hexyl	00B-4603-UO-AX	00D-4603-UO-AX	00F-4603-UO-AX	00G-4603-UO-AX	AJ0-9216

for ID: 30-49 mm

3.5 µm Minibore and MidBore [™] Columns (mm)					SecurityGuard [™] ULTRA Cartridges [†]	
Phases	50 x 2.1	100 x 2.1	150 x 2.1	100 x 3.0	3/pk	3/pk
PAH	00B-4764-AN	00D-4764-AN	00F-4764-AN	00D-4764-YO	AJ0-9535	AJ0-9534

for 2.1 mm ID for 3.0 mm ID

3.5 µm Analytical Columns (mm)				SecurityGuard [™] ULTRA Cartridges [†]	2.6 µm Microbore Columns (mm)			
Phases	100 x 4.6	150 x 4.6	250 x 4.6	3/pk	Phases	50 x 1.0	100 x 1.0	150 x 1.0
XB-C18	00D-4744-E0	00F-4744-E0	—	AJ0-8768	XB-C18	00B-4496-A0	00D-4496-A0	00F-4496-A0
PAH	00D-4764-E0	00F-4764-E0	00G-4764-E0	AJ0-9533				

for 4.6 mm ID

2.6 µm Capillary Columns (mm)					
Phases	50 x 0.30	100 x 0.30	150 x 0.30	50 x 0.50	150 x 0.50
XB-C18	00B-4496-AC	00D-4496-AC	00F-4496-AC	00B-4496-AF	00F-4496-AF

2.6 µm MercuryMS [™] LC-MS Cartridges (mm)		
Phases	20 x 2.0	20 x 4.0
Biphenyl	00M-4622-B0-CE	00M-4622-D0-CE

MercuryMS Cartridge Holders		
Part No.	Description	Unit
CHO-7188	Direct-Connect Cartridge Holder, 20 mm	ea
CHO-5845	Standard Cartridge Holder, 20 mm	ea

2.6 µm Minibore Columns (mm)						SecurityGuard [™] ULTRA Cartridges [†]
Phases	30 x 2.1	50 x 2.1	75 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	00A-4725-AN	00B-4725-AN	—	00D-4725-AN	00F-4725-AN	AJ0-9298
PS C18	00A-4780-AN	00B-4780-AN	—	00D-4780-AN	00F-4780-AN	AJ0-8951
Polar C18	00A-4759-AN	00B-4759-AN	—	00D-4759-AN	00F-4759-AN	AJ0-9532
Biphenyl	00A-4622-AN	00B-4622-AN	—	00D-4622-AN	00F-4622-AN	AJ0-9209
XB-C18	00A-4496-AN	00B-4496-AN	00C-4496-AN	00D-4496-AN	00F-4496-AN	AJ0-8782
C18	00A-4462-AN	00B-4462-AN	00C-4462-AN	00D-4462-AN	00F-4462-AN	AJ0-8782
C8	00A-4497-AN	00B-4497-AN	00C-4497-AN	00D-4497-AN	00F-4497-AN	AJ0-8784
HILIC	00A-4461-AN	00B-4461-AN	00C-4461-AN	00D-4461-AN	00F-4461-AN	AJ0-8786
Phenyl-Hexyl	00A-4495-AN	00B-4495-AN	00C-4495-AN	00D-4495-AN	00F-4495-AN	AJ0-8788
F5	00A-4723-AN	00B-4723-AN	—	00D-4723-AN	00F-4723-AN	AJ0-9322

for 2.1 mm ID

2.6 µm MidBore [™] Columns (mm)						SecurityGuard [™] ULTRA Cartridges [†]
Phases	30 x 3.0	50 x 3.0	75 x 3.0	100 x 3.0	150 x 3.0	3/pk
EVO C18	—	00B-4725-Y0	—	00D-4725-Y0	00F-4725-Y0	AJ0-9297
PS C18	00A-4780-Y0	00B-4780-Y0	—	00D-4780-Y0	00F-4780-Y0	AJ0-8950
Polar C18	—	00B-4759-Y0	—	00D-4759-Y0	00F-4759-Y0	AJ0-9531
Biphenyl	—	00B-4622-Y0	—	00D-4622-Y0	00F-4622-Y0	AJ0-9208
XB-C18	00A-4496-Y0	00B-4496-Y0	00C-4496-Y0	00D-4496-Y0	00F-4496-Y0	AJ0-8775
C18	00A-4462-Y0	00B-4462-Y0	00C-4462-Y0	00D-4462-Y0	00F-4462-Y0	AJ0-8775
C8	00A-4497-Y0	00B-4497-Y0	00C-4497-Y0	00D-4497-Y0	00F-4497-Y0	AJ0-8777
HILIC	00A-4461-Y0	—	—	—	00F-4461-Y0	AJ0-8779
Phenyl-Hexyl	—	00B-4495-Y0	—	00D-4495-Y0	00F-4495-Y0	AJ0-8781
F5	—	00B-4723-Y0	—	00D-4723-Y0	00F-4723-Y0	AJ0-9321

for 3.0 mm ID

[†]SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)
^{*}PREP SecurityGuard Cartridges require holder, Part No. [AJ0-8223](#)
^{**}PREP SecurityGuard Cartridges require holder, Part No. [AJ0-8277](#)

Kinetex[®] Core-Shell LC Columns

Ordering Information (continued)

2.6 µm Analytical Columns (mm)							SecurityGuard [™] ULTRA Cartridges [‡]
Phases	30 x 4.6	50 x 4.6	75 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
EVO C18	—	00B-4725-E0	—	00D-4725-E0	00F-4725-E0	00G-4725-E0	AJ0-9296
PS C18	—	00B-4780-E0	—	00D-4780-E0	00F-4780-E0	00G-4780-E0	AJ0-8949
Polar C18	—	00B-4759-E0	—	00D-4759-E0	00F-4759-E0	00G-4759-E0	AJ0-9530
Biphenyl	—	00B-4622-E0	—	00D-4622-E0	00F-4622-E0	00G-4622-E0	AJ0-9207
XB-C18	—	00B-4496-E0	00C-4496-E0	00D-4496-E0	00F-4496-E0	00G-4496-E0	AJ0-8768
C18	00A-4462-E0	00B-4462-E0	00C-4462-E0	00D-4462-E0	00F-4462-E0	00G-4462-E0	AJ0-8768
C8	—	00B-4497-E0	00C-4497-E0	00D-4497-E0	00F-4497-E0	00G-4497-E0	AJ0-8770
HILIC	—	00B-4461-E0	00C-4461-E0	00D-4461-E0	00F-4461-E0	00G-4461-E0	AJ0-8772
Phenyl-Hexyl	—	00B-4495-E0	00C-4495-E0	00D-4495-E0	00F-4495-E0	00G-4495-E0	AJ0-8774
F5	—	00B-4723-E0	—	00D-4723-E0	00F-4723-E0	00G-4723-E0	AJ0-9320

for 4.6 mm ID

1.7 µm Minibore Columns (mm)					SecurityGuard [™] ULTRA Cartridges [‡]
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	—	00B-4726-AN	00D-4726-AN	00F-4726-AN	AJ0-9298
Biphenyl	—	00B-4628-AN	00D-4628-AN	00F-4628-AN	AJ0-9209
XB-C18	00A-4498-AN	00B-4498-AN	00D-4498-AN	00F-4498-AN	AJ0-8782
C18	00A-4475-AN	00B-4475-AN	00D-4475-AN	00F-4475-AN	AJ0-8782
C8	00A-4499-AN	00B-4499-AN	00D-4499-AN	00F-4499-AN	AJ0-8784
HILIC	00A-4474-AN	00B-4474-AN	00D-4474-AN	—	AJ0-8786
Phenyl-Hexyl	—	00B-4500-AN	00D-4500-AN	00F-4500-AN	AJ0-8788
F5	—	00B-4722-AN	00D-4722-AN	00F-4722-AN	AJ0-9322

for 2.1 mm ID



For Column Heater, see p. 390

1.7 µm MidBore [™] Columns (mm)				SecurityGuard [™] ULTRA Cartridges [‡]
Phases	30 x 3.0	50 x 3.0	100 x 3.0	3/pk
XB-C18	00A-4498-Y0	00B-4498-Y0	00D-4498-Y0	AJ0-8775
C18	—	00B-4475-Y0	00D-4475-Y0	AJ0-8775
C8	00A-4499-Y0	00B-4499-Y0	00D-4499-Y0	AJ0-8777
HILIC	—	00B-4474-Y0	—	AJ0-8779

for 3.0 mm ID



1.7 µm Microbore Columns (mm)			
Phases	50 x 1.0	100 x 1.0	150 x 1.0
EVO C18	00B-4726-A0	00D-4726-A0	00F-4726-A0
Biphenyl	00B-4628-A0	00D-4628-A0	00F-4628-A0

1.3 µm Minibore Columns (mm)		
Phases	30 x 2.1	50 x 2.1
C18	00A-4515-AN	00B-4515-AN

[‡]SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

Core-Shell Performance Enhancement Kit

Ordering Information

Part No.	Unit
AQ0-8892	ea

SecurityGuard[™] ULTRA Cartridge System

The SecurityGuard ULTRA cartridge system protects ultra-high performance columns, like Kinetex, from damaging contaminants and microparticulates.

- Extend Kinetex column lifetime
- Simple to use
- Pressure rated to 20000 psi (1378 bar)
- Fits virtually all manufacturers' columns 2.1 to 4.6 mm ID

High Pressure
Rated Format

SecurityGuard ULTRA Cartridge Holder

Ordering Information

Part No.	Description	Unit
AJ0-9000	SecurityGuard ULTRA Cartridge Holder	ea



For Core-Shell Performance Enhancement Kit description, see p. 395

For more information on the SecurityGuard ULTRA Cartridge System, see p. 316

For UHPLC system connections, see SecurityLINK[™] UHPLC fingertight fitting system on pp. 317-318

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP[™] products on pp. 391-392

UHPLC / HPLC Sure-Lok[™] High Pressure PEEK Male Nut Fittings

Ordering Information

Part No.	Description	Unit
AQ0-8503	Sure-Lok High Pressure PEEK 1-Pc Nut 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)	10/pk
AQ0-8530	Sure-Lok Fitting Tightening Tool, Aluminum	ea

See p. 394 for more information.



For Ultra-High Performance Stainless Steel Nut and Ferrule Set, see p. 394

LiChrosorb®

- Quality-packed columns by Phenomenex

LiChrosorb® is a well-established, rugged, irregular silica material, with high surface area (60 Å, 500 m²/g).

Ordering Information

SecurityGuard™ Analytical Cartridges require universal holder Part No.: [KJO-4282](#)

5 µm Columns (mm)				SecurityGuard Cartridges (mm)	
Phases	125 x 4.0	250 x 4.0	150 x 4.6	250 x 4.6	4 x 3.0
RP-8	00E-0233-D0	00G-0233-D0	00F-0233-E0	00G-0233-E0	AJ0-4290 /10pk

for ID: 3.2-8.0 mm

LiChrospher®

- Quality-packed by Phenomenex

LiChrospher® (the 4 µm material is also known as Superspher® in Europe) is a spherical alternative to the well-established LiChrosorb irregular material. It offers higher efficiencies than the LiChrosorb material.

Ordering Information

SecurityGuard™ Analytical Cartridges require universal holder Part No.: [KJO-4282](#)

4 µm (Superspher) Columns (mm)			SecurityGuard Cartridges (mm)	
Phases	125 x 4.0	250 x 4.0	4 x 2.0	4 x 3.0
RP-8	00E-3042-D0	00G-3042-D0	AJ0-4289 /10pk	AJ0-4290 /10pk
RP-18	00E-3043-D0	00G-3043-D0	AJ0-4286	AJ0-4287

for ID: 2.0-3.0 mm 3.2-8.0 mm

5 µm Columns (mm)					SecurityGuard Cartridges (mm)	
Phases	125 x 4.0	250 x 4.0	150 x 4.6	250 x 4.6	4 x 2.0	4 x 3.0
RP-8	00E-3049-D0	00G-3049-D0	00F-3049-E0	00G-3049-E0	AJ0-4289 /10pk	AJ0-4290 /10pk
RP-18	00E-3050-D0	00G-3050-D0	00F-3050-E0	00G-3050-E0	AJ0-4286	AJ0-4287
RP-8 endcapped	00E-3051-D0	00G-3051-D0	—	00G-3051-E0	AJ0-4289	AJ0-4290
RP-18 endcapped	00E-3052-D0	00G-3052-D0	00F-3052-E0	00G-3052-E0	AJ0-4286	AJ0-4287
CN	00E-3053-D0	00G-3053-D0	—	00G-3053-E0	AJ0-4304	AJ0-4305
RP-Select B	00E-3156-D0	00G-3156-D0	—	00G-3156-E0	—	—

for ID: 2.0-3.0 mm 3.2-8.0 mm



Other column dimensions available upon request.

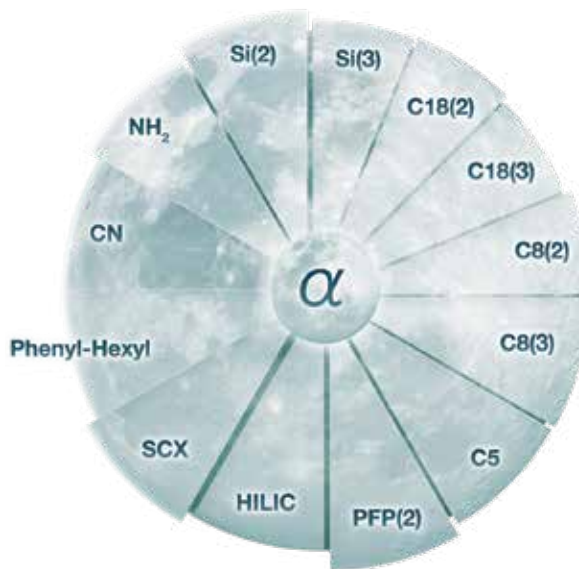


Explore Successful Separations

Your success begins with our commitment to provide the essential solutions to HPLC separations in the Luna brand. Some of the highest quality and performance standards are incorporated into Luna products, making them an indispensable platform for all areas of HPLC.

Explore Resolution with Luna Selectivities

Phase selectivity has the strongest impact on overall chromatographic resolution. Choosing the optimal selectivity can drive your separation to success. Luna phases span through 10 different chemistries, each offering its own unique selectivity.



Luna Bonded Phase Selectivity Chart

Luna Phases	Description	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load (%)	pH Stability	Reversed Phase	Normal Phase	HILIC	IEX	USP Column Classification
Silica(2)	Unbonded silica	3, 5, 10, 10-PREP, 15	100	400	—	2.0 - 7.5		☾	☾		L3
Silica(3)	Unbonded silica	10-PREP	100	400	—	2.0 - 7.5		☾	☾		L3
C5	5 Carbon ligand	5, 10	100	440	12.5	1.5 - 9.0*	☾				—
C8(2)	C8 ligand optimized for improved peak shape	3, 5, 10, 10-PREP, 15	100	400	13.5	1.5 - 9.0*	☾				L7
C8(3)	C8 ligand optimized for improved peak shape	10-PREP	100	400	13	1.5 - 9.0*	☾				L7
C18(2)	C18 ligand optimized for improved peak shape	2.5, 3, 5, 10, 10-PREP, 15	100	400	17.5	1.5 - 9.0*	☾				L1
C18(3)	C18 ligand optimized for improved peak shape	10-PREP	100	400	17	1.5 - 9.0*	☾				L1
CN	Versatile CN phase	3, 5, 10	100	400	7.0	1.5 - 7.0	☾	☾			L10
NH₂	Rugged and reproducible NH ₂	3, 5, 10	100	400	9.5	1.5 - 11	☾	☾	☾	☾	L8
Phenyl-Hexyl	Phenyl phase attached to C6 (hexyl) ligand	3, 5, 10, 10-PREP, 15	100	400	17.5	1.5 - 9.0*	☾				L11
SCX	Benzene sulfonic acid	5, 10	100	400	Binding Capacity: 0.15 meq/g	2.0 - 7.0				☾	L9
HILIC	Reproducible, cross-linked diol	3, 5	200	200	5.7	1.5 - 8.0			☾		L20
PFP(2)	Pentafluorophenyl with a C3 (propyl) linkage	3, 5	100	400	11.5	1.5 - 8.0	☾		☾		L43

* pH range is 1.5 - 9 under gradient conditions. pH range is 1.5 - 10 under isocratic conditions.



Luna Omega UHPLC Columns will boost your UHPLC instrumentation (see page 271).



Try Gemini for 1.0 - 12.0 pH stability. (see page 215).



Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 391-392



Luna Silica

A Backbone and Phase Designed for Long Column Lifetimes

Luna columns' excellent performance is not simply the result of ultra-pure metal-free silica (99.99% purity). Meticulous care is given to the quality control of surface smoothness, pore structure and pore consistency to ensure particles of uniform structure and enhanced mechanical strength. Either bonded or unbonded, Luna silica produces highly advanced HPLC columns:

- Low percentage of "fines" from damaged silica leading to lower backpressures and enhanced column performance and lifetimes
- High column bed stability enhanced by particle shape uniformity

Incredible Silica Smoothness

Luna silica is extremely smooth and spherical. For bonded phases, this provides a uniform bonding surface for consistent and even bonded phase coverage. The likelihood of silica particle shearing and breakage during bonding and packing is very low; thus, Luna columns have high efficiencies and long column lifetimes.

- Recommended for preparative and bulk packing into DAC systems, see page 363 for more information

Luna Silica(2)

USP: L3

pH Stability: 2.0 – 7.5

Particle Size: 3 µm, 5 µm, 10 µm, 10 µm-PREP, and 15 µm

Phase: Unbonded silica

Application: Polar compounds

Luna Silica(3)

USP: L3

pH Stability: 2.0 – 7.5

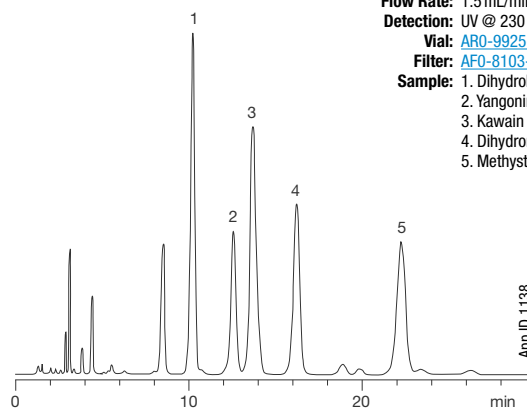
Particle Size: 10 µm-PREP

Phase: Unbonded silica

Application: Small Organic Molecules, Steroids, Nutraceuticals, Fat Soluble Vitamins, Tocopherols

Natural Products (Kava Kava)

Column: Luna 5 µm Silica(2)
Dimensions: 150 x 4.6 mm
Part No.: [00F-4274-E0](#)
Guard Cartridge: [AJ0-4348](#)
Guard Holder: [KJ0-4282](#)
Mobile Phase: Hexane/Dioxane (85:15)
Flow Rate: 1.5 mL/min
Detection: UV @ 230 nm
Vial: [AR0-9925-13](#)
Filter: [AF0-8103-52](#)
Sample: 1. Dihydrokavain
 2. Yangonin
 3. Kavain
 4. Dihydromethysticin
 5. Methysticin



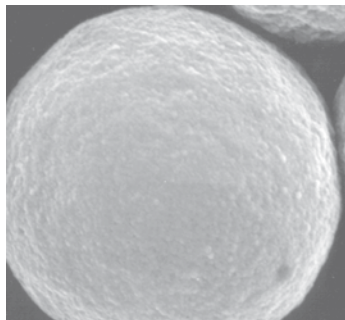
App ID 1138



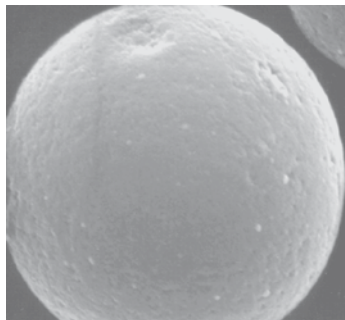
Long Column Lifetimes and Excellent Performance

Ultra-pure, metal-free silica (99.99% purity) is the backbone of all Luna material. The resulting high quality particles have a surface smoothness, pore structure, and pore consistency to ensure a more uniform particle shape and greater reproducibility.

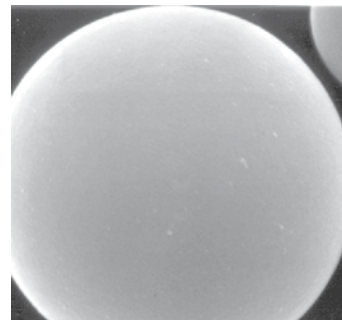
Superior Particle Smoothness



Agilent Technologies®
ZORBAX® 5 µm SB-C18



Waters®
Symmetry® 5 µm C18



Phenomenex
Luna 5 µm C18

Luna C18(2), C18(3), C8(2), C8(3), C5

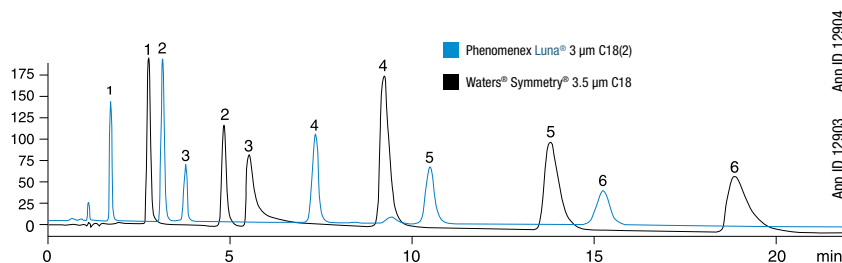
Your Starting Point for Reversed Phase Methods

The Luna column has found a place as one of the world's top reversed phase columns because it provides a measurable improvement over many HPLC columns for two important chromatographic properties: resolution and peak shape. The high efficiencies and bonded phase surface coverage provide for sharp peaks. The result:

- Free exposed silanols virtually eliminated by complete bonding and endcapping
- Sharp peak shape for good method sensitivity
- pH stable from 1.5 to 10.0 for over 10000 hours

Applications

Polar, Acidic Drugs

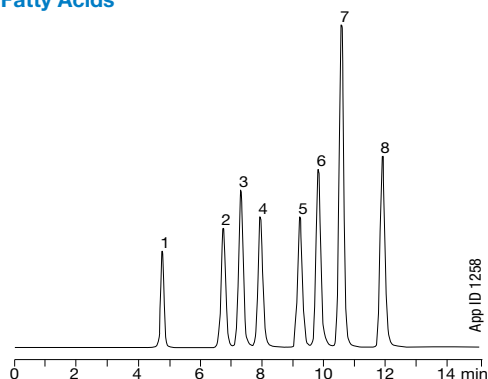


App ID 12904
App ID 12903

Conditions same for both columns:

- Dimensions:** 75 x 4.6 mm
- Mobile Phase:** 20 mM KH_2PO_4 / Acetonitrile(70:30)
- Flow Rate:** 0.75 mL/min
- Detection:** UV @ 202 nm
- Sample:**
 1. Tolmetin
 2. Naproxen
 3. Diflunisal
 4. Fenoprofen
 5. Indomethacin
 6. Ibuprofen

Fatty Acids



App ID 1258

- Columns:** Luna 5 µm C8(2)
- Dimensions:** 150 x 4.6 mm
- Part No.:** [00F-4249-E0](#)
- Mobile Phase:** A: Acetonitrile
B: Water (18 Mohms DI)
- Gradient:** A/B (70:30) to A/B (90:10) in 10 min,
A/B (90:10) to A/B (70:30) in 2 min,
hold for 4 min
- Flow Rate:** 0.3 mL/min
- Detection:** Evaporative Light Scattering (ELSD)
- Temperature:** 22 °C

- Sample:**
 1. Lauric acid
 2. Myristic acid
 3. Palmitoleic acid
 4. Linoleic acid
 5. Palmitic acid
 6. Oleic acid
 7. Heptadecanoic acid
 8. Stearic acid

The comparative data presented here may not be representative for all applications.

Luna C18(2)

USP: L1 LC-MS Certified

- pH Stability:** 1.5-9.0*
- Particle Size:** 2.5 µm, 3 µm, 5 µm, 10 µm, 10 µm-*PREP*, and 15 µm
- Phase:** C18, endcapped
- Application:** Small molecules
- Strength:** Wide pH stability provides longer column lifetime and greater method flexibility

Luna C18(3)

USP: L1 LC-MS Certified

- pH Stability:** 1.5-9.0*
- Particle Size:** 10 µm-*PREP*
- Phase:** C18, endcapped
- Application:** Pharmaceuticals, Peptides, Nutraceuticals, Agrochemical, Vitamins, Basic Compounds, General Reversed Phase Applications
- Strength:** Media made for process and purification methods

Luna C8(2)

USP: L7 LC-MS Certified

- pH Stability:** 1.5-9.0*
- Particle Size:** 3 µm, 5 µm, 10 µm, 10 µm-*PREP*, and 15 µm
- Phase:** C8, endcapped
- Application:** Small molecules when less retention and greater speed is desired
- Strength:** Lower silanol activity than C18(2) phase plus wide pH stability for longer column life and greater method flexibility

Luna C8(3)

USP: L7 LC-MS Certified

- pH Stability:** 1.5-9.0*
- Particle Size:** 10 µm-*PREP*
- Phase:** C8, endcapped
- Application:** Pharmaceuticals, Peptides, Estrogens, Basic Compounds, General Reversed Phase Applications
- Strength:** Media made for process and purification methods

Luna C5

LC-MS Certified

- pH Stability:** 1.5-9.0*
- Particle Size:** 5 µm, 10 µm
- Phase:** C5, endcapped
- Application:** Small molecules when less retention and greater speed is desired
- Strength:** Greater hydrolytic and pH stability compared to most C4 phases

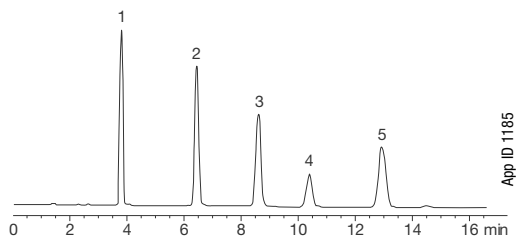
* pH range is 1.5-10 under isocratic conditions. pH range is 1.5-9 under gradient conditions.



Luna C18(2), C18(3), C8(2), C8(3), C5 (cont'd)

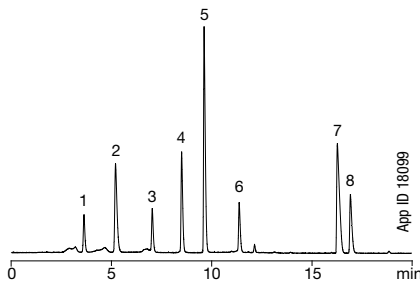
Steroids

Column: Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Part No.: [00F-4252-E0](#)
Mobile Phase: 0.1% H₃PO₄ / Acetonitrile/Methanol (54:35:11)
Flow Rate: 0.75 mL/min
Detection: UV @ 254 nm
Sample: 1. Hydrocortisone 3. 11- α -Hydroxyprogesterone
 2. Corticosterone 4. Cortisone Acetate
 5. 11-Ketoprogesterone



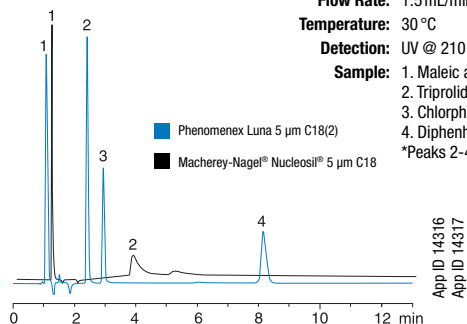
Narcotics

Columns: Luna 5 µm C18(2) **Flow Rate:** 1.0 mL/min
Dimensions: 150 x 4.6 mm **Temperature:** 45 °C
Part No.: [00F-4252-E0](#) **Detection:** UV @ 254 nm (ambient)
Mobile Phase: A: 10 mM NH₄OAc, pH 5.5 **Sample:** 1. Normorphine 5. Codeine
 B: Acetonitrile 2. Morphine 6. Hydrocodone
Gradient: A/B (95:5) for 3 minutes, then A/B (95:5) to A/B (60:40) in 23 minutes 3. Hydromorphone 7. Cocaine
 4. Norcodeine 8. Norcocaine



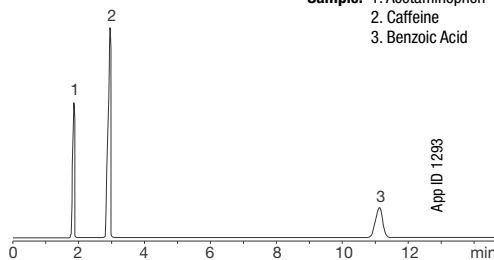
Basic Compounds

Conditions same for both columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate, pH 2.5 / Acetonitrile (75:25)
Flow Rate: 1.5 mL/min
Temperature: 30 °C
Detection: UV @ 210 nm
Sample: 1. Maleic acid
 2. Triprolidine*
 3. Chlorpheniramine*
 4. Diphenhydramine*
 *Peaks 2-4 adsorb on Nucleosil C18



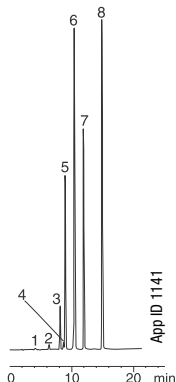
Acetaminophen, USP Method

Column: Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Part No.: [00F-4252-E0](#)
Mobile Phase: Water/Methanol/Acetic Acid (69:28:3)
Flow Rate: 1.5 mL/min
Detection: UV @ 275 nm
Sample: 1. Acetaminophen
 2. Caffeine
 3. Benzoic Acid



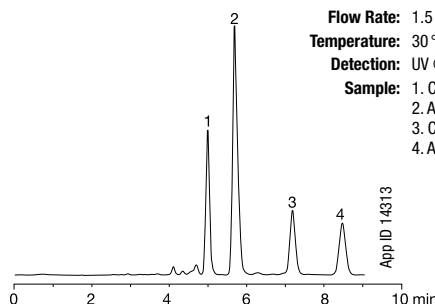
Pharmaceutical Preservatives

Column: Luna 5 µm C5
Dimensions: 150 x 4.6 mm
Part No.: [00F-4043-E0](#)
Mobile Phase: A: 0.5% Acetic acid in water/acetonitrile (80:20)
 B: 0.5% Acetic acid in water/acetonitrile (20:80)
Gradient: A/B (100:0) to A/B (0:100) in 30 min
Flow Rate: 1 mL/min
Temperature: 25 °C
Detection: UV @ 254 nm
Sample: 1. Propylparaben impurity
 2. Benzyl alcohol
 3. Phenol
 4. Benzoic acid
 5. Methylparaben
 6. Benzaldehyde
 7. Ethylparaben
 8. Propylparaben



α - and β -acids in Hop Extract

Column: Luna 5 µm C18(2)
Dimensions: 250 x 4.6 mm
Part No.: [00G-4252-E0](#)
Mobile Phase: Methanol with 0.1% H₃PO₄ / Water with 0.1% H₃PO₄ (90:10)
Flow Rate: 1.5 mL/min
Temperature: 30 °C
Detection: UV @ 314 nm
Sample: 1. Cohumulone
 2. Ad-+humulone
 3. Colupulone
 4. Ad-+lupulone



Luna Phenyl-Hexyl Engineered for Stability

Luna Phenyl-Hexyl columns provide separations not achievable on C18 or C8 columns; such as increased retention for polar, aromatic compounds as well as reversals in analyte elution order. Luna Phenyl-Hexyl columns are a reproducible, extremely stable phenyl phase. Most phenyl phases use a short propyl (3 carbon) linker, which limits phase stability. The Phenyl-Hexyl bonded phase employs a phenyl ring with a hexyl (6 carbon) linker and is densely bonded to Luna silica surface, reducing bonded phase hydrolysis and increasing chemical stability. The result:

- **Highly reproducible and stable phenyl phase**
- **Dual selectivity of both phenyl phase and a short alkyl phase (C5 or C8)**
- **Excellent retention of aromatic and polar, amine compounds**
- **Recommended for US EPA Method 8330B for explosives analysis**
- **1.5 to 10 pH stability for over 10000 hours**

Luna Phenyl-Hexyl

USP: L11

LC-MS Certified

pH Stability: 1.5-9.0*

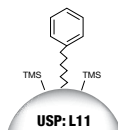
Particle Size: 3 µm, 5 µm, 10 µm, 10 µm-*PREP*, and 15 µm

Phase: Phenyl with Hexyl (C6) linker, endcapped

Application: Non-polar compounds

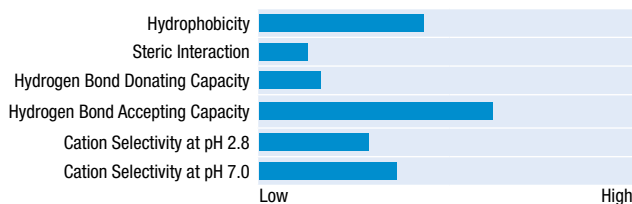
Strength: Aromatic selectivity enhanced by higher hydrophobicity due to hexyl linker

* pH range is 1.5 - 10 under isocratic conditions.
pH range is 1.5 - 9 under gradient conditions.

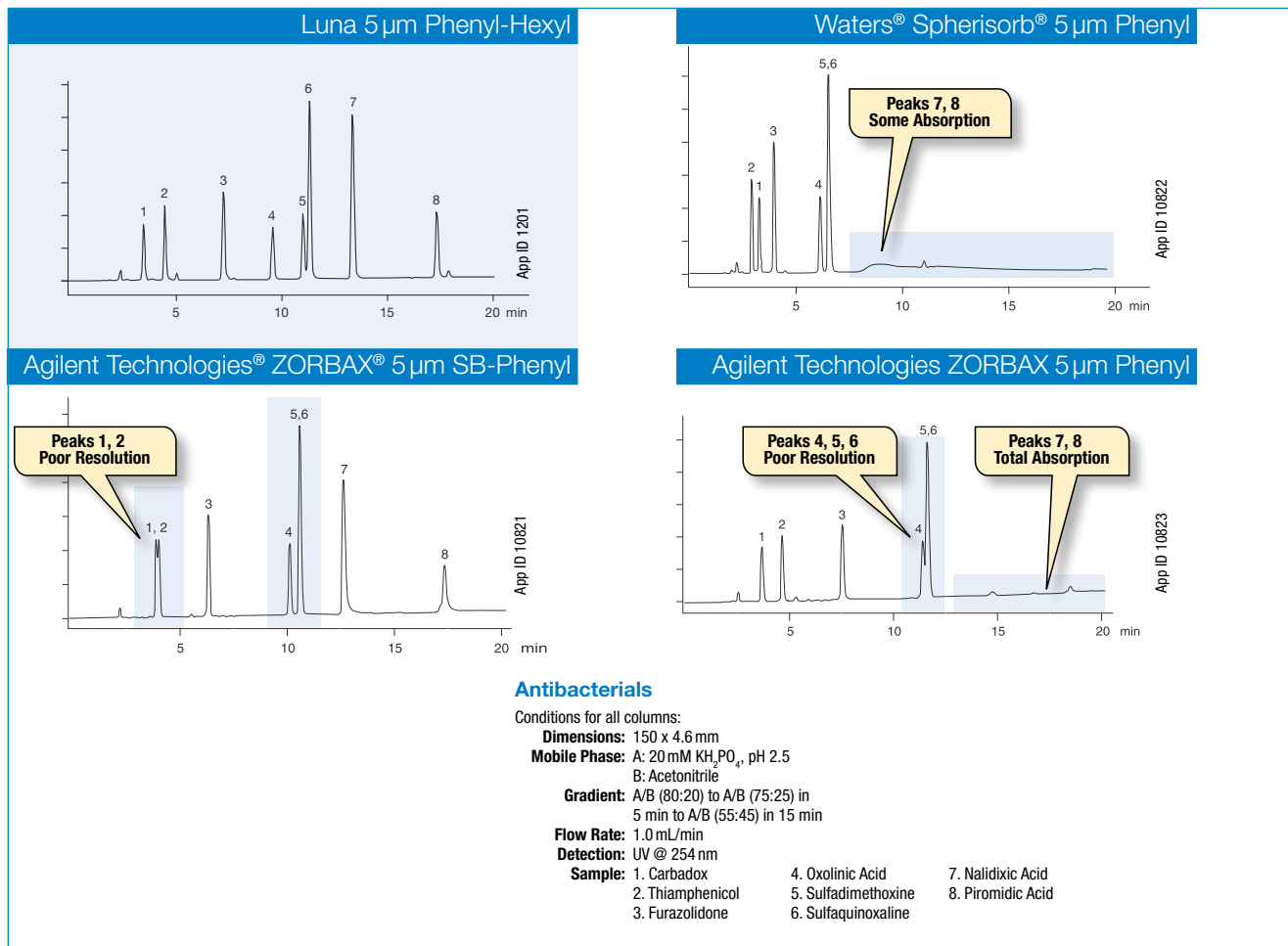


Luna Phenyl-Hexyl

Our most hydrophobic phenyl column and it will also provide good hydrogen accepting functionality for acidic retention.



Chromatographic Comparisons of Phenyl Columns**



**The comparative data presented here may not be representative for all applications.

Luna CN (cyano)

Proven Reproducibility

For carboxyl, carbonyl, and amine containing compounds, Luna CN columns offer a unique polar selectivity in reversed phase and normal phase modes. Luna CN columns provide sharp peaks and great reproducibility run-to-run, column-to-column and batch-to-batch. State of the art modification of the silica surface ensures improved resistance to bonded phase hydrolysis providing one of the most stable CN phases on the market. The result:

- Excellent polar selectivity
- Improved peak shapes
- One of the most stable CN columns under reversed phase or normal phase conditions
- pH stable from 1.5 to 7.0

Luna CN

USP: L10

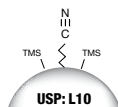
pH Stability: 1.5-7.0

Particle Size: 3 μm, 5 μm, and 10 μm

Phase: Cyano, endcapped

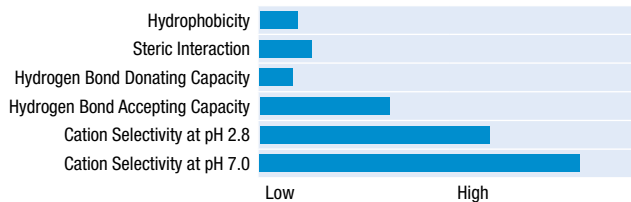
Application: Compounds with COOH, CO, NH₂, NHR₂, or NR₂

Strength: Improved reproducibility for more consistent results run-to-run, column-to-column, batch-to-batch



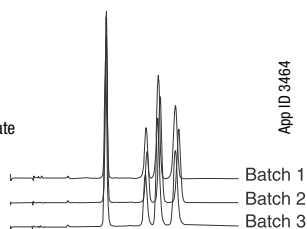
Luna CN

Nitrile groups bound to the silica surface offer a unique polar selectivity under reversed phase or normal phase conditions.



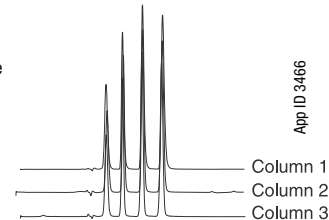
Batch-to-Batch Reproducibility

Column: Luna 5 μm CN
Dimensions: 150 x 4.6 mm
Mobile Phase: A: Hexane, B: Methylene chloride/Methanol(80:20), A/B (80:20)
Flow Rate: 2.0 mL/min
Detection: UV @ 254 nm
Injection: 1.0 μL
Temperature: Ambient
Sample: 1. Hydrocortisone
 2. Prednisone
 3. Cortisone
 4. Hydrocortisone Acetate



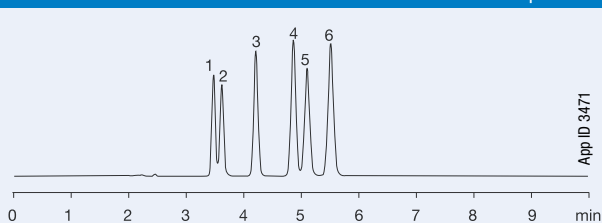
Column-to-Column Reproducibility

Column: Luna 5 μm CN
Dimensions: 150 x 4.6 mm
Mobile Phase: A: Hexane, B: Methylene chloride/Methanol(80:20), A/B (95:5)
Flow Rate: 1.0 mL/min
Injection: 5 μL
Detection: UV @ 254 nm
Temperature: Ambient
Sample: 1. Dimethyl phthalate
 2. Diethyl phthalate
 3. Dibutyl phthalate
 4. Dioctyl phthalate

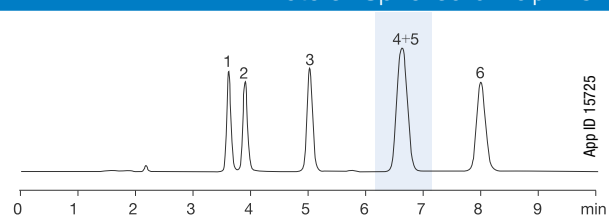


Chromatographic Comparisons of CN Columns**

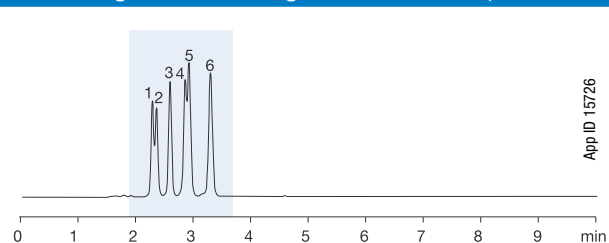
Luna 5 μm CN



Waters[®] Spherisorb[®] 5 μm CN



Agilent Technologies[®] ZORBAX[®] 5 μm SB-CN



Phthalate Esters

Normal Phase Conditions for all columns:

Dimensions: 150 x 4.6 mm

Mobile Phase: A: Hexane, B: Methylene chloride/Methanol (80:20), A/B (99:1)

Flow Rate: 1.0 mL/min

Detection: UV @ 254 nm

Temperature: Ambient

- Sample:** 1. Di-n-octyl phthalate
 2. Bis (2-Ethylhexyl) phthalate
 3. Butylbenzyl phthalate
 4. Di-n-butyl phthalate
 5. Diethyl phthalate
 6. Dimethyl phthalate

**The comparative data presented here may not be representative for all applications.



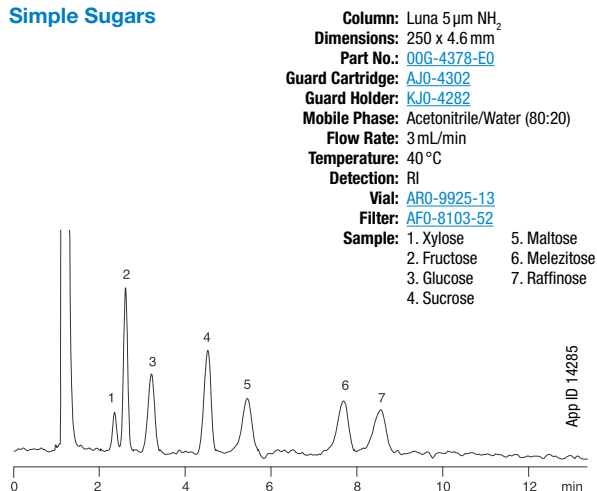
Luna NH₂ (amino)

Developed for Ruggedness

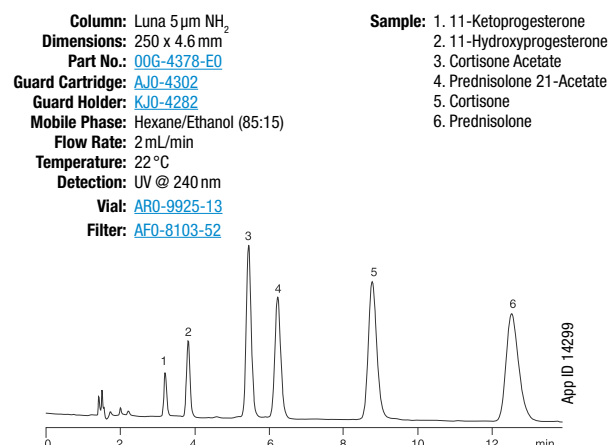
Luna NH₂ columns were developed to provide improved amino column lifetime. Column life for most amino columns can be problematic as the amino bonding easily strips off the silica. Luna NH₂ columns, however, show good bonded phase stability under both normal and reversed phase modes and across a pH range of 1.5 to 11.0. Such a broad pH range indicates the bonded phase ruggedness and the density of the bonded phase coverage. The result:

- Long lifetimes and low phase bleed for more reproducible methods
- Excellent retention of simple sugars, complex sugars, sugar alcohols by reversed phase conditions, and hydrogen bonding compounds under normal phase conditions
- pH stable from 1.5 to 11.0
- Stable in 100 % aqueous mobile phases

Simple Sugars



Steroids



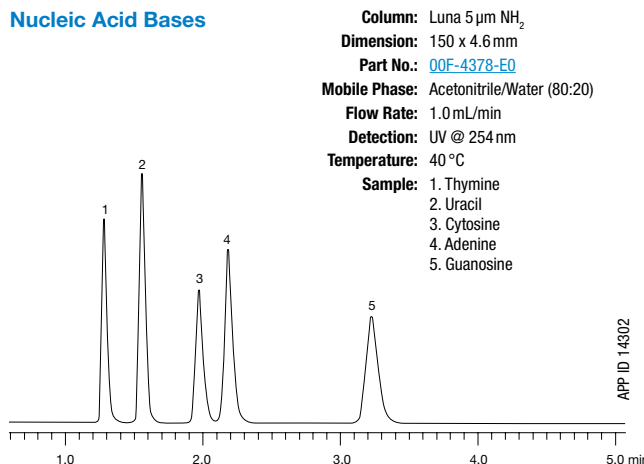
Phenomenex

Luna NH₂

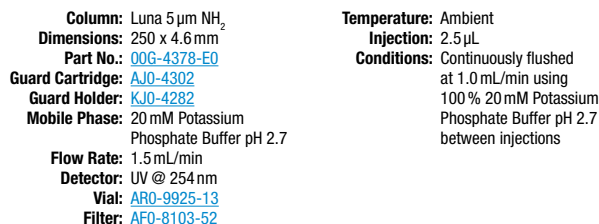
USP: L8

pH Stability:	1.5-11.0
Particle Size:	3 µm, 5 µm, and 10 µm
Phase:	Amino
Application:	Compounds with COOH, CO, NH ₂ , NHR ₂ , or NR ₂
Strength:	Sugars by reversed phase, steroids by normal phase, oligonucleotides by ion exchange

Nucleic Acid Bases



Stability in 100% Aqueous Mobile Phase



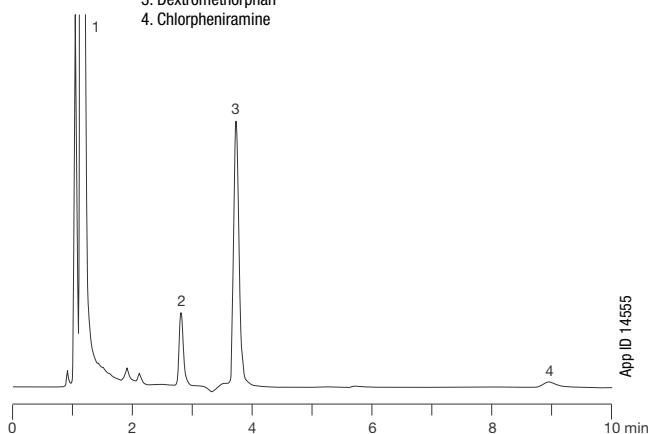
Luna SCX (strong cation exchange) Develop Robust Methods

Luna SCX columns provide excellent resolution and peak shape of basic, cationic compounds. However, most SCX columns show poor peak shape and bad resolution causing many chromatographers to ignore this important phase for small molecule method development, until now. Luna SCX columns contain a benzene sulfonic acid ligand providing ion-exchange, reversed phase, and aromatic interactions. Such interactions make Luna SCX columns great as a first dimension for 2D LC applications as well as improved resolution for small molecules. The result:

- Resolving power and sharp peak shape to separate complex cationic/basic and nitrogen containing compounds
- 5 and 10 μm columns and bulk media for analytical through preparative separations
- Benzene sulfonic acid ligand provides mixed-mode interaction improving separation for 2D peptide applications

Childrens Tylenol Cold Syrup

Column: Luna 5 μm SCX
Dimensions: 150 x 4.6 mm
Part No.: [00F-4398-E0](#)
Guard Cartridge: [AJ0-4308](#)
Guard Holder: [KJ0-4282](#)
Mobile Phase: 50 mM KH_2PO_4 , pH 2.5/Acetonitrile (35:65)
Injection Volume: 1 μL
Flow Rate: 1.5 mL/min
Detection: UV @ 210 nm
Vial: [ARO-9925-13](#)
Filter: [AF0-8103-52](#)
Sample Prep: Dissolve 1 part Childrens Tylenol Cold in 10 parts Methanol
Sample: 1. Acetaminophen
 2. Pseudoephedrine
 3. Dextromethorphan
 4. Chlorpheniramine



App ID 14555



SCX Method Development and pH: The standard operating pH range for Luna SCX columns is 2.0 to 7.0. Most SCX methods are typically run between pH 2.0 and 5.0 for optimal performance. This ensures that nitrogen-containing analytes, especially those with adjacent conjugated system are protonated. Running in highly acidic (pH < 2.0) or basic (pH > 7.0) mobile phases may cause this phase to undergo degradation, as is common for all silica-based SCX phases.

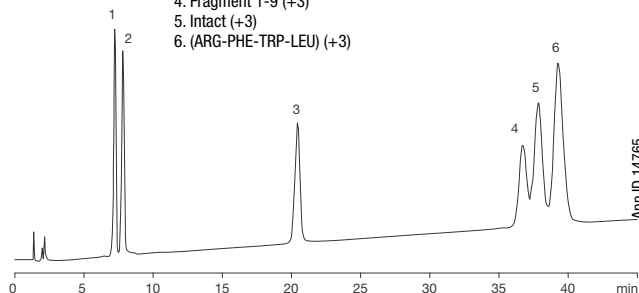
Luna SCX

USP: L9

pH Stability: 2.0-7.0
Particle Size: 5 μm and 10 μm
Phase: Benzene Sulfonic Acid, Strong Cation Exchange
Application: Amine and polyamine containing compounds
Strength: Guaranteed to provide sharper peak shape and better resolution compared to traditional SCX columns

Peptides

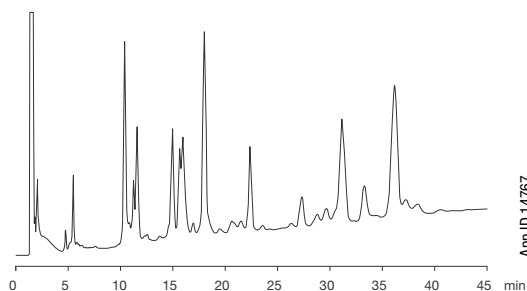
Column: Luna 5 μm SCX
Dimensions: 150 x 4.6 mm
Part No.: [00F-4398-E0](#)
Guard Cartridge: [AJ0-4308](#)
Guard Holder: [KJ0-4282](#)
Mobile Phase: A: 20 mM Potassium Phosphate, 25% Acetonitrile, pH 2.5
 B: 20 mM Potassium Phosphate, 25% Acetonitrile, 400 mM Potassium Chloride, pH 2.5
Gradient: A/B (95:5) to A/B (10:90) in 45 minutes
Flow Rate: 1 mL/min
Temperature: 35 $^{\circ}\text{C}$
Detection: UV @ 215 nm
Vial: [ARO-9925-13](#)
Filter: [AF0-8103-52](#)
Injection Volume: 2 μL (5 μg on column)
Sample: Peptide Mixture - Substance P
 1. Fragment 5-11 (+1)
 2. Fragment 4-11 (+1)
 3. Fragment 2-11 (+2)
 4. Fragment 1-9 (+3)
 5. Intact (+3)
 6. (ARG-PHE-TRP-LEU) (+3)



App ID 14765

Tryptic Digest of Bovine Cytochrome c

Column: Luna 5 μm SCX
Dimensions: 150 x 4.6 mm
Part No.: [00F-4398-E0](#)
Guard Cartridge: [AJ0-4308](#)
Guard Holder: [KJ0-4282](#)
Mobile Phase: A: 20 mM Potassium Phosphate, pH 2.5 / 25% Acetonitrile
 B: 20 mM Potassium Phosphate, pH 2.5 / 25% Acetonitrile / 350 mM Potassium Chloride
Gradient: 100% A to 100% B in 50 minutes
Flow Rate: 1 mL/min
Temperature: 35 $^{\circ}\text{C}$
Detection: UV @ 215 nm
Vial: [ARO-9925-13](#)
Filter: [AF0-8103-52](#)
Injection Volume: 50 μL (20 μg on column)
Sample: Bovine Cytochrome c trypsin digest



App ID 14767

Phenomenex

Luna HILIC

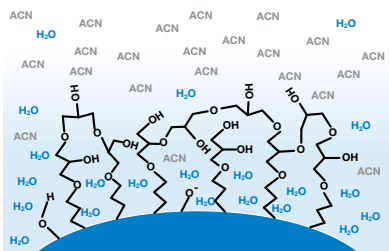
Increase MS Sensitivity and Retention for Polar Compounds

Luna HILIC columns retain a water-enriched layer on the surface of the silica. This water layer facilitates the transfer of polar compounds onto the stationary phase for increased retention.

Hydrophilic Interaction Liquid Chromatography (HILIC) is a separation mode where the partitioning of polar solutes from the high concentration, water-miscible, organic mobile phase into the hydrophilic surface environment creates separations. Polar solutes exhibit increased retention and elute in the order of increasing hydrophilicity.

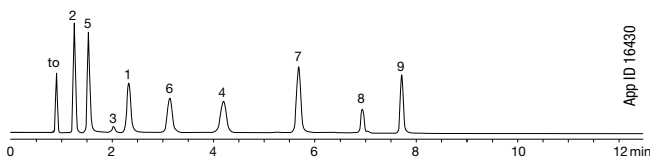
Finally, reproducible, robust HILIC separations!

- Made for retention of polar compounds
- Increase mass spectrometry sensitivity
- Increase laboratory throughput and productivity



Vitamin Mix on Luna HILIC

Vitamins provide an excellent platform to demonstrate the benefits of HILIC. The effect of increased polar compound retention can be easily seen in this application.



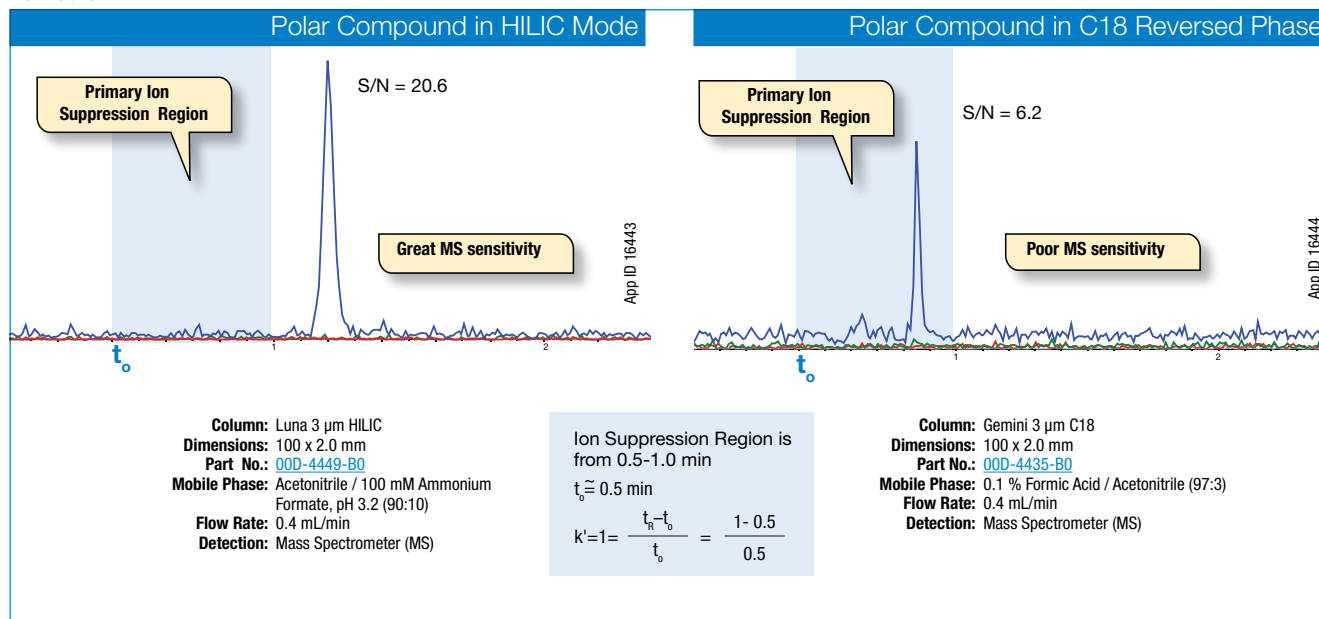
Column: Luna 5 μ m HILIC
 Dimensions: 150 x 4.6 mm
 Part No.: [00F-4450-E0](#)
 Guard Cartridge: [AJ0-8329](#)
 Guard Holder: [KJ0-4282](#)
 Mobile Phase: A: Acetonitrile
 B: Water
 C: 100 mM Ammonium Acetate, pH 5.8
 Gradient: A/B/C (90:5:5) for 2.5 min to A/B/C (50:45:5) in 7.5 min, hold for 2.5 min. Re-equilibrate @ A/B/C (90:5:5) for 7.5 min
 Flow Rate: 2.0 mL/min
 Detection: UV @ 260 nm
 Vial: [AR0-9925-13](#)
 Filter: [AF0-8103-52](#)
 Sample: 1. p-Aminobenzoic Acid pK_a 4.7, H^+ pK_a 2.7 logP 0.83
 2. Nicotinamide H^+ pK_a 3.35 logP -0.37
 3. Riboflavin pK_a 10.2 logP -1.46
 4. Nicotinic Acid pK_a 4.7, H^+ pK_a 3.0 logP 0.36
 5. Pyridoxine H^+ pK_a 5.6, pK_a 8.6 logP -0.77
 6. Thiamine H^+ pK_a 5.5 logP -4.6
 7. Ascorbic Acid pK_a 4.1, 11.2 logP -1.85
 8. Cyanocobalamin pK_a 1.59 logP -0.90
 9. Folic Acid pK_a 2.7, 4.1, 8.9 logP -0.02



Improved Mass Spec Sensitivity

Luna HILIC columns allow low level polar metabolites to be retained on column past the critical ion suppression zone, allowing: Increased MS sensitivity and Higher signal-to-noise ratio (S/N).

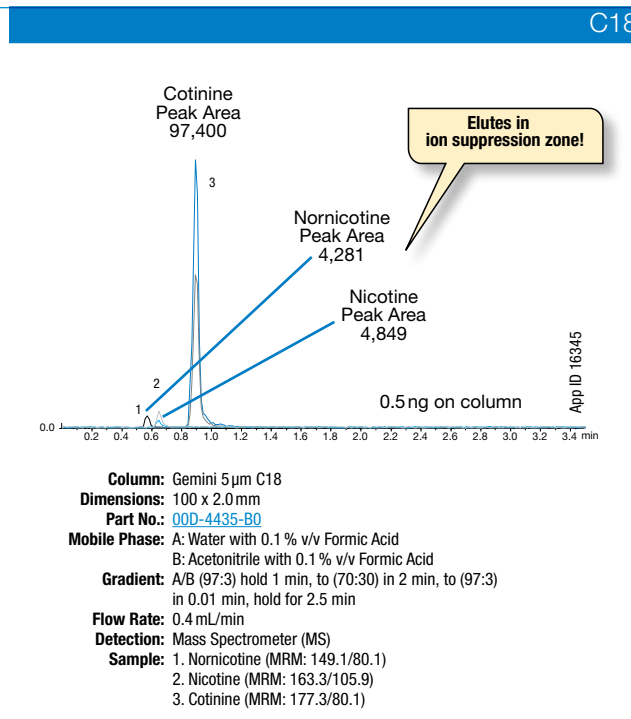
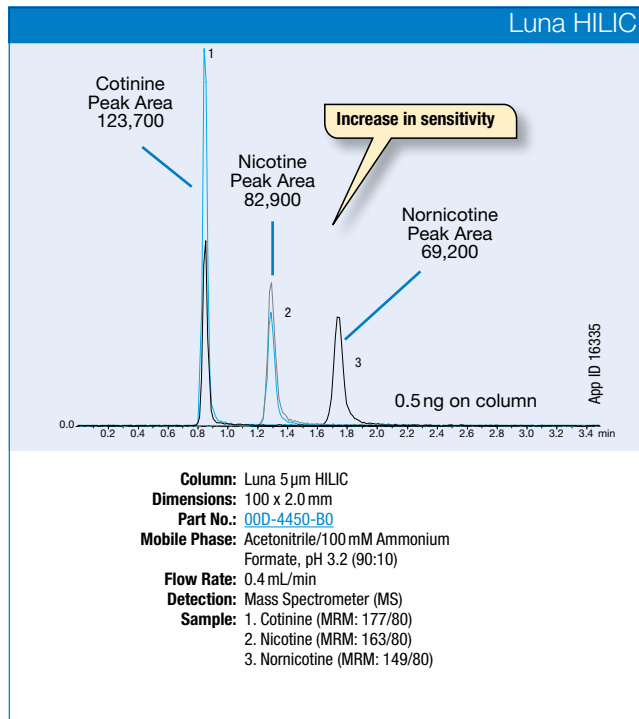
Bamethan



Luna HILIC (cont'd) Improved Mass Spec Sensitivity (cont'd)

The increased retention in HILIC allows elution of the analytes outside the suppression region and thus increases detector sensitivity. In addition, the Luna HILIC column also resolves the compounds with the reverse order of that seen in reversed phase LC.

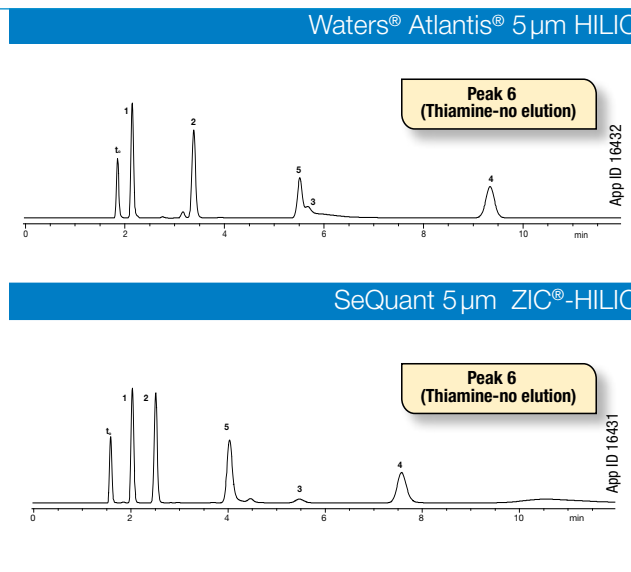
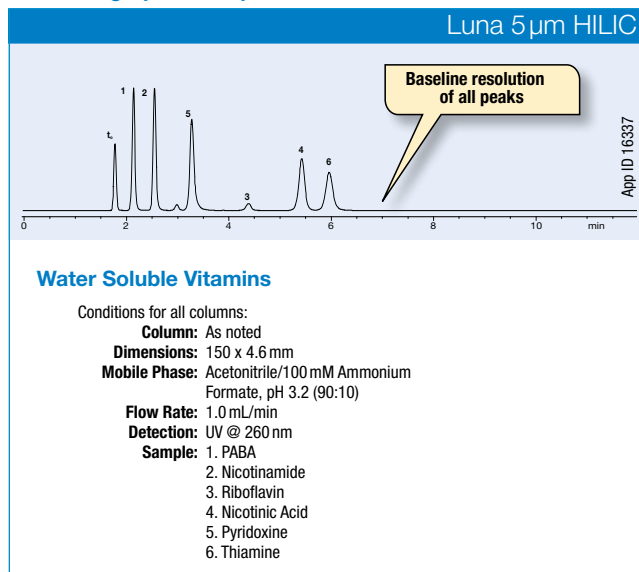
Nicotine and Metabolites



Unique HILIC Selectivity

Not all HILIC columns are alike, Luna HILIC columns deliver on the exacting standards you have come to trust from the Luna product line.

Chromatographic Comparisons of HILIC Columns**



** The comparative data presented here may not be representative for all applications.

Luna PFP(2)

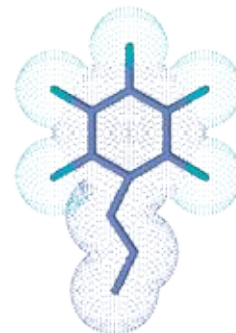
Powerful Selectivity for Reversed Phase Methods

Luna PFP(2) columns provide remarkable selectivity for highly polar compounds, complex natural products, isomers, and other closely related compounds. This is achieved by using a pentafluorophenyl with a propyl linkage which provides multiple retention mechanisms different to other reversed phase media.

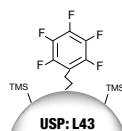
- Achieve excellent selectivity using four mechanisms of solute/stationary phase interactions
- Extremely discerning for halogenated, aromatic and conjugated compounds
- Provides orthogonal selectivity even using traditional reversed phase mobile phase systems

Luna PFP(2) selectivity is achieved through 4 mechanisms of interaction

- Hydrogen Bonding
- Dipole-Dipole Interactions
- Aromatic and π - π Interactions
- Hydrophobic

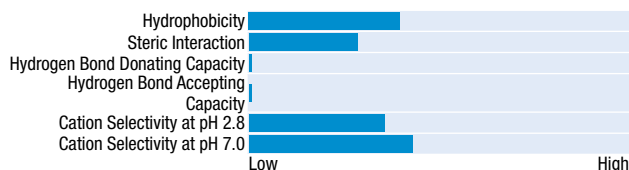


A typical alkyl phase (C18, C8) achieves selectivity through only 1 mechanism of interaction.



Luna PFP(2)

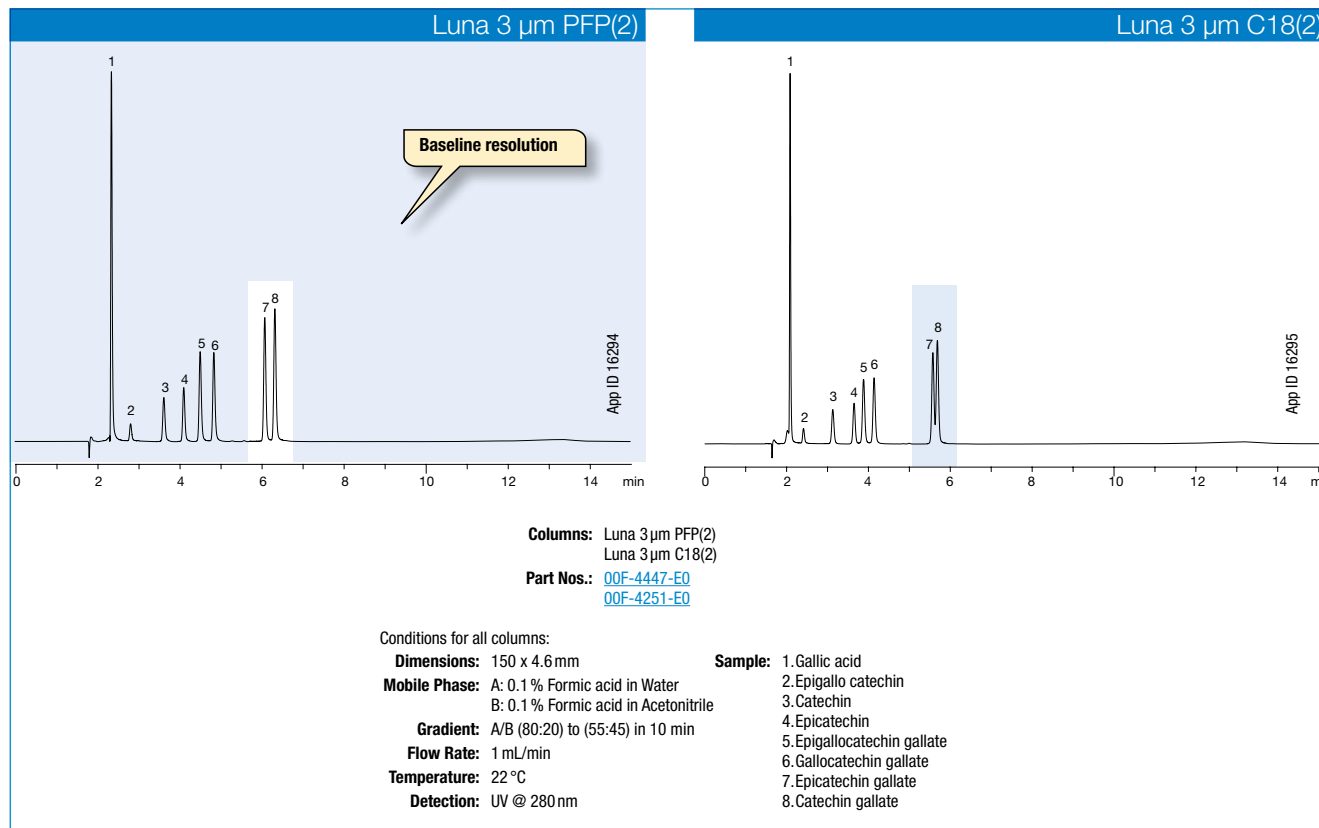
Pentafluorophenyl groups provide very little hydrogen bonding abilities, but the strongly electronegative fluorine groups will provide good charge based selectivity for cationic compounds, while the rigid bonded phase is a good steric selector.



Aromatic Compounds

Aromatic compounds show different retention characteristics on Luna PFP(2) compared to traditional reversed phase columns. The presence of the aromatic benzene ring in Luna PFP(2) increases the relative attraction between the stationary phase and aromatic analytes, leading to increased retention for these types of compounds. Closely related polyphenolic compounds are readily separated with Luna PFP(2) columns.

Catechins



Fast LC Solutions

Ordering Information

2.5 µm High Speed Technology (HST) Columns (mm)					
Phase	30 x 2.0	50 x 2.0	100 x 2.0	50 x 3.0	100 x 3.0
Luna 2.5 µm C18(2)-HST	00A-4446-B0	00B-4446-B0	00D-4446-B0	00B-4446-Y0	00D-4446-Y0



For information about HST Columns, contact your Phenomenex technical consultant or local distributor.

MercuryMS™ LC-MS Cartridges (mm)						Columns (mm)	
3 µm	Phase	10 x 2.0	10 x 4.0	20 x 2.0	20 x 4.0	20 x 2.0	20 x 4.0
Luna	C18(2)	00N-4251-B0-CE	00N-4251-D0-CE	00M-4251-B0-CE	00M-4251-D0-CE	00M-4251-B0	00M-4251-D0
Luna	C8(2)	00N-4248-B0-CE	—	00M-4248-B0-CE	—	00M-4248-B0	—
5 µm	Phase	10 x 2.0	10 x 4.0	20 x 2.0	20 x 4.0	—	—
Luna	C18(2)	00N-4252-B0-CE	00N-4252-D0-CE	00M-4252-B0-CE	00M-4252-D0-CE	—	—
Luna	C8(2)	00N-4249-B0-CE	—	00M-4249-B0-CE	—	—	—

MercuryMS™ Cartridge Holders

Ordering Information

Direct-Connect Cartridge Holders

Part No.	Description
CHO-7187	10 mm direct-connect holder
CHO-7188	20 mm direct-connect holder



Direct-Connect Holder

Standard Cartridge Holders

Part No.	Description
CHO-5846	10 mm standard holder
CHO-5845	20 mm standard holder



Standard Holder



Capillary Columns

Ordering Information

3 µm and 5 µm Capillary Columns (mm)								Trap Column	Trap Column
Phases	50 x 0.30	100 x 0.30	150 x 0.30	50 x 0.50	100 x 0.50	150 x 0.50	250 x 0.50	20 x 0.30	20 x 0.50
3 µm C8(2)	00B-4248-AC	—	—	00B-4248-AF	—	—	—	—	—
3 µm C18(2)	00B-4251-AC	00D-4251-AC	00F-4251-AC	00B-4251-AF	00D-4251-AF	00F-4251-AF	—	—	—
3 µm Phenyl-Hexyl	—	00D-4256-AC	—	—	00D-4256-AF	—	—	—	—
3 µm NH ₂	—	—	00F-4377-AC	—	—	—	—	—	—
3 µm HILIC	—	—	—	00B-4449-AF	—	—	—	—	—
5 µm C8(2)	—	—	00F-4249-AC	—	—	—	—	05M-4249-AC	05M-4249-AF
5 µm C18(2)	—	—	00F-4252-AC	—	—	00F-4252-AF	00G-4252-AF	05M-4252-AC	05M-4252-AF
5 µm Phenyl-Hexyl	00B-4257-AC	—	—	00B-4257-AF	—	—	—	—	—

HPLC Columns

Ordering Information

*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

3 µm Microbore and Minibore Columns (mm)							SecurityGuard Cartridges (mm)
Phases	50 x 1.0	150 x 1.0	30 x 2.0	50 x 2.0	100 x 2.0	150 x 2.0	4 x 2.0*
Silica(2)	—	00F-4162-A0	—	00B-4162-B0	00D-4162-B0	00F-4162-B0	AJ0-4347
C8(2)	—	—	00A-4248-B0	00B-4248-B0	00D-4248-B0	00F-4248-B0	AJ0-4289
C18(2)	00B-4251-A0	00F-4251-A0	00A-4251-B0	00B-4251-B0	00D-4251-B0	00F-4251-B0	AJ0-4286
CN	—	—	—	00B-4254-B0	00D-4254-B0	00F-4254-B0	AJ0-4304
Phenyl-Hexyl	—	—	—	00B-4256-B0	00D-4256-B0	00F-4256-B0	AJ0-4350
NH ₂	—	00F-4377-A0	00A-4377-B0	00B-4377-B0	00D-4377-B0	00F-4377-B0	AJ0-4301
HILIC	—	—	—	00B-4449-B0	00D-4449-B0	00F-4449-B0	AJ0-8328
PFP(2)	—	00F-4447-A0	00A-4447-B0	00B-4447-B0	00D-4447-B0	00F-4447-B0	AJ0-8326

for ID: 2.0-3.0 mm

HPLC Columns (cont'd)

Ordering Information (continued)

3µm MidBore™ and Analytical Columns (mm)								SecurityGuard™ Cartridges (mm)		
Phases	30 x 3.0	50 x 3.0	150 x 3.0	30 x 4.6	50 x 4.6	75 x 4.6	100 x 4.6	150 x 4.6	4 x 2.0*	4 x 3.0*
									/10pk	/10pk
Silica(2)	—	00B-4162-Y0	00F-4162-Y0	00A-4162-E0	00B-4162-E0	—	00D-4162-E0	00F-4162-E0	AJ0-4347	AJ0-4348
C8(2)	00A-4248-Y0	00B-4248-Y0	00F-4248-Y0	00A-4248-E0	00B-4248-E0	00C-4248-E0	00D-4248-E0	00F-4248-E0	AJ0-4289	AJ0-4290
C18(2)	00A-4251-Y0	00B-4251-Y0	00F-4251-Y0	00A-4251-E0	00B-4251-E0	00C-4251-E0	00D-4251-E0	00F-4251-E0	AJ0-4286	AJ0-4287
CN	—	00B-4254-Y0	00F-4254-Y0	00A-4254-E0	00B-4254-E0	00C-4254-E0	00D-4254-E0	00F-4254-E0	AJ0-4304	AJ0-4305
Phenyl-Hexyl	—	00B-4256-Y0	00F-4256-Y0	—	00B-4256-E0	00C-4256-E0	00D-4256-E0	00F-4256-E0	AJ0-4350	AJ0-4351
NH ₂	—	00B-4377-Y0	00F-4377-Y0	—	00B-4377-E0	—	00D-4377-E0	00F-4377-E0	AJ0-4301	AJ0-4302
HILIC	—	00B-4449-Y0	00F-4449-Y0	—	—	—	00D-4449-E0	00F-4449-E0	AJ0-8328	AJ0-8329
PFP(2)	—	00B-4447-Y0	00F-4447-Y0	—	00B-4447-E0	—	00D-4447-E0	00F-4447-E0	AJ0-8326	AJ0-8327

for ID: 2.0-3.0 mm 3.2-8.0 mm

5µm Microbore and Minibore Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	150 x 1.0	30 x 2.0	50 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0*
						/10pk
Silica(2)	—	00A-4274-B0	00B-4274-B0	00F-4274-B0	00G-4274-B0	AJ0-4347
C5	—	00A-4043-B0	00B-4043-B0	00F-4043-B0	—	AJ0-4292
C8(2)	—	00A-4249-B0	00B-4249-B0	00F-4249-B0	00G-4249-B0	AJ0-4289
C18(2)	00F-4252-A0	00A-4252-B0	00B-4252-B0	00F-4252-B0	00G-4252-B0	AJ0-4286
CN	—	—	00B-4255-B0	00F-4255-B0	—	AJ0-4304
Phenyl-Hexyl	—	00A-4257-B0	00B-4257-B0	00F-4257-B0	00G-4257-B0	AJ0-4350
NH ₂	—	00A-4378-B0	00B-4378-B0	00F-4378-B0	00G-4378-B0	AJ0-4301
PFP(2)	—	00A-4448-B0	00B-4448-B0	00F-4448-B0	—	AJ0-8326

for ID: 2.0-3.0 mm



5µm MidBore and Analytical Columns (mm)							SecurityGuard™ Cartridges (mm)		
Phases	30 x 3.0	50 x 3.0	150 x 3.0	250 x 3.0	30 x 4.6	50 x 4.6	75 x 4.6	4 x 2.0*	4 x 3.0*
								/10pk	/10pk
Silica(2)	—	—	—	—	—	00B-4274-E0	—	AJ0-4347	AJ0-4348
C5	—	—	00F-4043-Y0	—	—	00B-4043-E0	—	AJ0-4292	AJ0-4293
C8(2)	—	00B-4249-Y0	00F-4249-Y0	00G-4249-Y0	00A-4249-E0	00B-4249-E0	00C-4249-E0	AJ0-4289	AJ0-4290
C18(2)	00A-4252-Y0	00B-4252-Y0	00F-4252-Y0	00G-4252-Y0	00A-4252-E0	00B-4252-E0	00C-4252-E0	AJ0-4286	AJ0-4287
CN	—	—	00F-4255-Y0	00G-4255-Y0	00A-4255-E0	00B-4255-E0	00C-4255-E0	AJ0-4304	AJ0-4305
Phenyl-Hexyl	—	00B-4257-Y0	00F-4257-Y0	00G-4257-Y0	00A-4257-E0	00B-4257-E0	—	AJ0-4350	AJ0-4351
NH ₂	—	00B-4378-Y0	00F-4378-Y0	00G-4378-Y0	—	00B-4378-E0	—	AJ0-4301	AJ0-4302
SCX	—	—	00F-4398-Y0	—	—	00B-4398-E0	—	AJ0-4307	AJ0-4308
HILIC	—	—	00F-4450-Y0	—	—	—	—	AJ0-8328	AJ0-8329
PFP(2)	—	—	00F-4448-Y0	—	—	00B-4448-E0	—	AJ0-8326	AJ0-8327

for ID: 2.0-3.0 mm 3.2-8.0 mm

5µm Analytical and Semi-Prep Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	100 x 4.6	150 x 4.6	250 x 4.6	250 x 10	4 x 3.0*	10 x 10 [‡]
					/10pk	/3pk
Silica(2)	00D-4274-E0	00F-4274-E0	00G-4274-E0	00G-4274-N0	AJ0-4348	AJ0-7223
C5	00D-4043-E0	00F-4043-E0	00G-4043-E0	00G-4043-N0	AJ0-4293	AJ0-7372
C8(2)	00D-4249-E0	00F-4249-E0	00G-4249-E0	00G-4249-N0	AJ0-4290	AJ0-7222
C18(2)	00D-4252-E0	00F-4252-E0	00G-4252-E0	00G-4252-N0	AJ0-4287	AJ0-7221
CN	00D-4255-E0	00F-4255-E0	00G-4255-E0	00G-4255-N0	AJ0-4305	AJ0-7313
Phenyl-Hexyl	00D-4257-E0	00F-4257-E0	00G-4257-E0	00G-4257-N0	AJ0-4351	AJ0-7314
NH ₂	00D-4378-E0	00F-4378-E0	00G-4378-E0	00G-4378-N0	AJ0-4302	AJ0-7364
SCX	00D-4398-E0	00F-4398-E0	00G-4398-E0	00G-4398-N0	AJ0-4308	AJ0-7369
HILIC	00D-4450-E0	00F-4450-E0	00G-4450-E0	00G-4450-N0	AJ0-8329	AJ0-8902
PFP(2)	00D-4448-E0	00F-4448-E0	00G-4448-E0	00G-4448-N0	AJ0-8327	AJ0-8376

for ID: 3.2-8.0 mm 9-16 mm



For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 317-318

*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)
[‡]SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJ0-9281](#)

Preparative Columns

Ordering Information (continued)

5 µm Axia™ Packed Preparative Columns (mm)								SecurityGuard™ Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	50 x 30	100 x 30	250 x 30	15 x 21.2**	15 x 30 *
Silica(2)	—	00D-4274-PO-AX	00F-4274-PO-AX	00G-4274-PO-AX	—	—	00G-4274-UO-AX	AJ0-7229	AJ0-8312
C5	—	—	—	00G-4043-PO-AX	—	—	—	—	—
C8(2)	—	—	00F-4249-PO-AX	00G-4249-PO-AX	—	00D-4249-UO-AX	—	AJ0-7840	AJ0-8302
C18(2)	00B-4252-PO-AX	00D-4252-PO-AX	00F-4252-PO-AX	00G-4252-PO-AX	00B-4252-UO-AX	00D-4252-UO-AX	00G-4252-UO-AX	AJ0-7839	AJ0-8301
CN	—	—	—	00G-4255-PO-AX	—	—	00G-4255-UO-AX	AJ0-8220	AJ0-8311
Phenyl-Hexyl	—	—	00F-4257-PO-AX	00G-4257-PO-AX	—	—	00G-4257-UO-AX	AJ0-7841	AJ0-8303
NH ₂	—	—	00F-4378-PO-AX	00G-4378-PO-AX	—	—	—	AJ0-8162	AJ0-8309
PPF(2)	—	00D-4448-PO-AX	00F-4448-PO-AX	00G-4448-PO-AX	—	00D-4448-UO-AX	—	AJ0-8377	AJ0-8378
HILIC	—	00D-4450-PO-AX	00F-4450-PO-AX	00G-4450-PO-AX	—	—	00G-4450-UO-AX	AJ0-8829	AJ0-8830

for ID: 18-29 mm 30-49 mm

10 µm Axia™ Packed Preparative Columns (mm) (continued)						SecurityGuard Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	250 x 21.2	250 x 30	250 x 50	15 x 21.2**	15 x 30 *
Silica(2)	—	—	00G-4091-PO-AX	00G-4091-UO-AX	00G-4091-V0-AX	AJ0-7229	AJ0-8312
C5	—	00D-4092-PO-AX	00G-4092-PO-AX	—	00G-4092-V0-AX	—	—
C8(2)	—	—	00G-4250-PO-AX	—	00G-4250-V0-AX	AJ0-7840	AJ0-8302
C18(2)	00B-4253-PO-AX	00D-4253-PO-AX	00G-4253-PO-AX	00G-4253-UO-AX	00G-4253-V0-AX	AJ0-7839	AJ0-8301
CN	—	—	00G-4300-PO-AX	—	—	AJ0-8220	AJ0-8311
Phenyl-Hexyl	—	—	00G-4285-PO-AX	00G-4285-UO-AX	—	AJ0-7841	AJ0-8303
NH ₂	—	—	00G-4379-PO-AX	—	—	AJ0-8162	AJ0-8309

for ID: 18-29 mm 30-49 mm



Pilot Scale Columns

Ordering Information

10 µm Analytical and Semi-Prep Columns (mm)			SecurityGuard Cartridges (mm)	
Phases	250 x 4.6	250 x 10	4 x 3.0*	10 x 10†
Silica(2)	00G-4091-E0	00G-4091-N0	AJ0-4348	AJ0-7223
C8(2)	00G-4250-E0	00G-4250-N0	AJ0-4290	AJ0-7222
C18(2)	00G-4253-E0	00G-4253-N0	AJ0-4287	AJ0-7221
CN	00G-4300-E0	—	AJ0-4305	AJ0-7313
Phenyl-Hexyl	00G-4285-E0	00G-4285-N0	AJ0-4351	AJ0-7314
NH ₂	00G-4379-E0	00G-4379-N0	AJ0-4302	AJ0-7364
SCX	00G-4401-E0	00G-4401-N0	AJ0-4308	AJ0-7369

for ID: 3.2-8.0 mm 9-16 mm



*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)
 †SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)
 **PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)
 ††PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8277](#)

10 µm-PREP Columns (mm)		
Phases	250 x 4.6	250 x 10
Silica(3)	00G-4617-E0	00G-4617-N0
C8(3)	00G-4623-E0	00G-4623-N0
C18(3)	00G-4616-E0	00G-4616-N0

15 µm Pilot Scale Columns (mm)	
Phases	250 x 4.6
C18(2)	00G-4273-E0
Phenyl-Hexyl	00G-4286-E0



See our latest developments in High-throughput Purifications starting on page 352
 For more dimensions and phases of Axia packed preparative columns, see p. 362
 For SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315
 For additional Luna 10 µm-PREP Scout/Pilot Scale columns, see p. 367
 For Bulk Media, see p. 368



Method development column kits and method validation column kits are available. Contact Phenomenex for details.

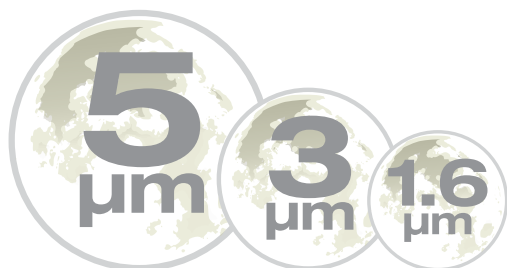
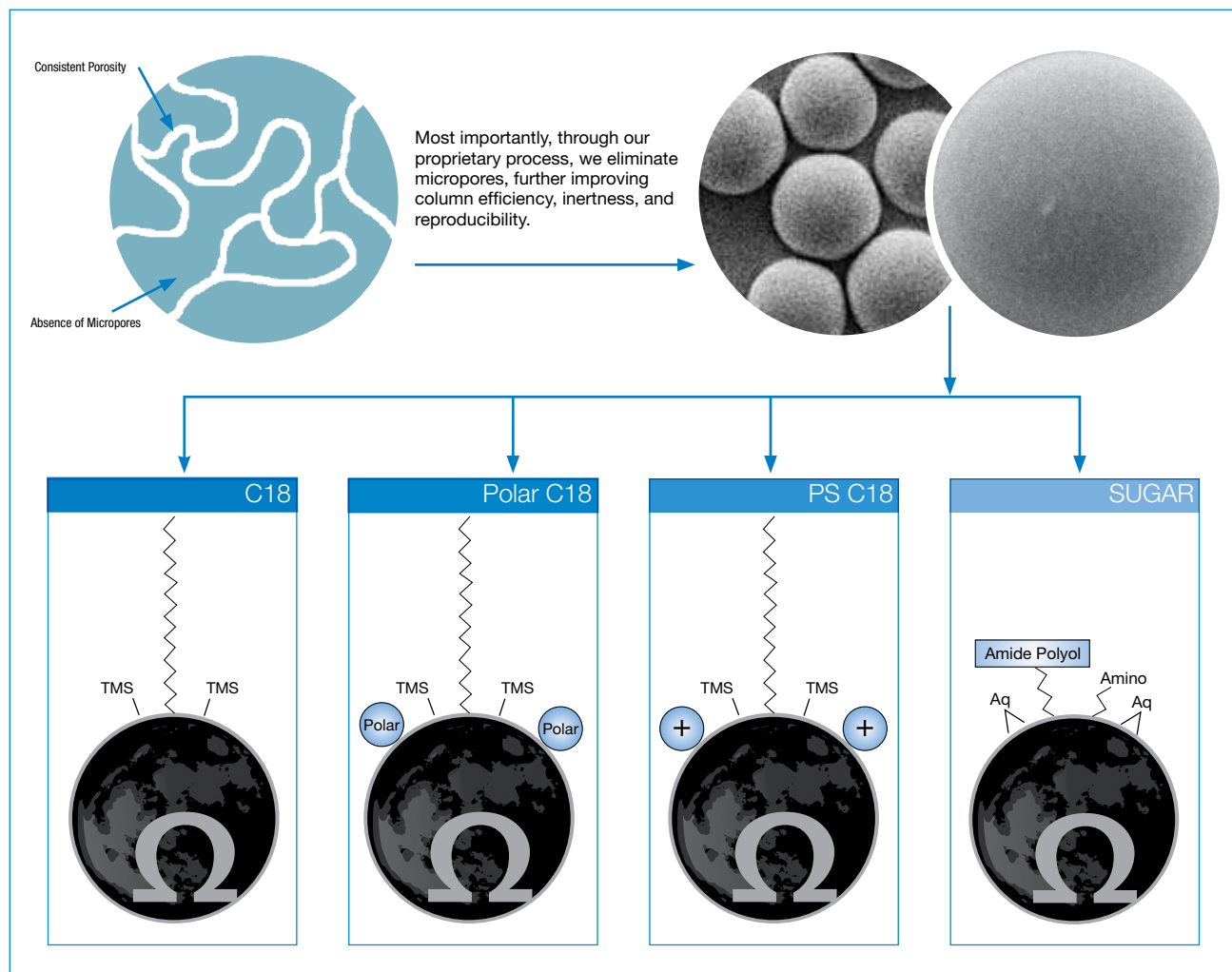


Improve analyte sensitivity and reduce baseline noise with Strata SPE tubes and well plates, see p. 70 for more information

Luna Omega Silica

The Luna Omega 1.6µm, 3µm, and 5µm particles build upon the Luna legacy with an innovative yet rugged UHPLC and HPLC silica particle architecture. The novel manufacturing process implements a proprietary processing technique to gain greater particle inertness, a stronger particle morphology, and more consistent porosity.

Thermal Modified Pore Structure

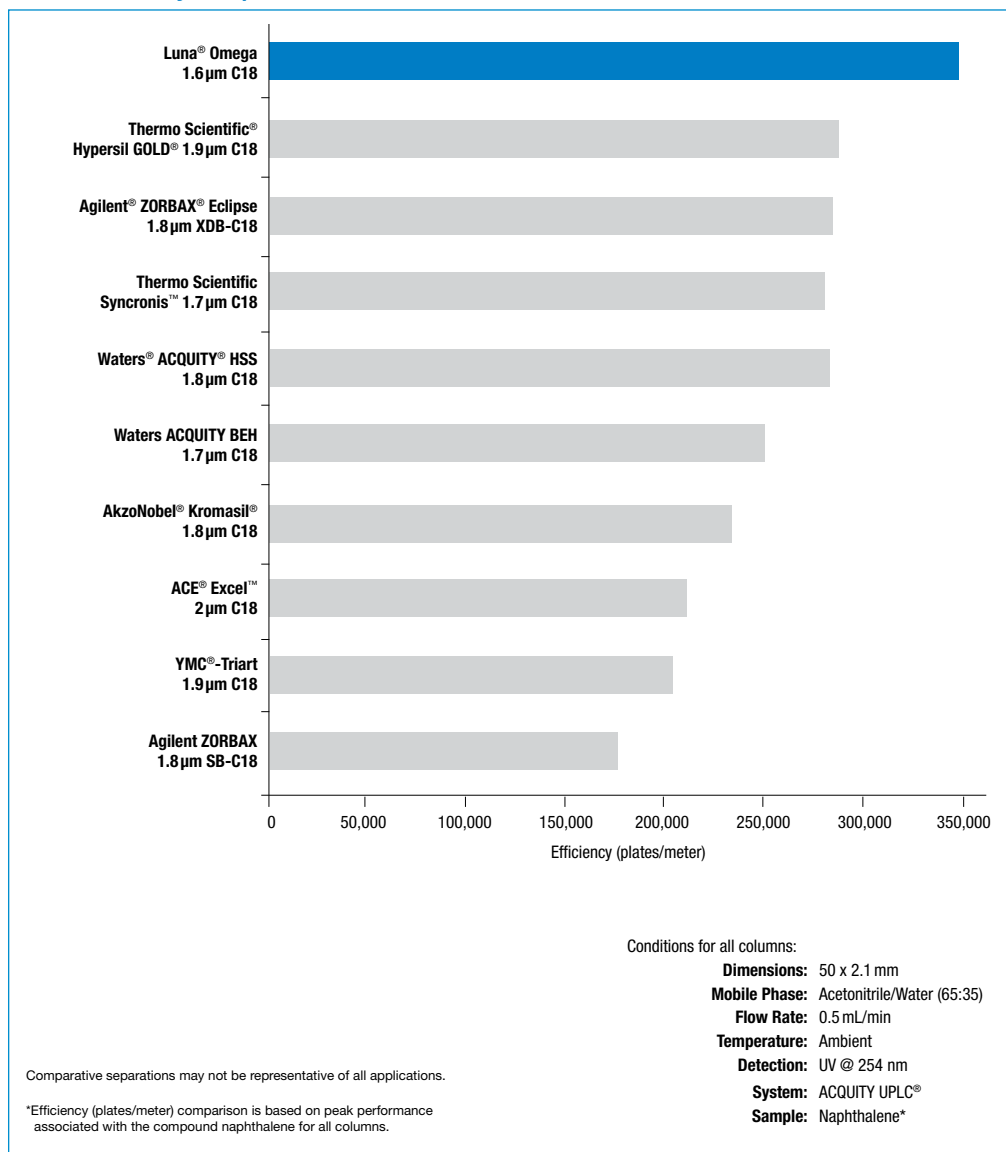


Astounding Performance

The undeniably high efficiency levels found in each Luna Omega UHPLC column provide you with the potential of huge gains in method performance. While traditional silica and hybrid fully porous

particles claim high performance, when compared to Luna Omega 1.6µm, they drastically fall short and prevent UHPLC scientists from reaching their UHPLC potential

UHPLC Efficiency Comparison



Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 391-392

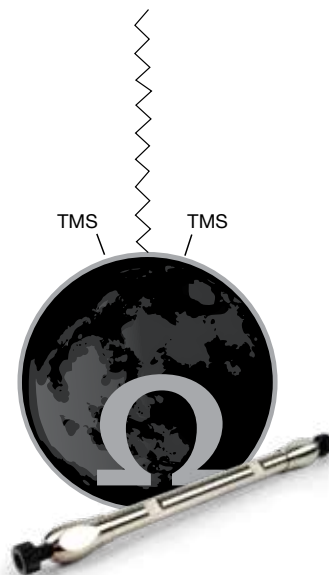
Luna Omega C18

Luna Omega C18 is an excellent first choice for chromatographers who are just starting method development or attempting to improve upon existing chromatographic results with other C18s. With its higher performance potential, excellent retention profile, and greater inertness, the Luna Omega C18 was designed to be the new all-purpose UHPLC solution for industries all over the world.

Materials Characteristics

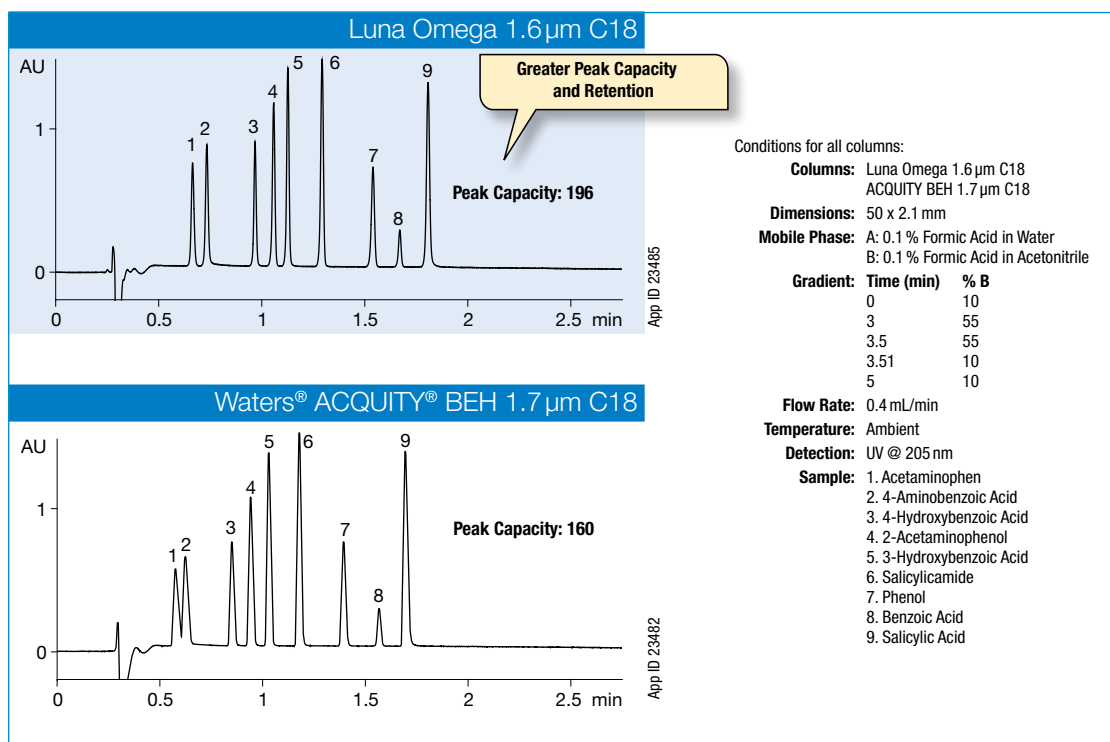
Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
C18	1.6	100	260	11	1.5 - 8.5*	1034	L1

*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.



Greater Retention and Better Results

Higher efficiency levels in combination with excellent stationary phase coverage and greater particle inertness, translates to improved separation power for you. Now you can utilize the greater retention of Luna Omega C18 to tackle both easy and difficult separations.



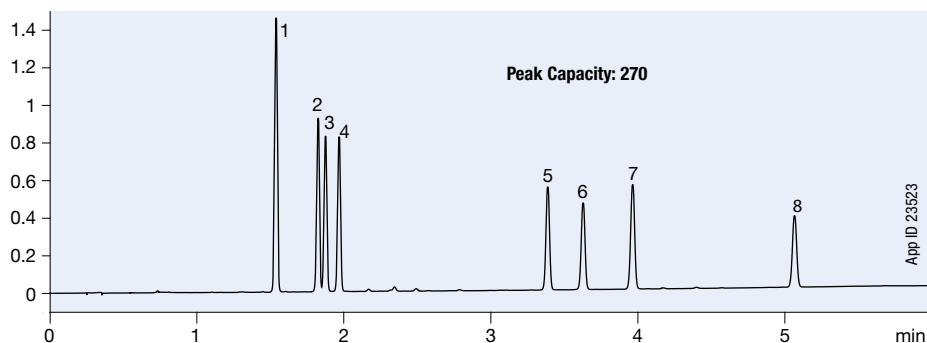
Comparative separations may not be representative of all applications.

Luna Omega C18 (cont'd)

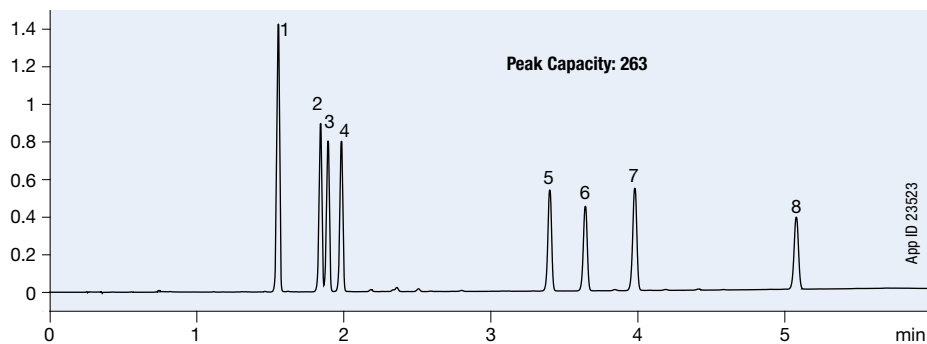
Consistent Batch-to-Batch Reproducibility

Batch-to-batch and column-to-column, Luna Omega media and columns are designed to be consistent and incredibly accurate tools for your analysis. Each batch and column are quality tested to ensure dependability and reproducibility.

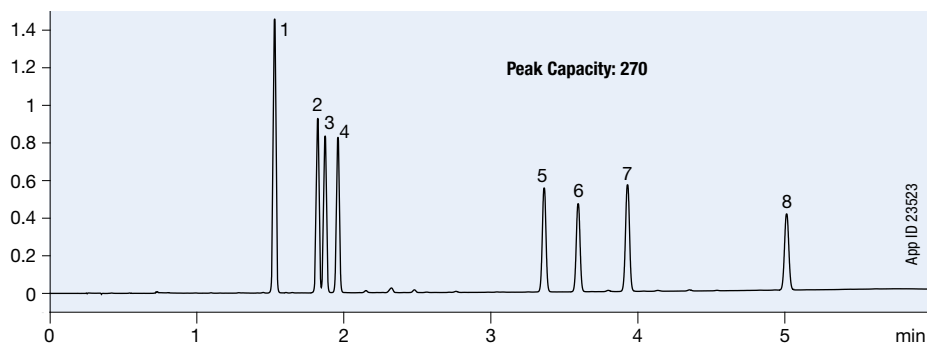
Luna Omega C18 – Batch A



Luna Omega C18 – Batch B



Luna Omega C18 – Batch C



Conditions for all columns:

Columns: Luna Omega 1.6 µm C18

Dimensions: 50 x 2.1 mm

Part No.: [00B-4742-AN](#)

Mobile Phase: A: Water
B: Acetonitrile

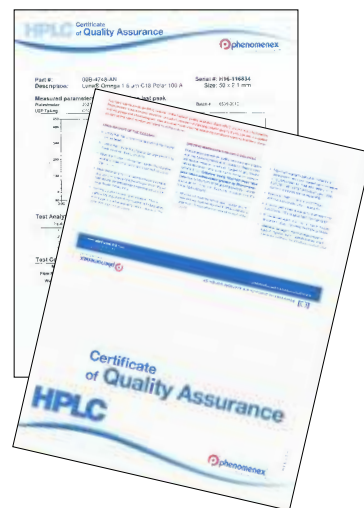
Gradient:	Time (min)	% B
	0	20
	6	60
	6.01	20
	8	20

Flow Rate: 0.4 mL/min

Temperature: Ambient

Detection: UV @ 220 nm

Sample: 1. Estriol
2. Prednisolone
3. Hydrocortisone
4. Cortisone
5. Cortisone Acetate
6. 21-Hydroxycortisone
7. 17-Hydroxycortisone
8. Deoxycorticosterone



Luna Omega PS C18

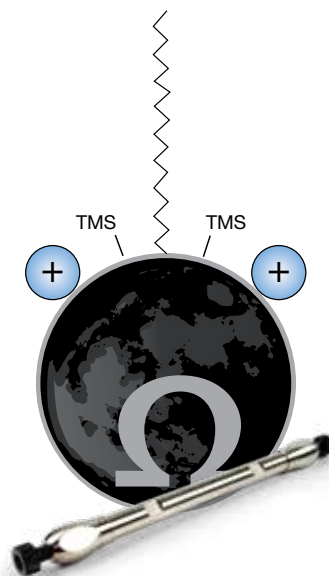
Luna Omega PS C18 is a unique mixed-mode stationary phase that provides incredibly useful polar and non-polar retention. The surface of the PS C18 contains a positive charge which aids in the retention of acidic compounds through ionic interactions, while the C18 ligand promotes general reversed phase retention. This mixed-mode selectivity allows for greater separation between compounds with varying functional groups.

Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
PS C18	1.6, 3, 5	100	260	9	1.5 - 8.5*	1034/345**	L1

*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

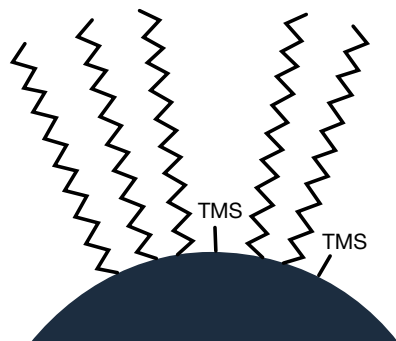
**1.6µm Luna Omega columns are pressure stable up to 1034 bar and 3 or 5µm are stable up to 345 bar.



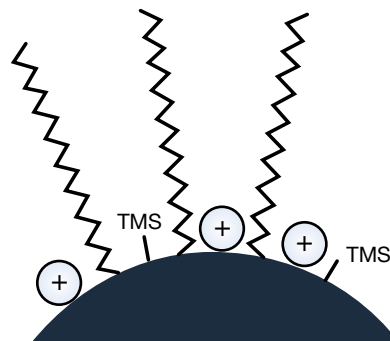
A C18, But More Positive

Luna Omega PS C18 has been fine-tuned and manufactured by Phenomenex to provide a mixed selectivity that is highly useful for method development involving either combinations of polars and non-polars, or just one single compound class with small changes in functional groups.

Luna Omega C18 silica surface



Luna Omega PS C18 silica surface

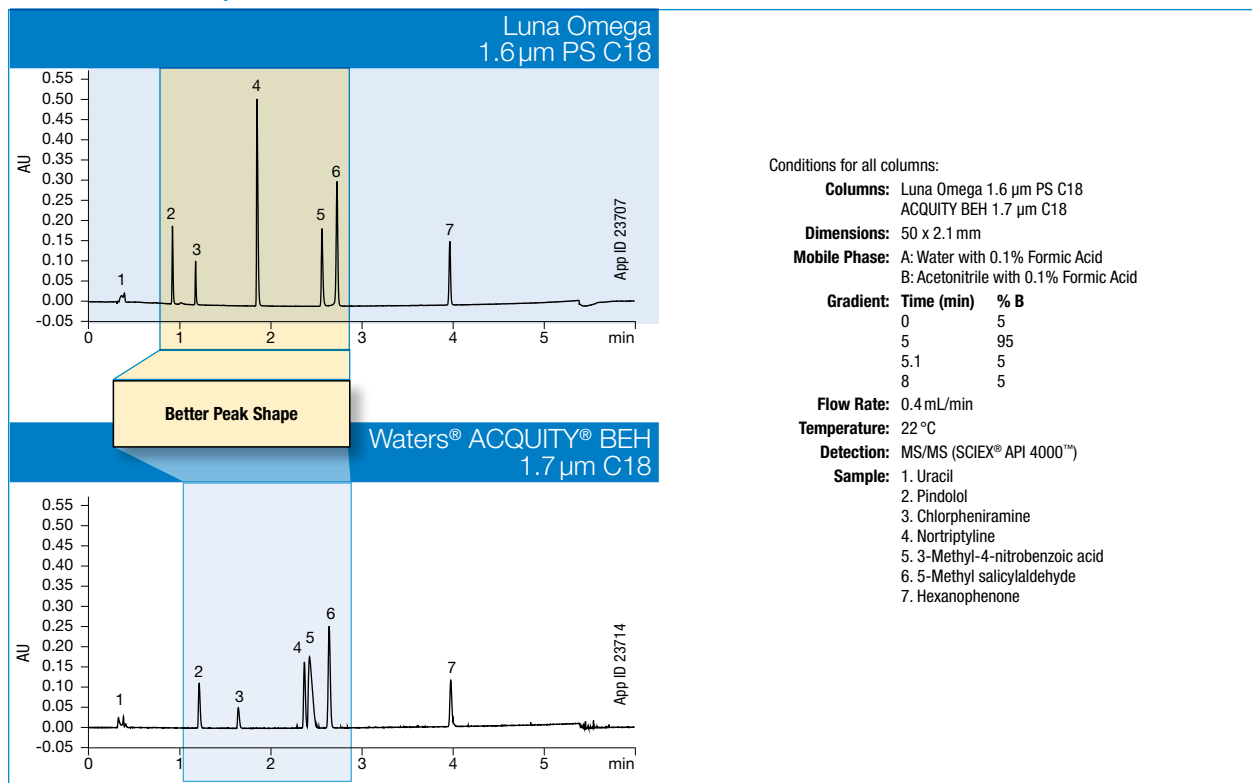


Luna Omega PS C18 (cont'd)

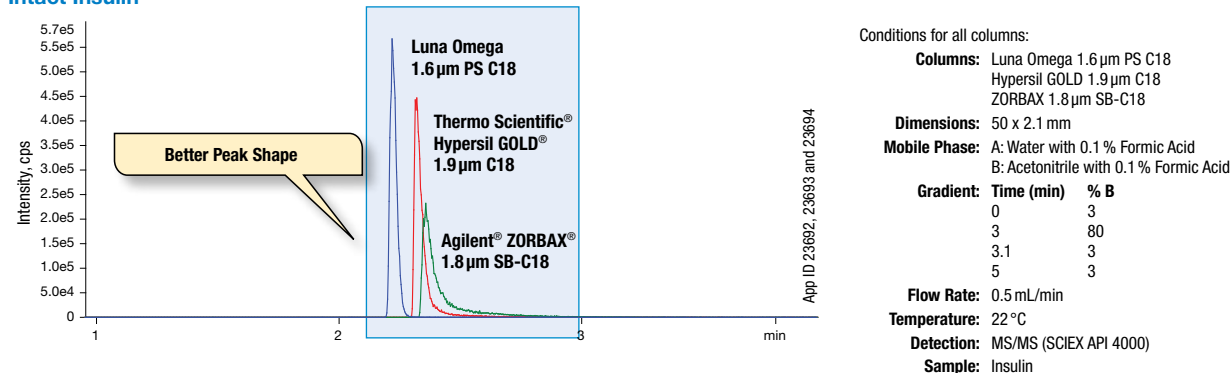
Better Peak Shape for Bases

While traditional alkyl phases are prone to show tailing for basic compounds because of secondary interactions occurring at the silica surface, the surface of the Luna Omega PS C18 was designed with positive charges that serve to repel strong basic species and consistently display sharp peak shape.

Pharmaceutical Compound Mixture



Intact Insulin



Comparative separations may not be representative of all applications.

Luna Omega Polar C18

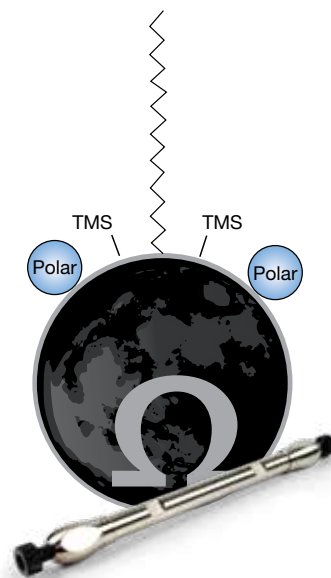
Luna Omega Polar C18 is a novel UHPLC stationary phase capable of providing a unique selectivity within a wide elution window and increased retention for both polar and non-polar analytes. The all-purpose C18 ligand provides hydrophobic interactions while a polar modified particle surface provides enhanced polar retention and also aqueous stability. These attributes make the Luna Omega Polar C18 an excellent choice for balanced retention of polar and hydrophobic compounds as well as to solely enhance retention of highly polar compounds.

Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
Polar C18	1.6, 3, 5	100	260	9	1.5 - 8.5*	1034/345**	L1

*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

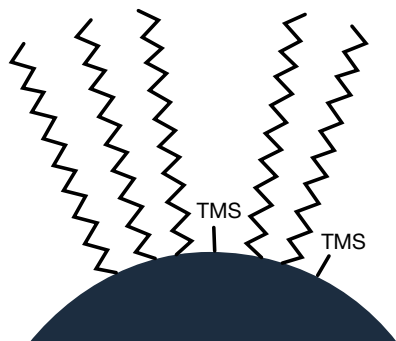
**1.6µm Luna Omega columns are pressure stable up to 1034 bar and 3 or 5µm are stable up to 345 bar.



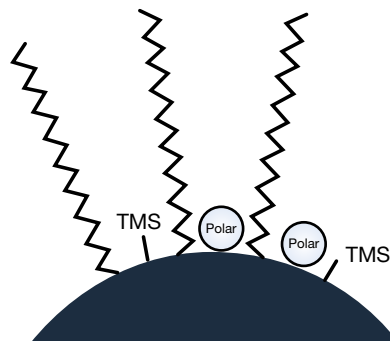
A C18, But Different

Luna Omega Polar C18 is a uniquely modified C18-based chemistry that has been optimized to improve the performance of polar analyses. This new particle surface chemistry makes the Polar C18 applicable to all industries that utilize UHPLC for mixtures of polar and non-polar compounds.

Luna Omega C18 silica surface



Luna Omega Polar C18 silica surface

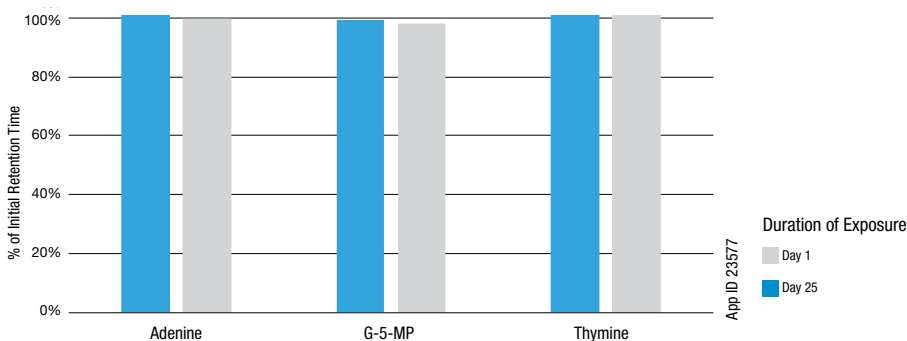


Luna Omega Polar C18 (cont'd)

No Stationary Phase Collapse

Traditional C18 phases are known to collapse under 100% aqueous conditions, causing retention loss of compounds and method development headaches. That is why an advanced proprietary bonding technology was used for the Luna Omega Polar C18 in order to ensure aqueous stability. The graph below displays the excellent stability of Polar C18 in 100% aqueous buffer conditions for over 2 weeks.

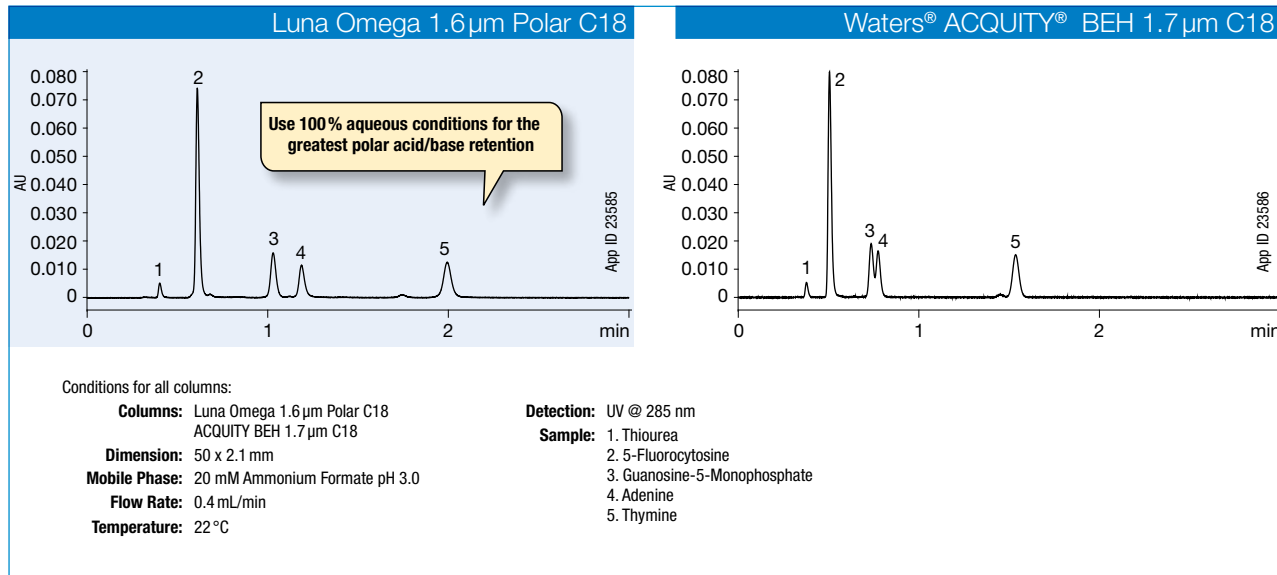
Aqueous Stability of Luna Omega Polar C18



Conditions for all columns:

Columns: Luna Omega 1.6 µm Polar C18	Temperature: 22 °C
Dimension: 50 x 2.1 mm	Detection: UV @ 254 nm
Part No.: 00B-4748-AN	Sample: 1. Adenine
Mobile Phase: 10 mM Ammonium Formate with 0.1 % Formic Acid	2. Guanosine-5-Monophosphate
Flow Rate: 0.4 mL/min	3. Thymine

Nucleosides in 100% Aqueous Conditions



Comparative separations may not be representative of all applications.

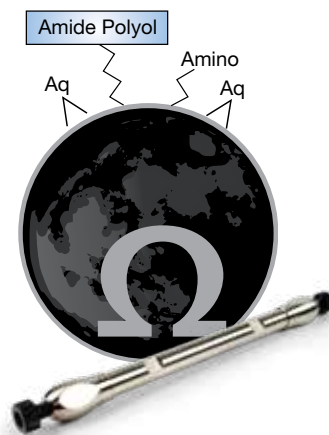
Luna Omega SUGAR

Luna Omega SUGAR breaks ground as it combines the performance benefits of thermally modified fully porous particles with a novel HILIC stationary phase that excels at polar compound retention and selectivity.

- Improved carbohydrate retention and separation with multi-functional selectivity that contains amide/amino stationary phase and polar endcapping
- Enhanced lifetime with highly robust and efficient thermally modified fully porous particle
- QC tested for sugars to ensure reliable quality

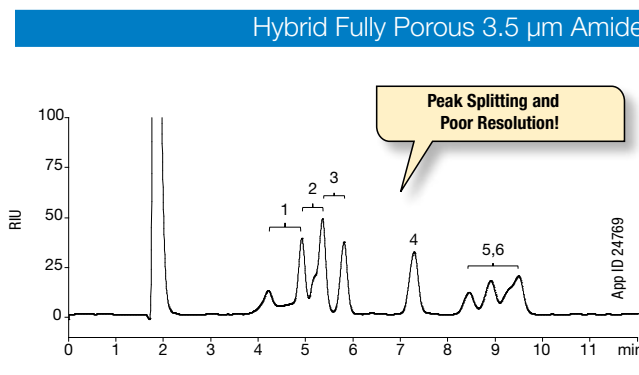
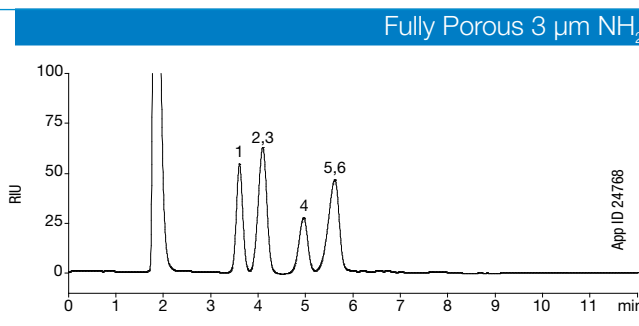
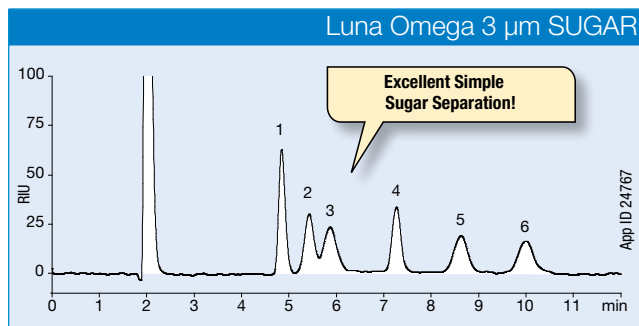
Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
Luna Omega SUGAR	3	100	260	<2	2.0-7.0	345	L8



Exceptional Retention and Separation

Luna Omega SUGAR greatly improves upon the retention and separation capabilities of traditional fully porous, core-shell, and hybrid materials, while also allowing for greater peak response! All this while also ensuring that customers do not need to depend on buffers or ion-pair agents to get adequate separation at the cost of losing signal.



Conditions for all columns:

Columns: Luna Omega 3 µm SUGAR
Fully Porous 3 µm NH₂
Hybrid Fully Porous 3.5 µm Amide

Dimensions: 150 x 4.6 mm

Mobile Phase: Acetonitrile/Water (75:25)

Flow Rate: 1 mL/min

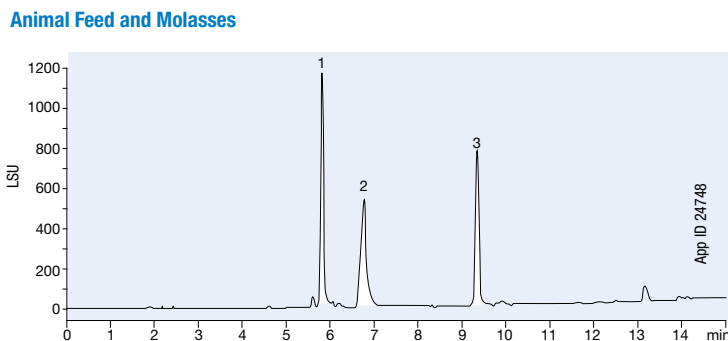
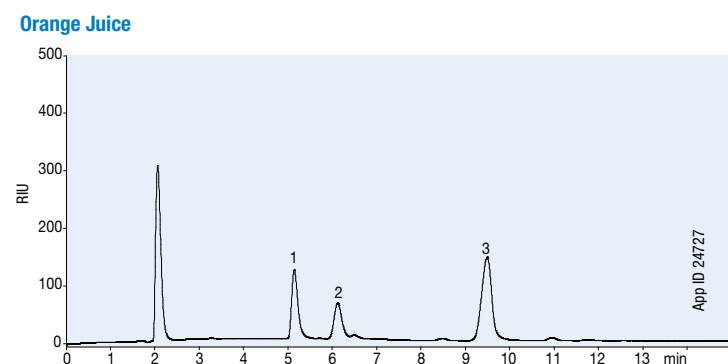
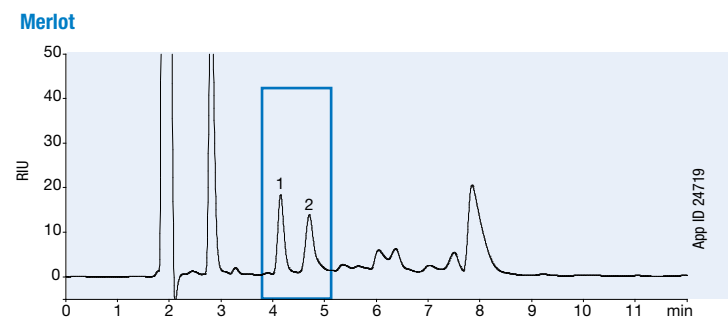
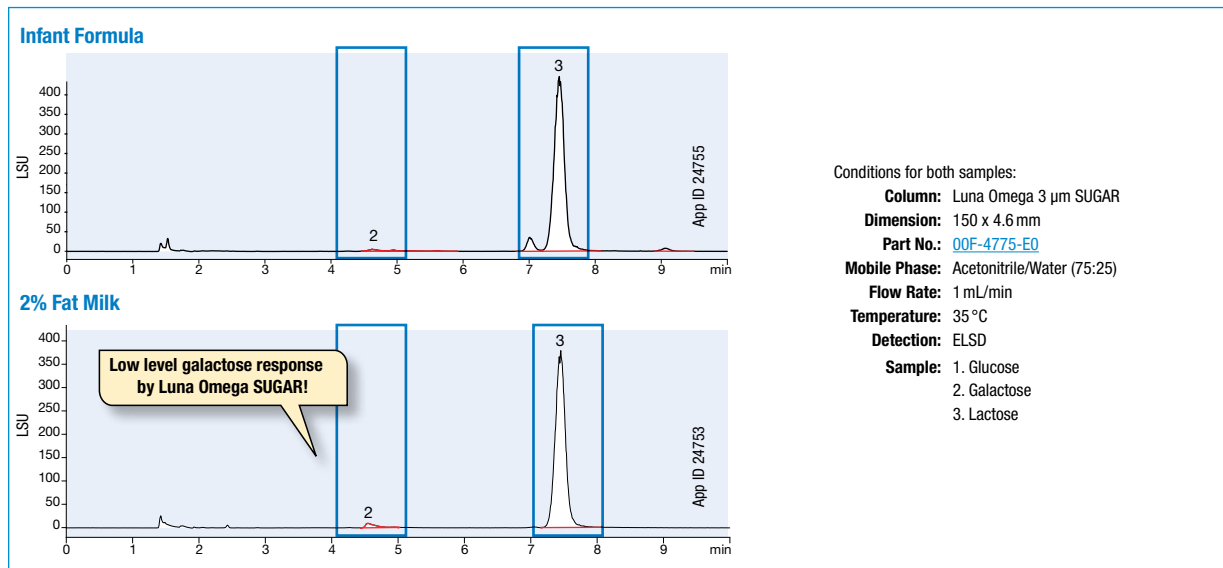
Temperature: 25 °C

Detection: RI

Sample:
1. Fructose
2. Glucose
3. Galactose
4. Sucrose
5. Maltose
6. Lactose

Comparative separations may not be representative of all applications.

Luna Omega SUGAR (cont'd)



Luna® Omega

Ordering Information

1.6 µm Microbore Columns (mm)			
Phases	50 x 1.0	100 x 1.0	150 x 1.0
Polar C18	00B-4748-A0	00D-4748-A0	00F-4748-A0
PS C18	00B-4752-A0	00D-4752-A0	—
C18	—	00D-4742-A0	00F-4742-A0

1.6 µm Minibore Columns (mm)					SecurityGuard™ ULTRA Cartridges [‡]
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
Polar C18	00A-4748-AN	00B-4748-AN	00D-4748-AN	00F-4748-AN	AJ0-9505
PS C18	00A-4752-AN	00B-4752-AN	00D-4752-AN	00F-4752-AN	AJ0-9508
C18	00A-4742-AN	00B-4742-AN	00D-4742-AN	00F-4742-AN	AJ0-9502

for 2.1 mm ID

3 µm Capillary Columns (mm)							Trap Column
Phases	50 x 0.30	100 x 0.30	150 x 0.30	50 x 0.50	100 x 0.50	150 x 0.50	20 x 0.30
Polar C18	00B-4760-AC	00D-4760-AC	00F-4760-AC	00B-4760-AF	00D-4760-AF	00F-4760-AF	—
PS C18	00B-4758-AC	00D-4758-AC	00F-4758-AC	00B-4758-AF	00D-4758-AF	00F-4758-AF	05M-4758-AC

3 µm Minibore and MidBore™ Columns (mm)								SecurityGuard Cartridges (mm)
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	50 x 3.0	100 x 3.0	150 x 3.0	4 x 2.0*
Polar C18	00A-4760-AN	00B-4760-AN	00D-4760-AN	00F-4760-AN	00B-4760-Y0	00D-4760-Y0	00F-4760-Y0	AJ0-7600
PS C18	00A-4758-AN	00B-4758-AN	00D-4758-AN	00F-4758-AN	00B-4758-Y0	00D-4758-Y0	00F-4758-Y0	AJ0-7605
SUGAR	—	00B-4775-AN	00D-4775-AN	00F-4775-AN	—	—	00F-4775-Y0	AJ0-4496

for ID: 2.0-3.0 mm

3 µm Analytical Columns (mm)					SecurityGuard Cartridges (mm)
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
Polar C18	00B-4760-E0	00D-4760-E0	00F-4760-E0	00G-4760-E0	AJ0-7601
PS C18	00B-4758-E0	00D-4758-E0	00F-4758-E0	00G-4758-E0	AJ0-7606
SUGAR	—	00D-4775-E0	00F-4775-E0	00G-4775-E0	AJ0-4495

for ID: 3.2-8.0 mm

5 µm Minibore and MidBore™ Columns (mm)							SecurityGuard Cartridges (mm)
Phases	50 x 2.1	100 x 2.1	150 x 2.1	50 x 3.0	100 x 3.0	150 x 3.0	4 x 2.0*
Polar C18	00B-4754-AN	00D-4754-AN	00F-4754-AN	00B-4754-Y0	00D-4754-Y0	00F-4754-Y0	AJ0-7600
PS C18	00B-4753-AN	00D-4753-AN	00F-4753-AN	00B-4753-Y0	00D-4753-Y0	00F-4753-Y0	AJ0-7605

for ID: 2.0 - 3.0 mm

5 µm Analytical Columns (mm)					SecurityGuard Cartridges (mm)
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
Polar C18	00B-4754-E0	00D-4754-E0	00F-4754-E0	00G-4754-E0	AJ0-7601
PS C18	00B-4753-E0	00D-4753-E0	00F-4753-E0	00G-4753-E0	AJ0-7606

for ID: 3.2-8.0 mm

5 µm Semi-Preparative Columns (mm)		SecurityGuard Cartridges (mm)
Phases	250 x 10	10 x 10**
Polar C18	00G-4754-N0	AJ0-9519
PS C18	00G-4753-N0	AJ0-9520

for ID: 9-16 mm

5 µm Axia™ Packed Preparative Columns (mm)						SecurityGuard Cartridges (mm)	
Phases	150 x 21.2	250 x 21.2	150 x 30	250 x 30	250 x 50	15 x 21.2**	15 x 30.0*
Polar C18	00F-4754-PO-AX	00G-4754-PO-AX	00F-4754-UO-AX	00G-4754-UO-AX	00G-4754-VO-AX	AJ0-7603	AJ0-7604
PS C18	00F-4753-PO-AX	00G-4753-PO-AX	00F-4753-UO-AX	00G-4753-UO-AX	00G-4753-VO-AX	AJ0-7608	AJ0-7609

for ID: 18-29 mm

for ID: 30-49 mm



[‡] SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)
^{*} SecurityGuard Analytical Cartridges require holder, Part No.: [KJ0-4282](#)
^{***} SemiPREP SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

^{**} PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)
^{*} PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8277](#)

Replace CHIRALCEL[®] and CHIRALPAK[®] Columns at a Fraction of the Cost!

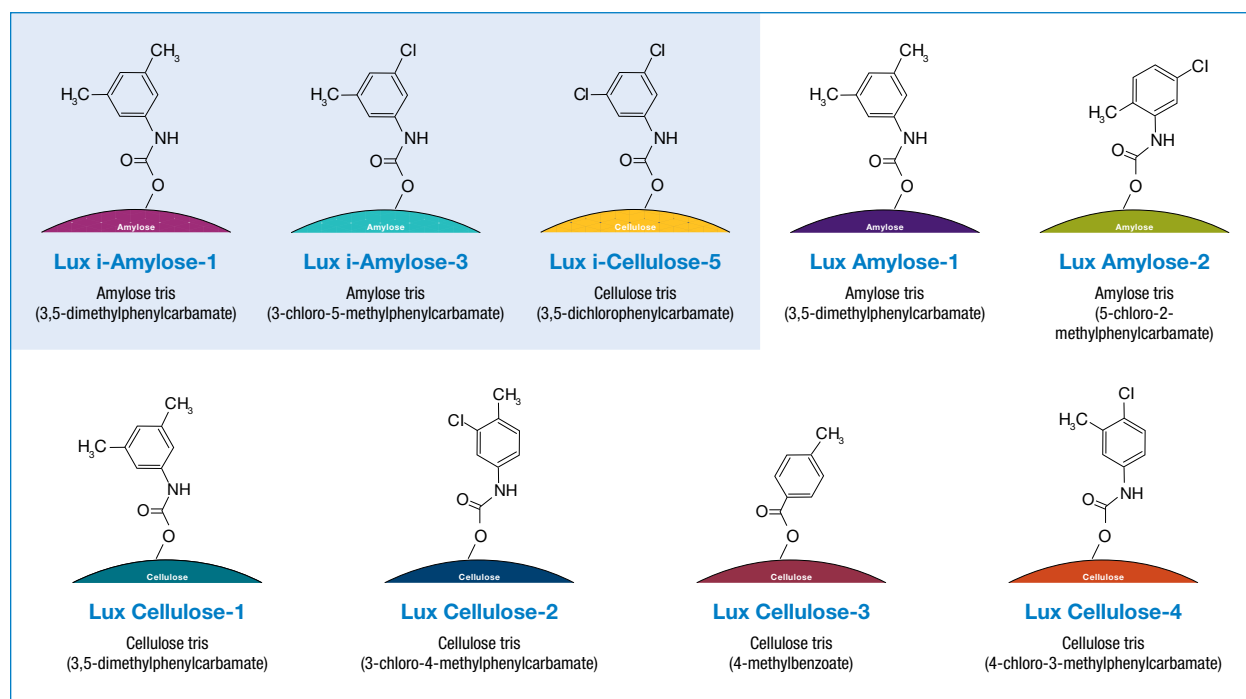
Lux coated and immobilized chiral columns are guaranteed to perform similar to or better than the equivalent DAICEL Chiral Technologies column of matching polysaccharide backbone and chiral selector at considerable cost savings. Lux phases can also provide alternative selectivity to other chiral selectors when separation is not achieved or when higher resolution is required.

Technical Specifications

Particle Size	3, 5, 10 ¹ , 20 ¹ μm
pH Stability	2-9
Stability	Normal phase, polar organic, SFC, and reversed phase conditions
Maximum Pressure	300 bar
Temperature Range	0-50 °C
Shipping Solvent	n-Hexane/2-propanol (9:1, v/v)
Switching Solvent	Methanol/Ethanol (9:1, v/v)

¹Please inquire for availability

Resolve Over 92% of Your Enantiomers with Our Nine Coated and Immobilized Phases!



Easily upgrade from your existing chiral columns to Lux LC/SFC columns!

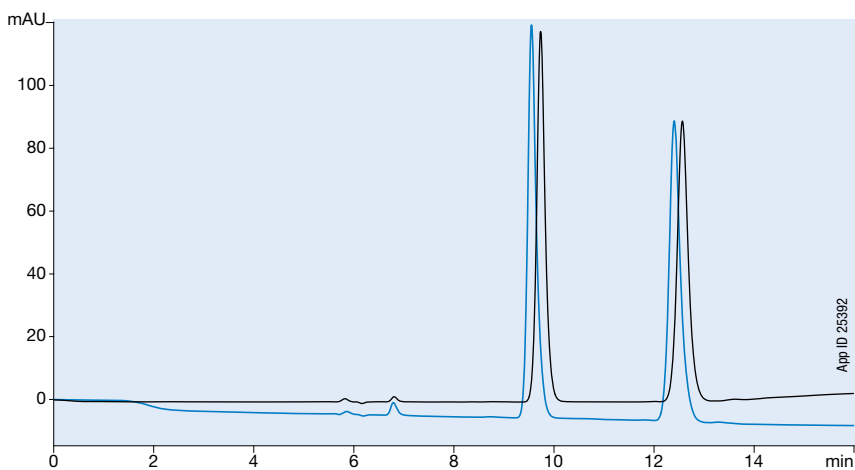
If you are using one of the DAICEL [®] columns below:	Guaranteed alternative:	Phase description:
CHIRALPAK [®] IA [®] and IA-3	Lux i-Amylose-1	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK [®] IG [®] and IG-3	Lux i-Amylose-3	Amylose tris(3-chloro-5-methylphenylcarbamate)
CHIRALPAK [®] IC [®] and IC-3	Lux i-Cellulose-5	Cellulose tris(3,5-dichlorophenylcarbamate)
CHIRALPAK [®] AD [®] , AD-H [®] , AD-3, AD-RH [®] , and AD-3R	Lux Amylose-1	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK [®] AV [®] , AV-H [®] , AV-3, AV-RH, and AV-3R	Lux Amylose-2	Amylose tris(5-chloro-2-methylphenylcarbamate)
CHIRALCEL [®] OD [®] , OD-H [®] , OD-3, OD-RH [®] , and OD-3R	Lux Cellulose-1	Cellulose tris(3,5-dimethylphenylcarbamate)
CHIRALCEL [®] OZ, OZ-H [®] , OZ-3, OZ-RH, and OZ-3R	Lux Cellulose-2	Cellulose tris(3-chloro-4-methylphenylcarbamate)
CHIRALCEL [®] OJ [®] , OJ-H [®] , OJ-3, OJ-RH [®] , and OJ-3R	Lux Cellulose-3	Cellulose tris(4-methylbenzoate)
CHIRALCEL [®] OX-H, OX-3, OX-RH, and OX-3R	Lux Cellulose-4	Cellulose tris(4-chloro-3-methylphenylcarbamate)

Lux Immobilized Chiral Selectors

The immobilization and bonding technology used within the Lux[®] i-Amylose-3 promotes column stability in strong organic solvents, which affords you the ability to expand your chiral separation success with more solvent systems and separation modes. Below is an example of stable retention time, separation, and peak shape

after exposure to strong solvents for both 5 and 3 μm particle sizes. The exposure to aggressive solvents DCM and THF did not affect the excellent performance of these Lux i-Amylose-3 columns. In addition, bonding technology that promotes robust reproducibility.

Strong Solvent Stability and Robustness



*Aggressive solvent stability was tested by flushing columns with DCM followed by THF before rerunning in mobile phase.

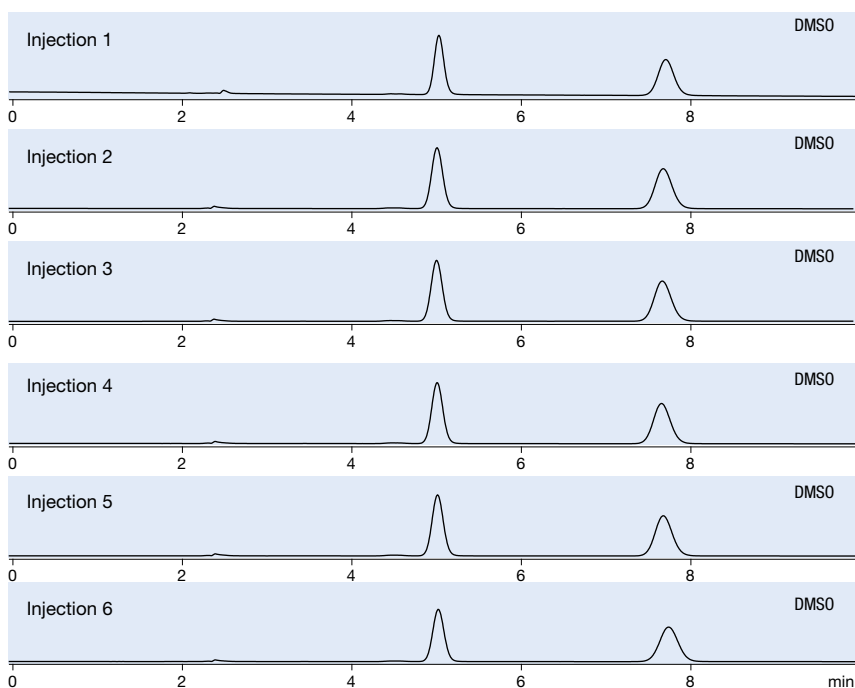
Conditions for all columns:

- Columns:** Lux 5 μm i-Amylose-3
Lux 3 μm i-Amylose-3
- Dimensions:** 250 x 4.6 mm
- Part No.:** [00G-4779-E0](#)
[00G-4778-E0](#)
- Mobile Phase:** Hexane/Isopropanol with 0.1% Diethylamine (80/20)
- Flow Rate:** 0.5 mL/min
- Injection Volume:** 10 μL (2 mg/mL)
- Detection:** UV @ 220 nm
- Sample:** 1. Trans-Stilbene Oxide
2. Trans-Stilbene Oxide

- Before Exposure to Strong Solvents (DCM & THF)*
- After Exposure

Load Samples in Desired Strong Solvents

With the strong solvent stability of the Lux immobilized phases (i-Amylose-3, i-Cellulose-5 and i-Amylose-1) comes the ability to keep samples diluted in the strong organic solvents that are needed for sample solubility or are directly from a reaction mixture.



Conditions for all columns:

- Column:** Lux 5 μm i-Cellulose-5
- Dimensions:** 250 x 4.6 mm
- Part No.:** [00G-4756-E0](#)
- Mobile Phase:** Methanol/DEA (100:0.1)
- Flow Rate:** 1.5 mL/min
- Detection:** UV @ 280 nm
- Temperature:** 27 °C
- Sample:** Laudanosine
- Dilution Solvent:** Dimethyl Sulfoxide (DMSO)

Solve compound solubility issues

by loading in strong organic solvents for preparative purifications on extremely robust Lux i-Amylose-3, i-Cellulose-5 and i-Amylose-1 AXIA™ packed columns.



Lux Chiral Stationary Phases

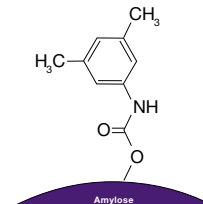
The Lux line of coated and immobilized cellulose-based and amylose-based chiral stationary phases includes eight complementary selectivities.



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

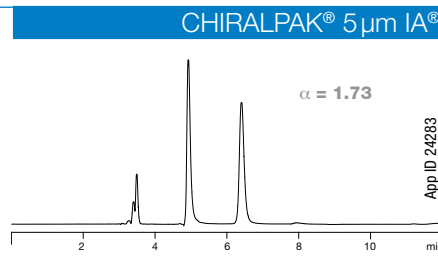
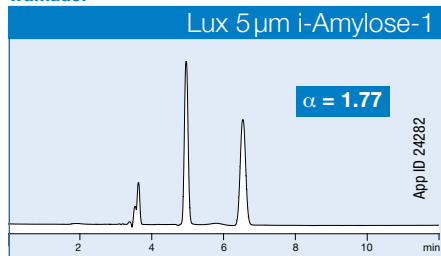
Lux i-Amylose-1: Immobilized 3,5-Dimethyl Phenylcarbamate Selector

Known to have broad enantio-recognition, this incredibly popular Amylose tris (3,5-dimethylphenylcarbamate) chiral selector provides polar, electrostatic, hydrophobic, van der Waals, and other retention mechanisms.



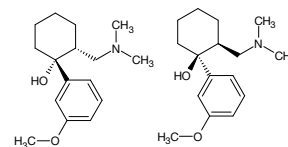
Amylose tris(3,5-dimethylphenylcarbamate)

Tramadol



Conditions for both columns:

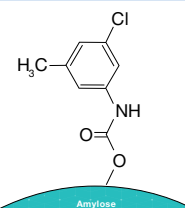
- Dimensions:** 250 x 4.6 mm
- Mobile Phase:** 0.1% DEA in Hexane / 0.1% DEA in IPA (90:10)
- Flow Rate:** 1 mL/min
- Detection:** UV @ 270 nm
- Temperature:** Ambient



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

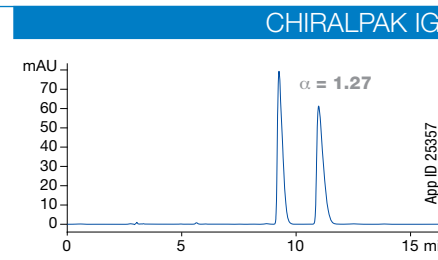
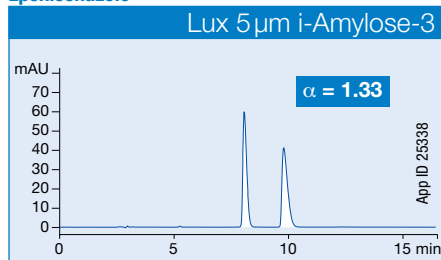
Lux i-Amylose-3: Immobilized 3-Chloro, 5-Methyl Phenylcarbamate Selector

Lux[®] immobilized chiral stationary phases provide complementary but distinct enantioselectivity for a wide range of chirality. In addition, the immobilization process allows for the use of a wide range of mobile phases and strong solvents, making the Lux immobilized phases an ideal set of chiral phases to start screening with.



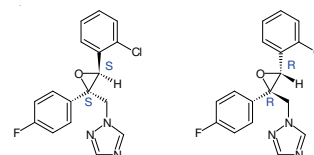
Amylose tris(3-chloro-5-methylphenylcarbamate)

Epoxiconazole



Conditions for both columns:

- Dimensions:** 250 x 4.6 mm
- Mobile Phase:** Water with 5 mM Ammonium Acetate + 0.05% Formic Acid/Acetonitrile (35:65)
- Flow Rate:** 1.0 mL/min
- Injection Volume:** 10 μL (2 mg/mL)
- Detection:** UV @ 254 nm
- Temperature:** Ambient



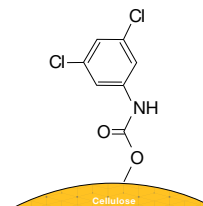
Columns used for comparison were manufactured by DAICEL Corporation. Phenomenex is in no way affiliated with DAICEL Corporation. Comparative separations may not be representative of all applications.



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

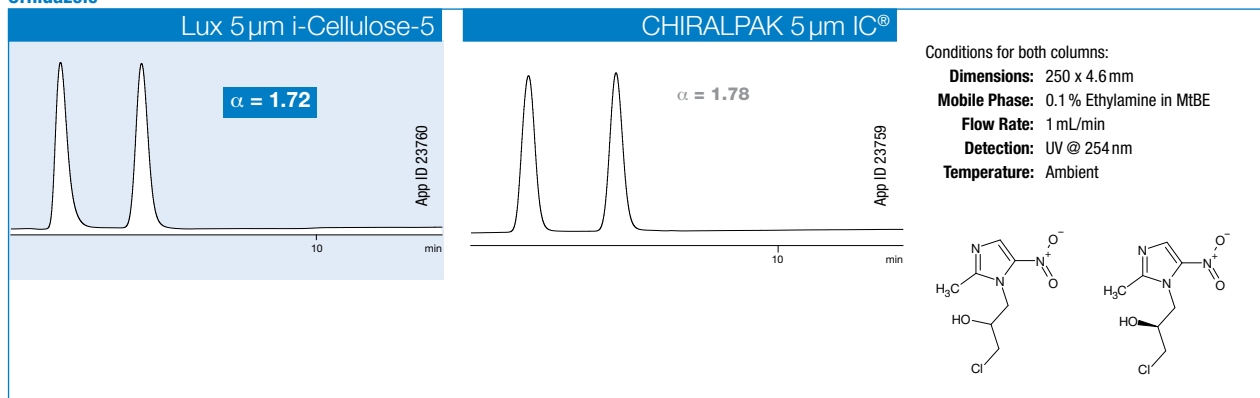
Lux i-Cellulose-5: Immobilized 3,5-Dichloro Phenylcarbamate Selector

The dichlorophenyl-moiety part of the i-Cellulose-5 selector creates a novel chiral selectivity by way of having two strong electron accepting atoms that draw the electron cloud of the phenyl ring outward.



Cellulose tris(3,5-dichlorophenylcarbamate)

Ornidazole



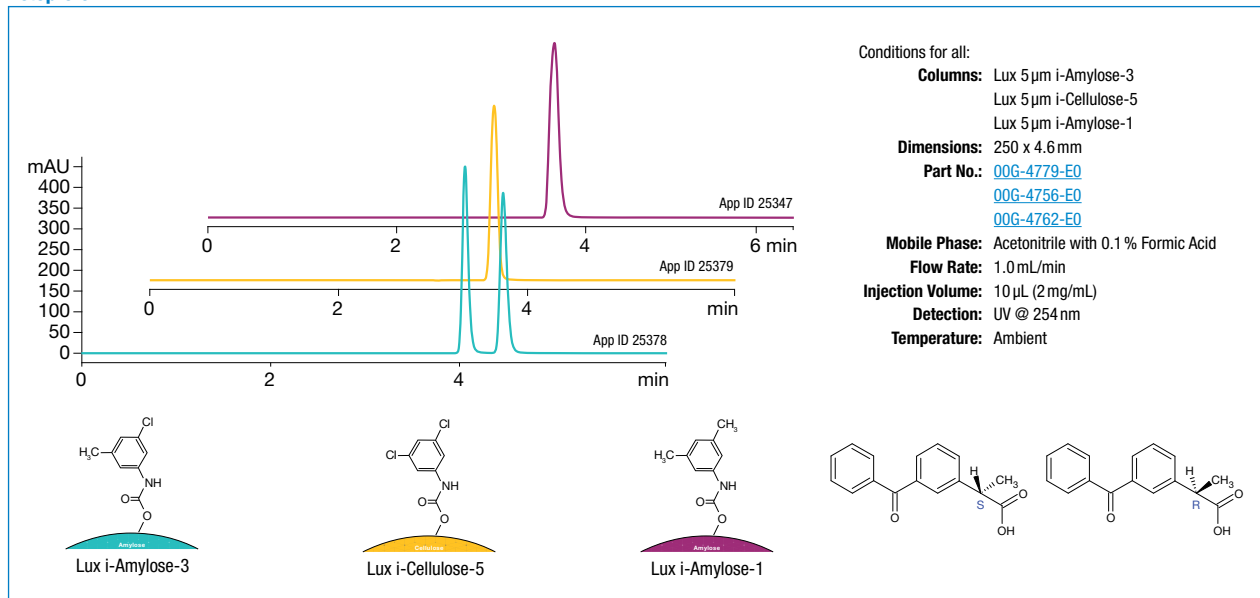
Columns used for comparison were manufactured by DAICEL Corporation. Phenomenex is in no way affiliated with DAICEL Corporation. Comparative separations may not be representative of all applications.



Immobilized Selectivity Comparison

Lux immobilized chiral columns offer a wide and complementary range of enantioselectivity for chiral separation projects under normal phase, reversed phase, polar ionic, or SFC separation modes. Below is an example of chiral screening using i-Amylose-3, i-Cellulose-5, and i-Amylose-1 under polar ionic conditions.

Ketoprofen

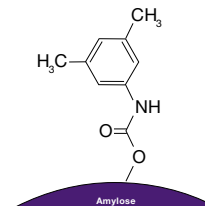




Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

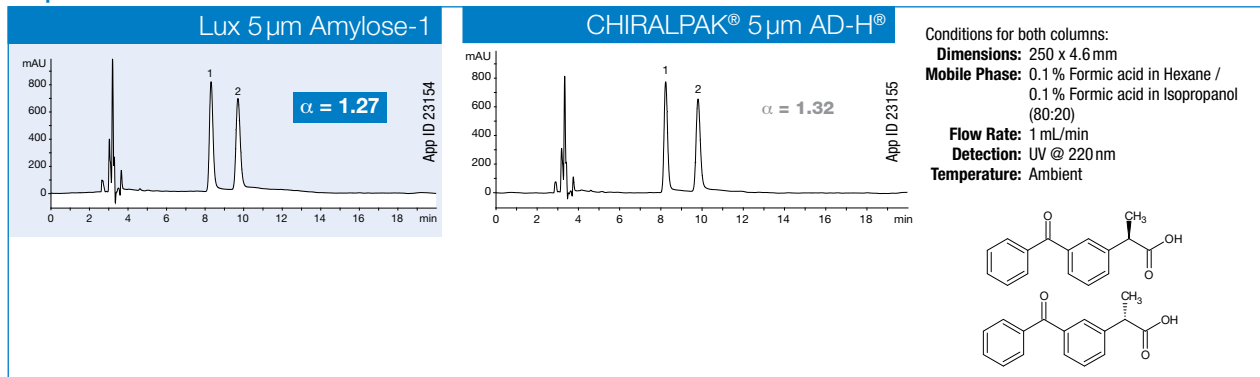
Lux Amylose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector

This universally trusted amylose phenylcarbamate derivative is absolutely essential to any chiral screen. Lux Amylose-1 is a guaranteed alternative to CHIRALPAK[®] AD[®]. Expect equivalent or better performance when using this Lux phase.



Amylose tris(3,5-dimethylphenylcarbamate)

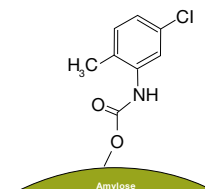
Ketoprofen



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

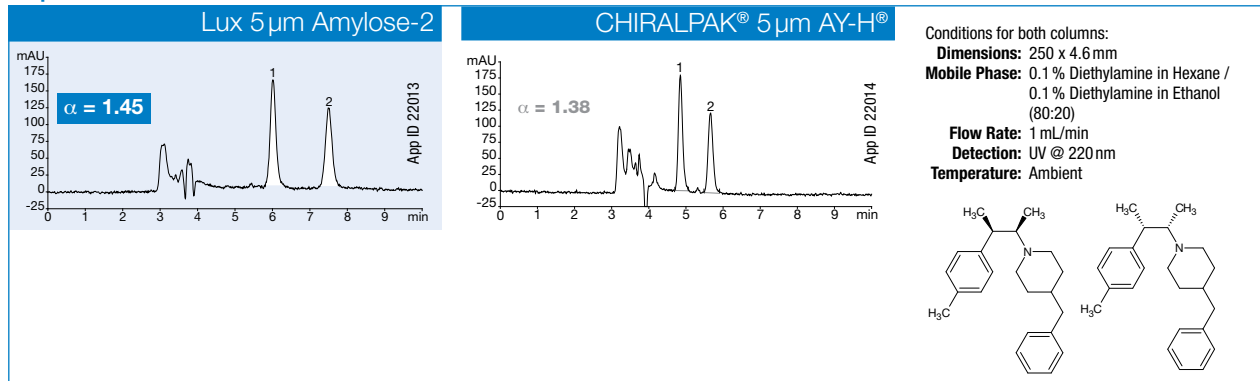
Lux Amylose-2: Coated 5-Chloro, 2-Methyl Phenylcarbamate Selector

This first-to-market chlorinated amylose phenylcarbamate derivative offers complex chiral recognition components that greatly increase the chances of achieving chiral resolution.



Amylose tris(5-chloro-2-methylphenylcarbamate)

Ifenprodil



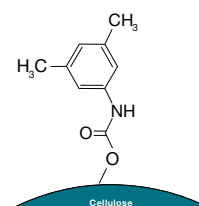
Comparative separations may not be representative of all applications.



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

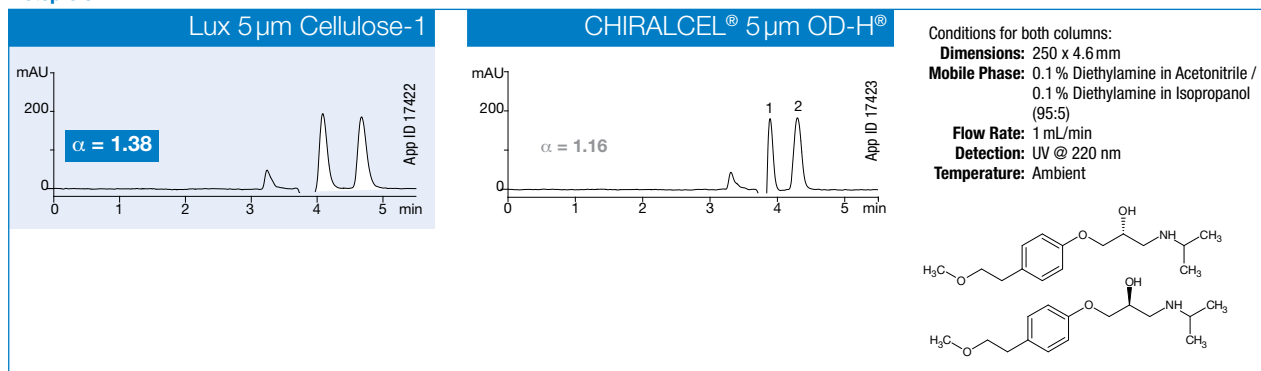
Lux Cellulose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector

This universally trusted cellulose phenylcarbamate derivative is absolutely essential to any chiral screen. Guaranteed alternative to CHIRALCEL[®] OD-H[®]. Expect equivalent or better performance.



Cellulose tris(3,5-dimethylphenylcarbamate)

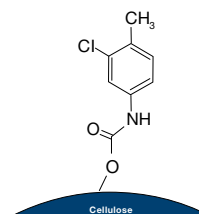
Metoprolol



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

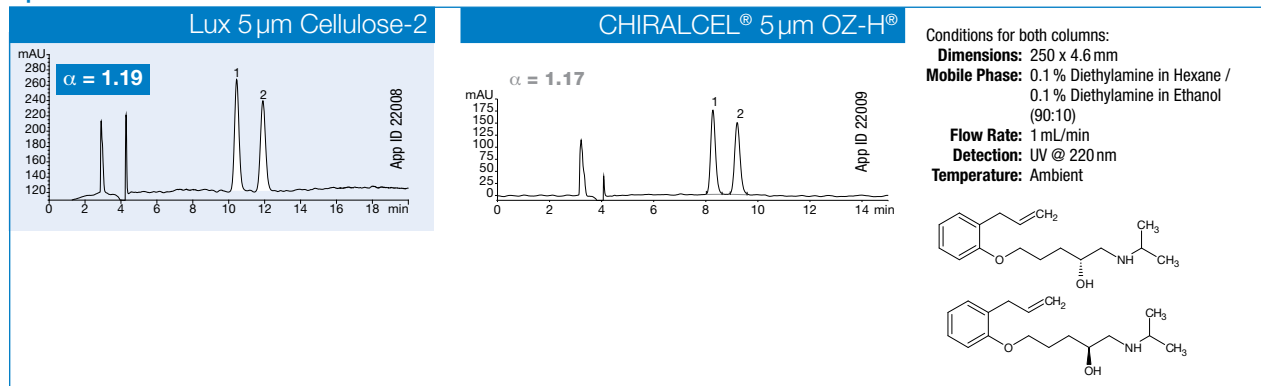
Lux Cellulose-2: Coated 3-Chloro, 4-Methyl Phenylcarbamate Selector

This first-to-market halogenated cellulose phenylcarbamate derivative offers unique chiral recognition abilities that complement the rest of the Lux family of columns.



Cellulose tris(3-chloro-4-methylphenylcarbamate)

Alprenolol



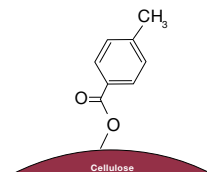
Comparative separations may not be representative of all applications.



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

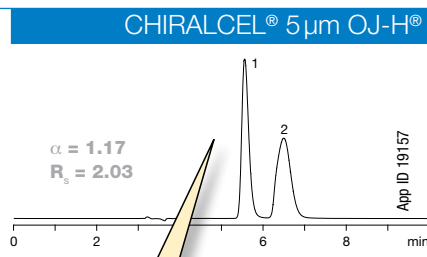
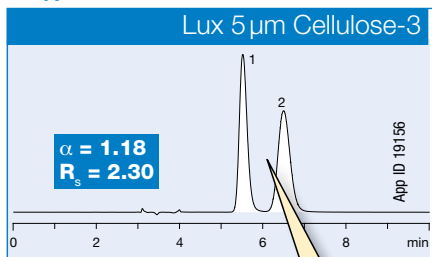
Lux Cellulose-3: Coated 4-Methyl Phenylacetate Selector

This cellulose methylbenzoate derivative offers distinct and complementary chiral recognition abilities.



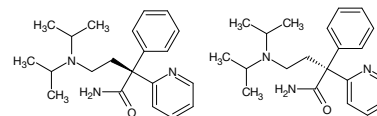
Cellulose tris(4-methylbenzoate)

Disopyramide



Similar Lux phases can offer equivalent, if not better, performance when compared to CHIRALCEL[®] and CHIRALPAK[®]

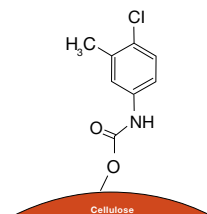
Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Hexane / 0.1 % Diethylamine in Ethanol (90:10)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

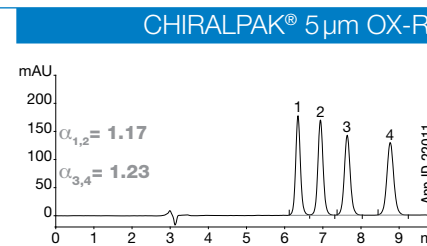
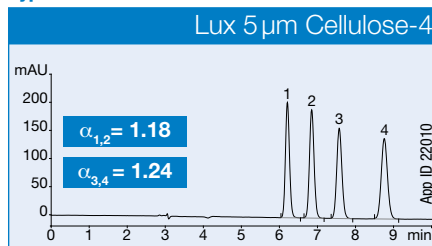
Lux Cellulose-4: Coated 4-Chloro, 3-Methyl Phenylcarbamate Selector

This chlorinated cellulose phenylcarbamate derivative offers unique chiral recognition abilities.

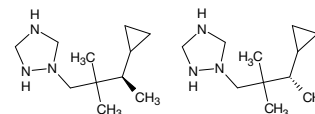


Cellulose tris(4-chloro-3-methylphenylcarbamate)

Cyproconazole



Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Acetonitrile / 0.1 % Diethylamine in 20 mM Ammonium bicarbonate (60:40)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

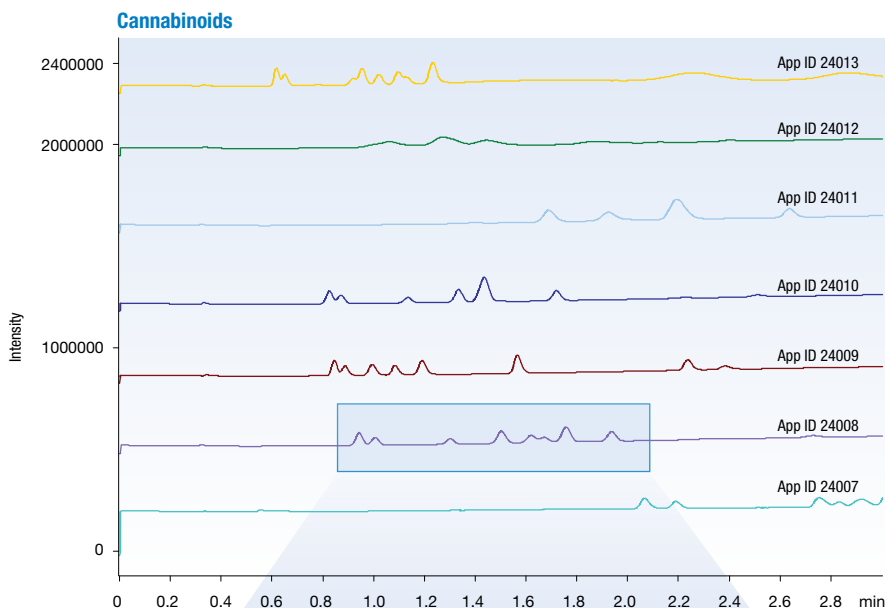


Comparative separations may not be representative of all applications.

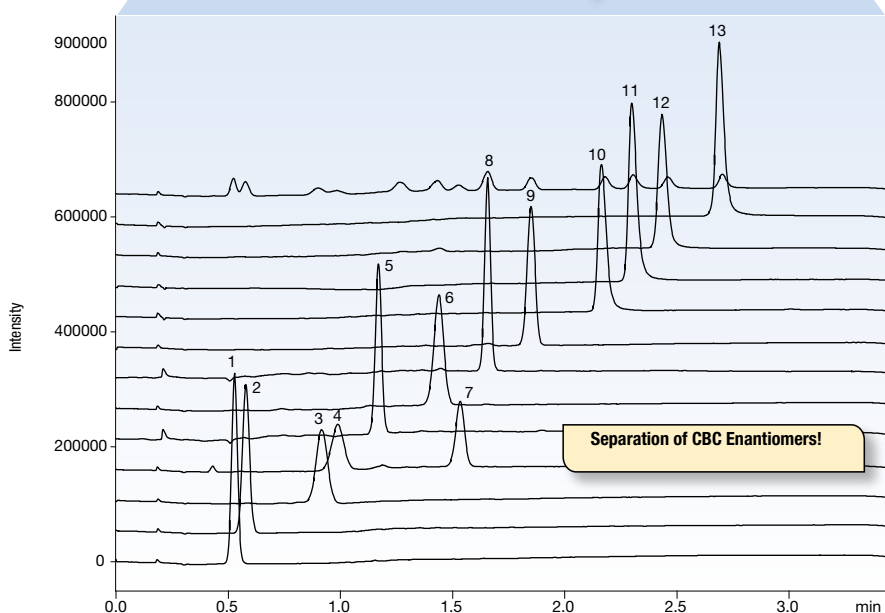
Achiral SFC Success with Chiral Columns!

While the incredible range of interaction mechanisms (polar, electrostatic, hydrophobic, van der Waals, and others) present in each Lux material are fundamental for ensuring baseline separation of chiral compounds, these same interaction mechanisms can also be used as an excellent screening tool for achiral work. Here we

present an achiral screening of natural cannabinoids using 7 Lux selectivities under one SFC mobile phase. The initial resolution and separation provided by the Lux Cellulose-2 was then further optimized to provide even greater resolution.



Expanded and optimized method separates achiral and chiral species!



Conditions for all columns:
Columns: Lux 3 µm i-Cellulose-5
 Lux 3 µm Amylose-2
 Lux 3 µm Amylose-1
 Lux 3 µm Cellulose-4
 Lux 3 µm Cellulose-3
 Lux 3 µm Cellulose-2
 Lux 3 µm Cellulose-1
Dimensions: 150 x 3.0 mm
Mobile Phase: A: Carbon Dioxide
 B: Methanol
Gradient:

Time (min)	% B
0	5
2.5	25
3	25

Flow Rate: 3 mL/min
Detection: UV @ 220 nm
Temperature: 40 °C
Sample: Cannabinoid mix of 8

Column: Lux 3 µm Cellulose-2
Dimensions: 150 x 3.0 mm
Part No.: [00F-4456-Y0](#)
Mobile Phase: A: Carbon Dioxide
 B: Methanol
Gradient:

Time (min)	% B
0	4
3	25
3.5	25

Flow Rate: 5 mL/min
Detection: UV @ 220 nm
Temperature: 40 °C
Sample: Cannabinoid mix of 12

- | | |
|-----------------------|-----------|
| 1. CBDV | 8. THCV |
| 2. CBN | 9. CBG |
| 3. Delta-8-THC | 10. CBDA |
| 4. CBC (Enantiomer 1) | 11. CBDVA |
| 5. CBD | 12. THCA |
| 6. Delta-9-THC | 13. CBGA |
| 7. CBC (Enantiomer 2) | |



HP/IC/UHPLC | LUX | CHIRAL LC

Axia™ Chiral Columns Out Perform Other Prep Columns

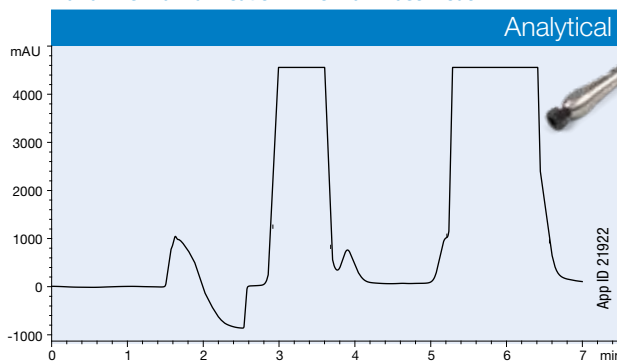
Axia specialized preparative hardware shows higher performance than traditionally packed standard hardware preparative columns. This revolutionary packing technology paired with Lux polysaccharide-based chiral stationary phases provide purification results like no other chiral column can provide.

To better understand how much Axia technology improves column performance over traditionally slurry packed preparative columns we scaled-up a 5 μm Lux Cellulose-1 chiral media analytical column and packed the same media into two different 150 x 21.2 mm ID

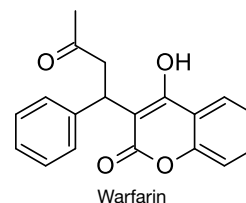
columns. One column was packed using Axia technology and the other prep column was packed using the traditional slurry packing process.

The Axia packing technology had a substantial increase in column efficiency resulting in increased resolution over traditionally packed preparative columns. With increased resolution you are able to increase your sample load enabling you to purify more target compound(s) per purification run. This equates to better throughput and economics.

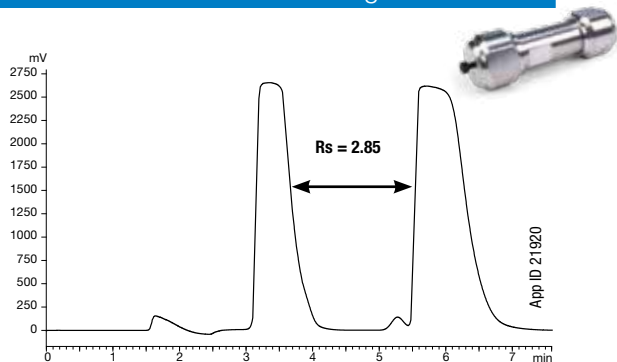
Warfarin Chiral Purification in Normal Phase Mode



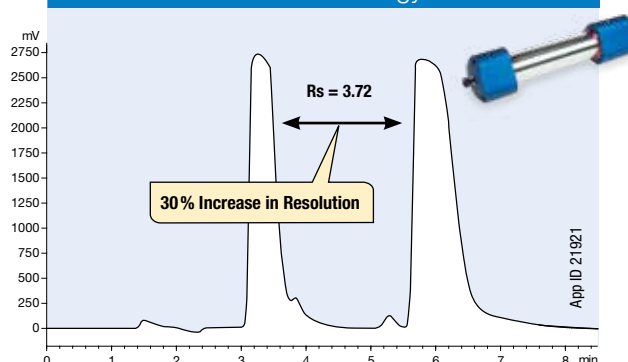
Column: Lux 5 μm Cellulose-1
Dimensions: 150 x 4.6 mm
Mobile Phase: Hexane/Ethanol (75:25)
Flow Rate: 1 mL/min
Temperature: Ambient
Inj. Volume: 100 μL



Standard Packing and Hardware



Axia Technology and Hardware



Conditions for both columns:
Media: Lux 5 μm Cellulose-1
Dimensions: 150 x 21.2 mm
Mobile Phase: Hexane / Ethanol (75:25)

Flow Rate: 20 mL/min
Temperature: Ambient
Inj. Volume: 2 mL

42% Increase in Efficiency

Column (mm)	Analytical 150 x 4.6	Standard 150 x 21.2	Axia 150 x 21.2
Mass Loaded (mg)	2	40	40
Resolution*	1.5	2.85	3.72
Plates (N)	117	535	760

* Resolution calculated with peak width at baseline and center retention time due to the overloaded peaks being off-scale

“We have used Phenomenex Axia prep-HPLC columns for several years and they consistently provide excellent separation and reproducibility for a variety of different compounds.”

Jeremy R. Wolf
 ABC Laboratories, USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.



LUX[®] Chiral LC & SFC Columns

Ordering Information

3µm Minibore, MidBore™, and Analytical Columns (mm)									SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	150 x 2.0	100 x 3.0	150 x 3.0	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 2.0*	4 x 3.0*
									/10pk	/10pk
i-Amylose-3	00B-4778-B0	00F-4778-B0	—	—	00B-4778-E0	00D-4778-E0	00F-4778-E0	00G-4778-E0	AJ0-8651	AJ0-8650
i-Cellulose-5	00B-4755-B0	00F-4755-B0	00D-4755-Y0	00F-4755-Y0	00B-4755-E0	00D-4755-E0	00F-4755-E0	00G-4755-E0	AJ0-8631	AJ0-8632
Cellulose-1	00B-4458-B0	00F-4458-B0	00D-4458-Y0	00F-4458-Y0	00B-4458-E0	00D-4458-E0	00F-4458-E0	00G-4458-E0	AJ0-8402	AJ0-8403
Cellulose-2	00B-4456-B0	00F-4456-B0	00D-4456-Y0	00F-4456-Y0	00B-4456-E0	00D-4456-E0	00F-4456-E0	00G-4456-E0	AJ0-8398	AJ0-8366
Cellulose-3	00B-4492-B0	00F-4492-B0	00D-4492-Y0	00F-4492-Y0	00B-4492-E0	00D-4492-E0	00F-4492-E0	00G-4492-E0	AJ0-8621	AJ0-8622
Cellulose-4	00B-4490-B0	00F-4490-B0	00D-4490-Y0	00F-4490-Y0	00B-4490-E0	00D-4490-E0	00F-4490-E0	00G-4490-E0	AJ0-8626	AJ0-8627
Amylose-1	00B-4729-B0	00F-4729-B0	00D-4729-Y0	00F-4729-Y0	00B-4729-E0	00D-4729-E0	00F-4729-E0	00G-4729-E0	AJ0-9337	AJ0-9336
Amylose-2	00B-4471-B0	00F-4471-B0	00D-4471-Y0	00F-4471-Y0	00B-4471-E0	00D-4471-E0	00F-4471-E0	00G-4471-E0	AJ0-8471	AJ0-8470

for ID: 2.0–3.0 mm 3.2–8.0 mm

5µm Minibore and Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 2.0*	4 x 3.0*
						/10pk	/10pk
i-Amylose-1	—	00B-4762-E0	00D-4762-E0	00F-4762-E0	00G-4762-E0	AJ0-8640	AJ0-8641
i-Amylose-3	—	00B-4779-E0	00D-4779-E0	00F-4779-E0	00G-4779-E0	AJ0-8651	AJ0-8650
i-Cellulose-5	—	00B-4756-E0	00D-4756-E0	00F-4756-E0	00G-4756-E0	AJ0-8631	AJ0-8632
Cellulose-1	—	00B-4459-E0	00D-4459-E0	00F-4459-E0	00G-4459-E0	AJ0-8402	AJ0-8403
Cellulose-2	00B-4457-B0	00B-4457-E0	00D-4457-E0	00F-4457-E0	00G-4457-E0	AJ0-8398	AJ0-8366
Cellulose-3	—	00B-4493-E0	00D-4493-E0	00F-4493-E0	00G-4493-E0	AJ0-8621	AJ0-8622
Cellulose-4	—	—	00D-4491-E0	00F-4491-E0	00G-4491-E0	AJ0-8626	AJ0-8627
Amylose-1	00B-4732-B0	—	00D-4732-E0	00F-4732-E0	00G-4732-E0	AJ0-9337	AJ0-9336
Amylose-2	00B-4472-B0	00B-4472-E0	00D-4472-E0	00F-4472-E0	00G-4472-E0	AJ0-8471	AJ0-8470

for ID: 2.0–3.0 mm 3.2–8.0 mm

5µm Semi-Prep Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	150 x 10.0	250 x 10.0	10 x 10.0†
			/3pk
i-Amylose-1	—	00G-4762-N0	AJ0-8642
i-Amylose-3	—	00G-4779-N0	AJ0-8652
i-Cellulose-5	—	00G-4756-N0	AJ0-8633
Cellulose-1†	00F-4459-N0	00G-4459-N0	AJ0-8404
Cellulose-2†	—	00G-4457-N0	AJ0-8399
Cellulose-3	—	00G-4493-N0	AJ0-8623
Cellulose-4	—	00G-4491-N0	AJ0-8628
Amylose-1	—	00G-4732-N0	AJ0-9344
Amylose-2	00F-4472-N0	00G-4472-N0	AJ0-8472

for ID: 9–16 mm

†Inquire for Lux 10µm Cellulose-1 and Cellulose-2 columns.

5µm Axia™ Packed Preparative Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	150 x 21.2	250 x 21.2	250 x 30	250 x 50	15 x 21.2**	15 x 30.0*
					/ea	/ea
i-Amylose-1	00F-4762-P0-AX	00G-4762-P0-AX	00G-4762-U0-AX	00G-4762-V0-AX	AJ0-8643	AJ0-8644
i-Amylose-3	00F-4779-P0-AX	00G-4779-P0-AX	00G-4779-U0-AX	00G-4779-V0-AX	AJ0-8653	AJ0-8654
i-Cellulose-5	00F-4756-P0-AX	00G-4756-P0-AX	00G-4756-U0-AX	00G-4756-V0-AX	AJ0-8634	AJ0-8635
Cellulose-1†	00F-4459-P0-AX	00G-4459-P0-AX	00G-4459-U0-AX	00G-4459-V0-AX	AJ0-8405	AJ0-8406
Cellulose-2†	00F-4457-P0-AX	00G-4457-P0-AX	00G-4457-U0-AX	00G-4457-V0-AX	AJ0-8400	AJ0-8401
Cellulose-3	00F-4493-P0-AX	00G-4493-P0-AX	00G-4493-U0-AX	00G-4493-V0-AX	AJ0-8624	AJ0-8625
Cellulose-4	00F-4491-P0-AX	00G-4491-P0-AX	00G-4491-U0-AX	00G-4491-V0-AX	AJ0-8629	AJ0-8630
Amylose-1	00F-4732-P0-AX	00G-4732-P0-AX	00G-4732-U0-AX	00G-4732-V0-AX	AJ0-9338	AJ0-9339
Amylose-2	00F-4472-P0-AX	00G-4472-P0-AX	00G-4472-U0-AX	—	AJ0-8473	AJ0-8474

for ID: 18–29 mm 30–49 mm

*SecurityGuard Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

†SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJ0-9281](#)

**HPLC PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)
SFC PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8617](#)

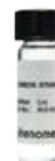
*HPLC PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8277](#)
SFC PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8618](#)

Bulk Media		
Phases	100 g	1 kg
10 µm		
Cellulose-1	04G-4501	04K-4501
Cellulose-2	04G-4502	04K-4502
Cellulose-3	04G-4624	04K-4624
Cellulose-4	04G-4625	04K-4625



Column Performance Check Standard

Part No.	Description	Unit
AL0-8412	Chiral Test Mix No. 5 (Lux)	ea



Lux Chiral Method Screening Kits are available. Please contact your Phenomenex representative for more information.

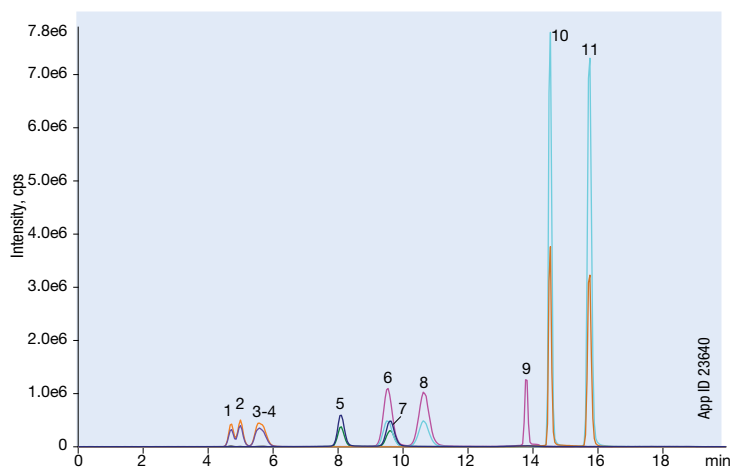
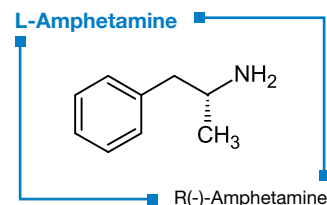
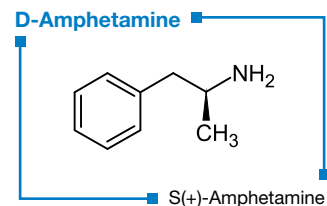
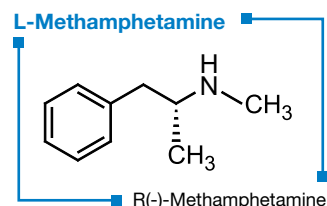
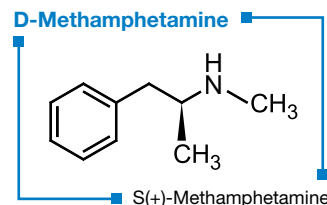


Rapid and Accurate Chiral Separation of Methamphetamine and Amphetamine Enantiomers from Urine

Lux 3 µm AMP is a unique LC media that is specifically developed and tested for the chiral analysis of amphetamine and substituted amphetamines, including methamphetamine. Once presence of amphetamine or methamphetamine has been determined, enantiomeric confirmation can then easily be achieved.

Not Affected by Common Interferences

Another excellent benefit of the Lux 3 µm AMP is that its separation of amphetamine and methamphetamine enantiomers isn't affected by common therapeutics and ingredients such as those seen below. In addition, the separation power of the Lux AMP column can also help with resolution between enantiomers of substituted amphetamines.



Column: Lux 3 µm AMP
Dimension: 150 x 3.0 mm
Part No.: 00F-4751-Y0
Mobile Phase: A: 5 mM Ammonium Bicarbonate, adjusted to pH 11 with Ammonium Hydroxide
 B: Methanol

Gradient	Time (min)	% B
	0	60
	10	60
	11	95
	16	95
	16.3	60

Flow Rate: 0.42 mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX 4500 QTRAP[®])

1. S,2R(+)-Ephedrine
2. R,R(-)-Pseudoephedrine
3. S,S(+)-Pseudoephedrine
4. 1R,2S(-)-Ephedrine
5. R(-)-Amphetamine
6. R(-)-Methamphetamine
7. S(+)-Amphetamine
8. S(+)-Methamphetamine
9. Phentermine
10. R(-)-MDMA
11. S(+)-MDMA

Compounds included in this interference study but not illustrated chromatographically:

- acetaminophen
- aspirin
- (±)-chlorpheniramine
- caffeine
- diphenhydramine
- dextromethorphan
- ibuprofen
- (±)-MDA
- (±)-MDEA
- phenylephrine
- norephedrine

1-Minute β-Glucuronidase Removal

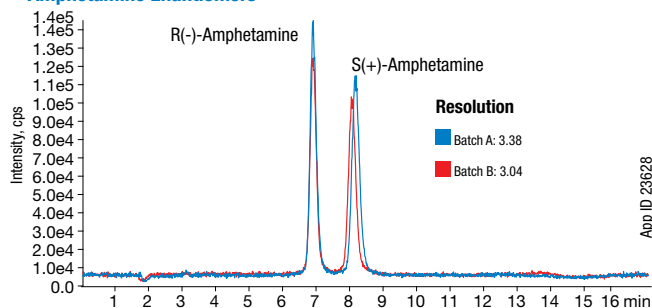
Within 1 minute, with no necessary method development, your samples will be ready for analysis.



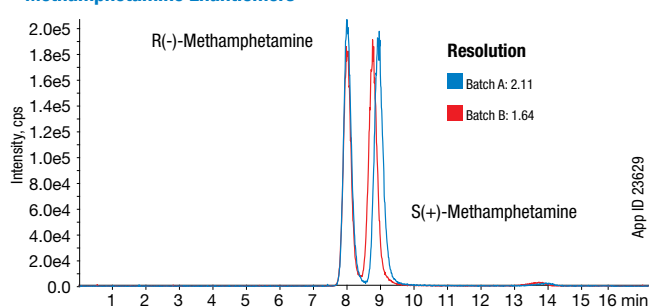
Exceptional Reliability

Lux 3 µm AMP media and columns are designed to be consistent and incredibly accurate tools for amphetamine and methamphetamine analysis. Each batch is specifically tested by LC-MS for the analysis of amphetamine and methamphetamine, and columns are quality tested to ensure dependability and reproducibility.

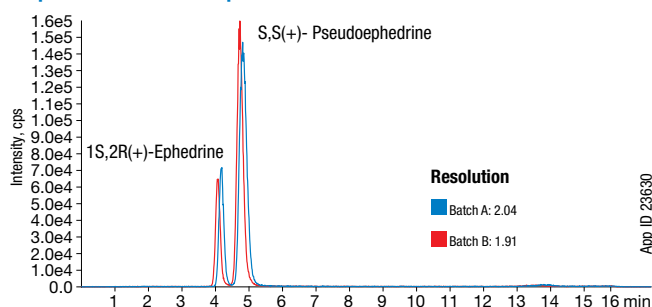
Amphetamine Enantiomers



Methamphetamine Enantiomers



Ephedrine and Pseudoephedrine



Column: Lux 3 µm AMP
Dimension: 150 x 3.0 mm
Part No.: 00F-4751-Y0
Mobile Phase: A: 5 mM Ammonium Bicarbonate, adjusted to pH 11 with Ammonium Hydroxide
 B: Methanol
Gradient:

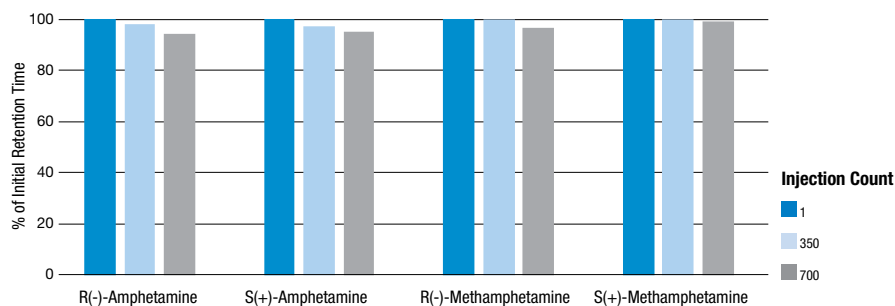
Time (min)	% B
0	60
10	60
11	95
13	95
13.1	60

Flow Rate: 0.42 mL/min
Temperature: 22 °C
Sample:

- Ephedrine
- Pseudoephedrine
- R(-)-Amphetamine
- S(+)-Amphetamine
- R(-)-Methamphetamine
- S(+)-Methamphetamine



Excellent Lifetime



Ordering Information

Phase	3 µm Analytical Columns (mm)		SecurityGuard™ Cartridges (mm)	
	150 x 3.0	150 x 4.6	4 x 2.0*	4 x 3.0*
AMP	00F-4751-Y0	00F-4751-E0	10/pk AJO-8475	10/pk AJO-8476
			for ID: 2.0 - 3.0 mm	3.2 - 8.0 mm

*SecurityGuard Analytical Cartridges require holder, Part No.: KJO-4282

Finish First with Monolithic Silica HPLC Columns

Onyx is a silica monolithic HPLC column designed for high speed analysis. The monolithic nature allows for "dilute-and-shoot" applications saving scientists valuable sample preparation time.

- Reduce run times by more than 50 %
- "Dilute-and-Shoot" dirty biological samples
- Analytical, capillary, and semi-prep dimensions

Material Characteristics

Packing Material	Macropore Size (µm)	Mesopore Size (Å)	Pore Volume (mL/g)	Surface Area (m ² /g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m ²)	End Capping
Onyx C8	2	130	1.0	300	11	3.8	Yes
Onyx C18	2	130	1.0	300	18	3.6	Yes
Onyx C18*	1.5	130	1.0	300	18	3.6	Yes
Onyx HD-C18	1	130	1.0	300	18	3.6	Yes

Maximum Pressure: 200 Bar; pH Range: 2.0-7.5

*50 x 2.0 mm ID only; enhanced 1.5 µm macropore size for higher efficiencies

High Resolution Monolithic Columns— Onyx HD-C18

- 50% higher performance compared to our standard Onyx columns
- Backpressure 2 times lower than particle packed columns
- 30% longer column lifetime compared to some particle packed columns

Monolithic Technology vs. Particle-Based Technology

Onyx

- **Monolithic porous silica rod**
- **Significantly shorter run times**
Cut methods by more than half
- **Low backpressures**
Less stress on system and column
- **High flow rates**
Due to high porosity
- **No inlet bed settling**
Increased reliability, reproducibility, and lifetime



Particle-Based Columns

- **Individual silica particles**
- **High flow resistance**
Limits ability to shorten run times
- **Increased backpressure**
Limits life of pumps, seals, and column
- **Reduced throughput**
Long run times
- **Bed splitting possible**
Shortens column life & lessens reproducibility



10 mm ID Onyx Semi-Prep Column

- Flow rates from 5 – 35 mL/min
- Loading capacities approaching what is typically observed on 21.2mm ID columns for some samples
- Pore structure rapidly disrupts DMSO injection slug resulting in better mixing & improved binding of analyte to sorbent
- Long lifetimes when analyzing “dirty” samples due to monolithic nature

Excellent Reproducibility

Several parameters, such as peak asymmetry and retention factors, were used to test the reproducibility of Onyx silica monolithic columns and ensure that every batch meets the quality control standards of chromatographers worldwide.



Refer to technical note, [TN-1025](#), for more information pertaining to Onyx reproducibility. Call your Phenomenex representative.

Ordering Information

Part No.	Description	Size (mm)
Capillary Columns		
CHO-7646	Onyx Monolithic C18	150 x 0.1
Analytical Columns		
CHO-8373	Onyx Monolithic C18	50 x 2.0
CHO-8464	Onyx Monolithic C18	25 x 3.0
CHO-8158	Onyx Monolithic C18	100 x 3.0
CHO-7643	Onyx Monolithic C18	100 x 4.6
CHO-7644	Onyx Monolithic C18	50 x 4.6
CHO-7645	Onyx Monolithic C18	25 x 4.6
CHO-8611	Onyx Monolithic HD-C18	100 x 4.6
CHO-7647	Onyx Monolithic C8	100 x 4.6
SemiPrep Columns		
CHO-7878	Onyx Monolithic C18	100 x 10.0
Guard Cartridge System		
KJO-8465	Onyx Monolithic C18 Guard Cartridge Kit (3/pk cartridges + holder)	5 x 3.0
CHO-8466	Onyx Monolithic C18 Guard Cartridges (3/pk)	5 x 3.0
CHO-7649	Onyx Monolithic C18 Guard Cartridges (3/pk)	5 x 4.6
KJO-7652	Onyx Monolithic C18 Guard Cartridge Kit (3/pk cartridges + holder + wrench)	10 x 4.6
CHO-7650	Onyx Monolithic C18 Guard Cartridges (3/pk)	10 x 4.6
Column Coupler		
AQQ-7654	Onyx Column Coupler, 0.020 in. ID	



For Onyx Reversed Phase Column
Check Standard, see p. 398



Product based on monolithic technology under
license from Merck KGaA, Darmstadt, Germany

Organic Size Exclusion/Gel Permeation for Polymer Analysis

- 5 and 10 μm particle sizes
- Narrow bore (4.6 mm ID) solvent-saver to preparative columns available
- Alternative to Agilent® (Polymer Labs) PLgel™, Waters® Styragel® and Ultrastaygel™, and other columns (see p. 301)
- Highly cross-linked for mechanical and chemical stability
- Temperature stable to 140°C

Phenogel is available in seven different pore sizes, ranging from 50 Å to 10⁶ Å†, and a linear bed configuration. Pore size distribution and pore volume are closely controlled parameters in the manufacturing process accounting for the high resolution, tight linear calibration curves, and excellent column-to-column reproducibility.

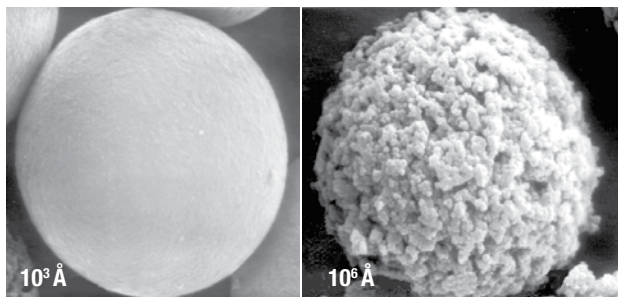
Sample Elution

Each standard dimension Phenogel column (300 x 7.8 mm) has an internal volume of 15 mL that is distributed as follows:

- 3 mL is occupied by the solid portions of the gel particles (20% of total column volume)
- 6 mL is the pore volume of the packing material (40% of total column volume)
- 6 mL is the interstitial volume or volume between the gel particles (40% of total column volume)

Thus, about 6 mL of solvent must elute through each column before even the largest molecules can emerge, while the smallest molecules emerge with the total column volume of 12 mL. This constant distribution of volume makes it possible to predict the amount of solvent and time necessary to complete any analysis.

SEM Photos of Phenogel Polymer Beads



Technical Specifications

Material:	SDVB
Particle Size:	5, 10 μm
Porosities:	50 Å to 10 ⁶ Å†, and mixed beds
Maximum Pressure:	1500 psi
Maximum Temperature:	140 °C
Minimum Efficiency*:	5 μm : 45,000 p/m** 10 μm : 35,000 p/m**
Typical Flow Rates:	4.6 mm ID: 0.35 mL/min 7.8 mm ID: 1.0 mL/min 21.2 mm ID: 7.0 mL/min

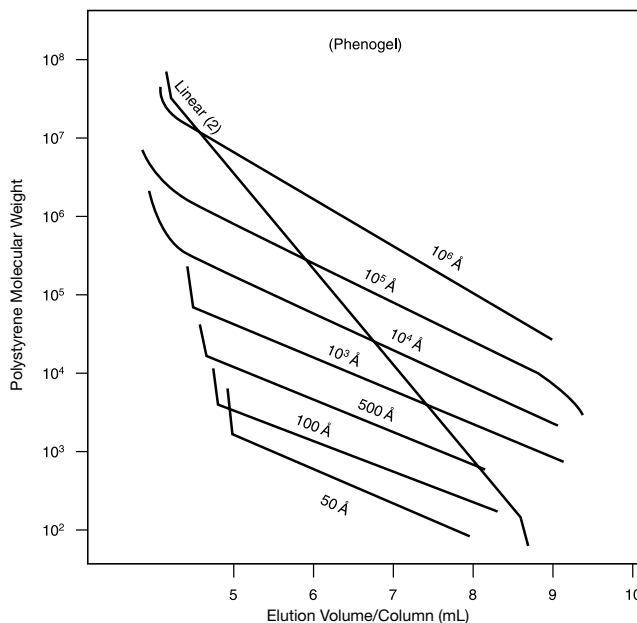
* Tested in THF ** For 300 x 7.8 mm ID columns

† See note on p. 418 regarding pore sizes and exclusion limits

Column Selection by Molecular Weight

Sample Type	Molecular Weight	Phenogel Column
Small Organics	100 - 3 K	50 Å
	500 - 6 K	100 Å
	1 K - 15 K	500 Å
Resins	1 K - 75 K	10 ³ Å
	5 K - 500 K	10 ⁴ Å
	10 K - 1,000 K	10 ⁵ Å
High MW Polymers	60 K - 10,000 K	10 ⁶ Å
	100 - 10,000 K	Linear(2)

Column Molecular Weight Calibration Curves



Solvent and Temperature Compatibility

- Phenogel columns are packed in tetrahydrofuran (THF)
- Columns can also be shipped in solvents such as DMF and chloroform to help minimize equilibration time

Solvent Compatibility Table

Mobile Phase Solvent	Phenogel Pore Size:							Linear & Mixed	Suggested Operating Temp.
	50 (Å)	100	500	10 ³	10 ⁴	10 ⁵	10 ⁶		
Acetone	Y	Y	Y	Y	Y	Y	Y	Y	
Benzene	Y	Y	Y	Y	Y	Y	Y	Y	
Carbon Tetrachloride	Y	Y	Y	Y	Y	Y	Y	Y	
Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	
30% HFIP/Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	
Diethyl Ether	Y	Y	Y	Y	Y	Y	Y	Y	
Dimethylacetamide (DMAC)	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Dimethylformamide (DMF)	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Dioxane	Y	Y	Y	Y	Y	Y	Y	Y	
DMSO	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Ethyl Acetate	Y	Y	Y	Y	Y	Y	Y	Y	
Hexafluoroisopropanol (HFIP)	Y	Y	Y	Y	Y	Y	Y	Y	
Hexane	Y	Y	Y	Y	Y	Y	Y	Y	
M-Cresol	Y*	Y	Y	Y	Y	Y	Y	Y	100 °C
Methyl Ethyl Ketone	Y	Y	Y	Y	Y	Y	Y	Y	
Methylene Chloride	Y	Y	Y	Y	Y	Y	Y	Y	
O-Chlorophenol	Y*	Y	Y	Y	Y	Y	Y	Y	100 °C
O-Dichlorobenzene	Y*	Y	Y	Y	Y	Y	Y	Y	135 °C
Quinolin	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Tetrahydrofuran	Y	Y	Y	Y	Y	Y	Y	Y	
Toluene	Y	Y	Y	Y	Y	Y	Y	Y	
Trichlorobenzene	Y*	Y	Y	Y	Y	Y	Y	Y	135 °C
Water	N	N	N	N	N	N	N	N	
Xylene	Y	Y	Y	Y	Y	Y	Y	Y	

*Not recommended on 5 μm 50 Å columns.

N = Not Compatible
Y = Compatible

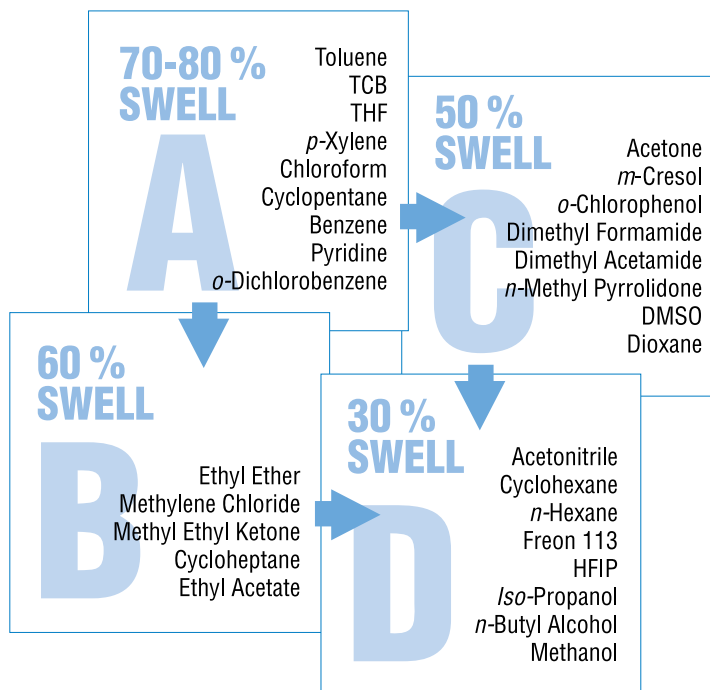


Solvent Switching Considerations

Although Phenogel columns are rugged and can withstand strong solvent changes, care should be exercised when switching from high-swell solvents (A) to low-swell solvents (B, C, and D). Improper solvent switches can result in a void. Best results are attained when an intermediate-swell solvent is used and column lifetime is improved. Contact Phenomenex regarding solvents not listed below.

Column life can be maximized by dedicating certain columns to certain solvents. This will also minimize solvent switches. If care is not taken, a void may occur.

- Reduce flow rate to 0.2 mL/min
- Backpressure must NEVER exceed 1500 psi
- Always check solvent miscibility in a beaker or follow the solvent miscibility table on page 416 before proceeding with ANY solvent switch.
- Compare the swell characteristics of solvent 1 (old solvent) to solvent 2 (new solvent) and use the following guidelines:
 - If solvent 1 and solvent 2 belong to the same swell category (see table below), check the solvent miscibility and proceed with the switch.
 - If solvent 1 and solvent 2 belong to successive swell categories as indicated by the arrows in the table below, check the miscibility and proceed with the switch.
 - If solvent 1 and solvent 2 DO NOT belong to the same OR successive swell categories, switch to an intermediate solvent FIRST, as indicated by the arrows in the table.

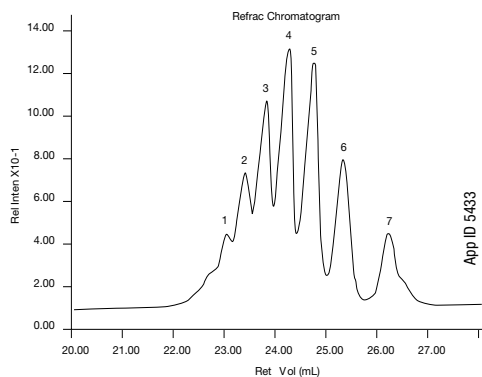


Pharmaceutical Excipients Analysis

Gel permeation chromatography using Phenogel columns is an excellent method for measuring the molecular weight distribution and lot-to-lot consistency of fillers and dispersants.

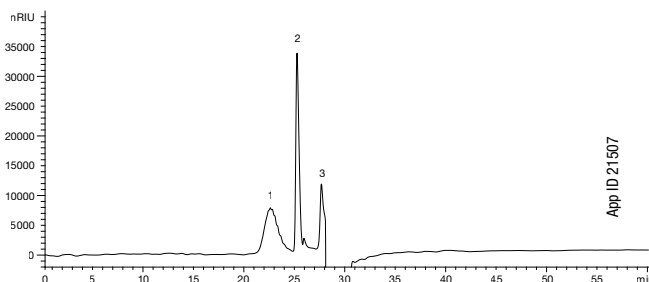
Polyethylene Glycol 330

Column: Phenogel 5 μm 50 Å, 100 Å, 500 Å
Dimensions: 300 x 7.8 mm
Guard Cartridge: [AJ0-9292](#)
Guard Holder: [KJ0-4282](#)
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 μL 0.25% w/v
Temperature: Ambient
Vial: [AR0-9925-13](#)
Filter: [AF0-1102-52](#)
Sample: 1. dp7 546 MW 5. dp3 194 MW
 2. dp6 458 MW 6. dp2 106 MW
 3. dp5 370 MW 7. dp1 62 MW
 4. dp4 282 MW



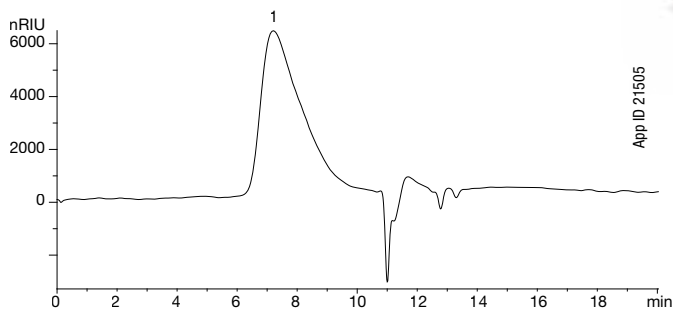
Polyethylene Glycol 106

Column: Phenogel 5 μm 50 Å, 100 Å, 500 Å
Dimensions: 300 x 7.8 mm
Guard Cartridge: [AJ0-9292](#)
Guard Holder: [KJ0-4282](#)
Mobile Phase: THF
Flow Rate: 1 mL/min
Detection: Refractive Index (RI)
Temperature: 40 °C
Vial: [AR0-9925-13](#)
Filter: [AF0-1102-52](#)
Sample: 1. PEG 106
 2. API peak A (unknown)
 3. API peak B (unknown)



Polyvinylpyrrolidone

Column: Phenogel 5 μm Linear(2) x2
Dimensions: 300 x 7.8 mm
Part No: [00H-3259-K0](#)
Guard Cartridge: [AJ0-9292](#)
Guard Holder: [KJ0-4282](#)
Mobile Phase: 10 mM Lithium bromide in DMF
Flow Rate: 2 mL/min
Detection: Refractive Index (RI)
Column Temp: 40 °C
Vial: [AR0-9925-13](#)
Filter: [AF0-1102-52](#)
Sample: 1. Polyvinylpyrrolidone (PVP)



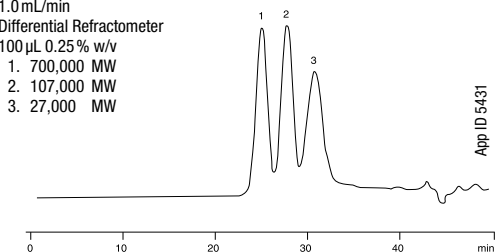
Phenogel™ Organic GPC/SEC Columns

50 Å - 10⁶ Å Columns

- High resolution at low cost
- Customize your analysis by coupling different pore-size columns
- Wide range of solvent compatibility

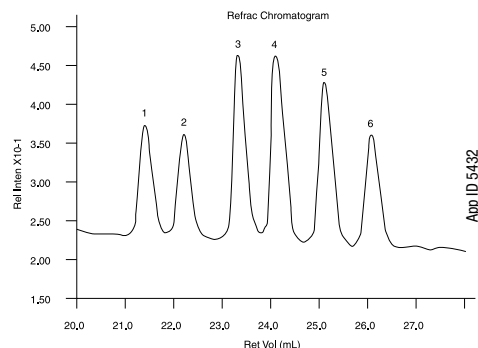
Polymethyl Methacrylates (Wide MW Range)

Column: Phenogel 5 μm 10⁵ Å, 10⁴ Å, 10³ Å, 500 Å
Dimensions: 300 x 7.8 mm
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 μL 0.25% w/v
Sample:



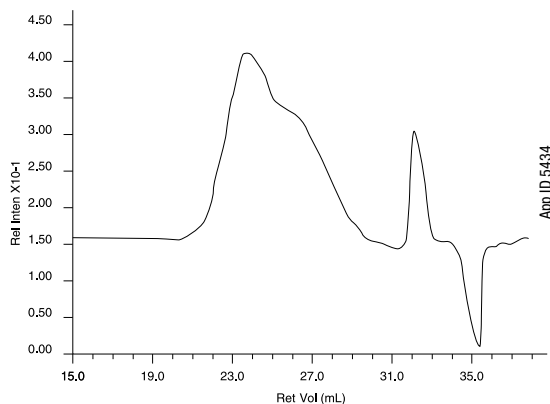
Closely Related Hydrocarbons

Column: Phenogel 5 μm 50 Å, 100 Å, 500 Å
Dimensions: 300 x 7.8 mm
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 μL 0.25% w/v
Temperature: Ambient
Sample:



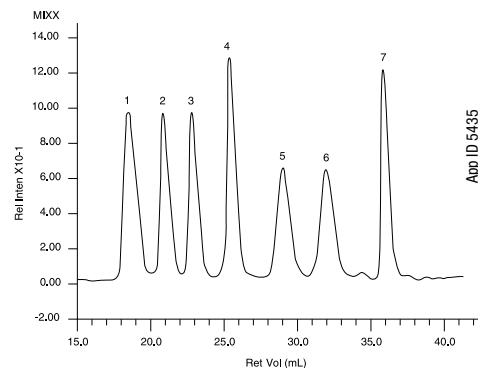
Polyethylene Oxide (PEO)

Column: Phenogel 10 μm 10⁵, 10⁴, 10³ Å
Dimensions: 300 x 7.8 mm
Mobile Phase: DMF (0.1 M LiBr)
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 μL 0.125% w/v
Temperature: 50 °C
Sample: 400,000 MW



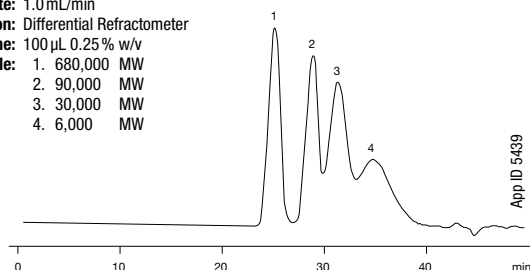
Polystyrenes (Wide MW Range)

Column: Phenogel 10 μm 10⁵, 10⁴, 10³ Å
Dimensions: 300 x 7.8 mm
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 μL 0.125% w/v
Temperature: Ambient
Sample:



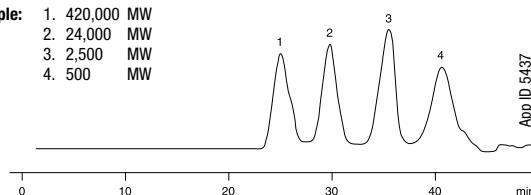
Poly-(α-Methyl Styrene) (Wide MW Range)

Column: Phenogel 5 μm 10⁵, 10⁴, 10³, 500 Å
Dimensions: 300 x 7.8 mm
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 μL 0.25% w/v
Sample:



Polybutadienes (Wide MW Range)

Column: Phenogel 5 μm 10⁵, 10⁴, 10³, 500 Å
Dimensions: 300 x 7.8 mm
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 μL 0.25% w/v
Sample:

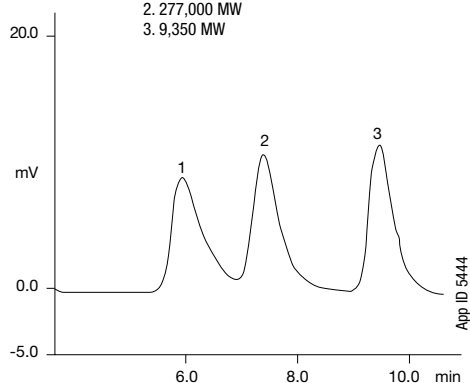


Linear Columns

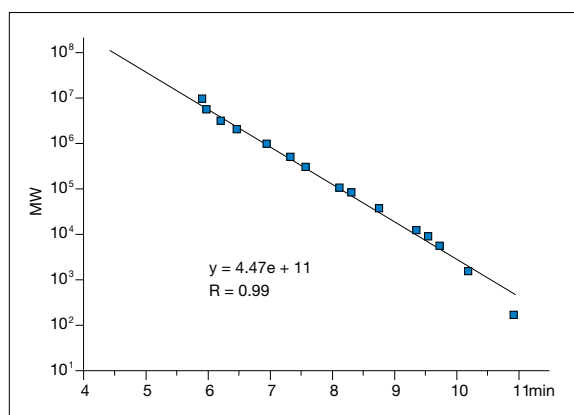
- Linear calibration to 10 million daltons
- Long column lifetime
- Excellent mechanical stability
- Excellent for analyzing a wide range of molecular weights

Mixed Polystyrene Standard

Column: Phenogel 5 µm Linear(2)
Dimensions: 300 x 7.8 mm
Part No.: [00H-3259-K0](#)
Guard Cartridge: [AJ0-9292](#)
Guard Holder: [KJ0-4282](#)
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Detection: RI
Injection Volume: 50 µL
Temperature: 35 °C
Vial: [ARO-9925-13](#)
Filter: [AF0-1102-52](#)
Sample: Polystyrene standards injected
 1. 2,860,000 MW
 2. 277,000 MW
 3. 9,350 MW



Calibration Curve: Linear (2) - Phenogel 5 µm 300 x 7.8 mm



Narrow Bore Columns

An Improved Dimension in GPC Analysis

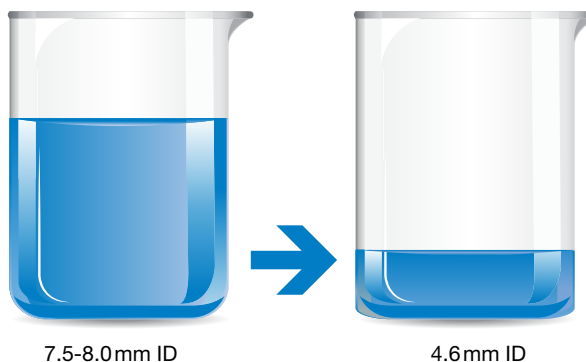
- Decrease solvent consumption
- Retain same elution profile
- Reduce solvent disposal costs


Phenogel-NB (Narrow Bore) columns are optimized to reduce solvent consumption. The Phenogel-NB columns have a 4.6 mm column ID and run at 0.35 mL/min, reducing solvent consumption and disposal costs up to 65 %!

Loading

With narrow bore GPC/SEC columns, the volume in which the sample elutes is significantly decreased, thus increasing the effective concentration of the sample. In GPC, this leads to overloading effects and proportionally lower sample loadings must be used.

Cut Waste!




DISCOVER HOW MUCH YOU WILL SAVE
 when switching to Phenogel Narrow Bore columns!

Phenogel™ Organic GPC/SEC Columns

Ordering Information

5 µm Analytical Columns (mm)		Shipping Solvent			SecurityGuard™ Cartridges (mm)
		THF	Chloroform	DMF	
		300 x 7.8	300 x 7.8	300 x 7.8	4 x 3.0*
Pore Size	MW Range				/3pk
50 Å	100-3 K	00H-0441-KO	—	00H-0441-KO-DF	AJ0-9292
100 Å	500-6 K	00H-0442-KO	—	—	AJ0-9292
500 Å	1 K-15 K	00H-0443-KO	—	—	AJ0-9292
10³ Å	1 K-75 K	00H-0444-KO	—	00H-0444-KO-DF	AJ0-9292
10⁴ Å	5 K-500 K	00H-0445-KO	00H-0445-KO-CL	—	AJ0-9292
10⁵ Å	10 K-1,000 K	00H-0446-KO	—	00H-0446-KO-DF	AJ0-9292
10⁶ Å	60 K-10,000 K	00H-0447-KO	—	—	AJ0-9292
		300 x 7.8	300 x 7.8	300 x 7.8	4 x 3.0*
Mixed Beds					/3pk
Linear(2)	100-10,000 K	00H-3259-KO	00H-3259-KO-CL	00H-3259-KO-DF	AJ0-9292

for 3.2–8.0 mm ID

5 µm Narrow Bore (NB) Columns (mm)		SecurityGuard Cartridges (mm)	
		300 x 4.6	4 x 3.0*
Pore Size	MW Range		/3pk
50 Å	100-3 K	00H-0441-E0	AJ0-9292
100 Å	500-6 K	00H-0442-E0	AJ0-9292
500 Å	1 K-15 K	00H-0443-E0	AJ0-9292
10³ Å	1 K-75 K	00H-0444-E0	AJ0-9292
10⁴ Å	5 K-500 K	00H-0445-E0	AJ0-9292
10⁵ Å	10 K-1,000 K	00H-0446-E0	AJ0-9292
10⁶ Å	60 K-10,000 K	00H-0447-E0	AJ0-9292
		300 x 4.6	4 x 3.0*
Mixed Beds			
Linear(2)	100-10,000 K	00H-3259-E0	AJ0-9292

for 3.2–8.0 mm ID

10 µm Analytical Columns (mm)		SecurityGuard Cartridges (mm)	
		300 x 7.8	4 x 3.0*
Pore Size	MW Range		/3pk
50 Å	100-3 K	00H-0641-KO	AJ0-9292
100 Å	500-6 K	00H-0642-KO	AJ0-9292
500 Å	1 K-15 K	00H-0643-KO	AJ0-9292
10³ Å	1 K-75 K	00H-0644-KO	AJ0-9292
10⁴ Å	5 K-500 K	00H-0645-KO	AJ0-9292
10⁵ Å	10 K-1,000 K	00H-0646-KO	AJ0-9292
10⁶ Å	60 K-10,000 K	00H-0647-KO	AJ0-9292
		300 x 7.8	4 x 3.0*
Mixed Beds			
Linear(2)	100-10,000 K	00H-3260-KO	AJ0-9292

for 3.2–8.0 mm ID

5 µm Preparative Columns (mm)		Guards	
		300 x 21.2	50 x 21.2
Pore Size	MW Range		
100 Å	500-6 K	00H-0442-PO	03B-0642-PO

10 µm Preparative Columns (mm)		Guards	
		300 x 21.2	50 x 21.2
Pore Size	MW Range		
100 Å	500-6 K	00H-0642-PO	03B-0642-PO

Guard Cartridge Holder

Part No.	Description
KJ0-4282	Reusable Holder (SecurityGuard Kit)

Column Union

Part No.	Description	Unit
AQ0-8507	Zero Dead Union, SS, with 10-32 fittings	ea

Note: Additional union ([AQ0-8507](#)) may be necessary for SecurityGuard to fit in column oven with less than 30 cm length capacity.



Phenogel columns are routinely shipped in THF. However, columns are also available in commonly used solvents, Chloroform and DMF, for an additional charge for these shipping solvents. Please specify shipping solvent when ordering.

Phenogel Columns are a Recommended Alternative to:

Manufacturer	Columns
Agilent® (Polymer Labs)	PLgel™
Jordi Labs	Jordi Gel™ DVB Jordi Gel DVB Fluorinated Jordi Gel DVB Glucose
Polymer Standards Service (PSS)	SDV® GRAM PolarSil PFG POLEFIN®
Shodex®	GPC K-800 Series GPC KF-800 Series GPC KD-800 Series
Tosoh Bioscience®	TSKgel® SuperMultiporeHZ TSKgel SuperHZ TSKgel Hxl TSKgel SuperH TSKgel Hhr
Waters®	Styragel® Ultrastryragel™ ACQUITY® APC™

*SecurityGuard Analytical Cartridges require holder, Part No.: [KJ0-4282](#)



For Column Heater, see p. 390



SecurityGuard cartridges for Non-Aqueous Polymer GPC columns are not compatible with HFIP solvent.



Reversed Phase Polymer HPLC Columns

- Excellent alternative to other polystyrene divinylbenzene (PSDVB) columns
- High chemical strength and stability
- pH stable from 0-14
- No bonded phase = zero phase bleed
- Great long-lived solution for separating quaternary amines

PolymerX RP-1 is a porous (100 Å) polystyrene divinylbenzene media which has hydrophobic retention similar to a C18-bonded silica. Because the media is a polymer instead of silica, it is tolerant to pH extremes (0-14) and a good solution for high pH applications where silica-based media fail. PolymerX also delivers good lifetime for analytes like quaternary amines which strongly interact with bonded silica particles.

Material Characteristics

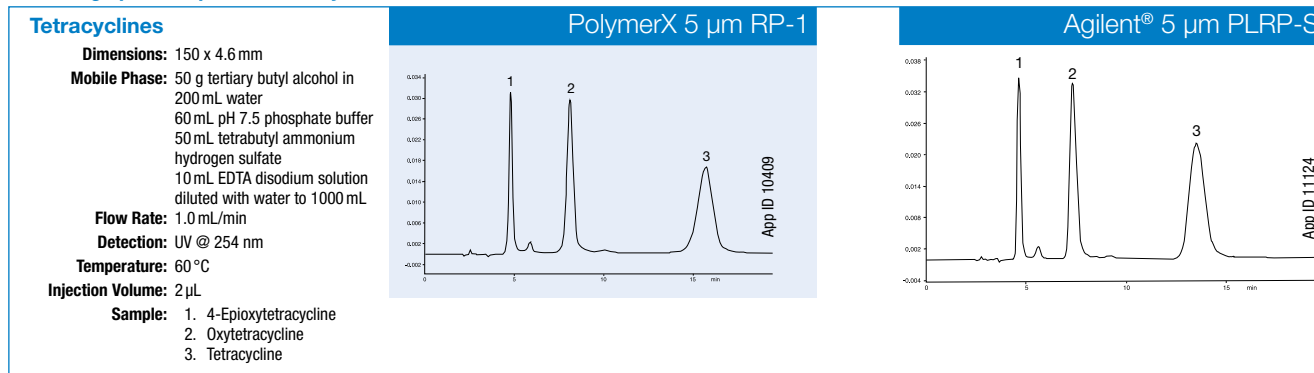
Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	pH Stability
RP-1 (PSDVB)	Spherical 3, 5, 7, 10	100	0 - 14

Typical Results and Operating Parameters of RP Silica and Polymer Columns

Parameter	C18 silica	RP-polymer
Acidic silanols	present	absent
pH stability	2-9	0-14
Recovery*	~50-80 %	>95 %
Capacity*	1 mg	10-25 mg
Pressure limit	3500 psi	2500 psi
Temperature limit	60 °C	80 °C
Column lifetime		longer

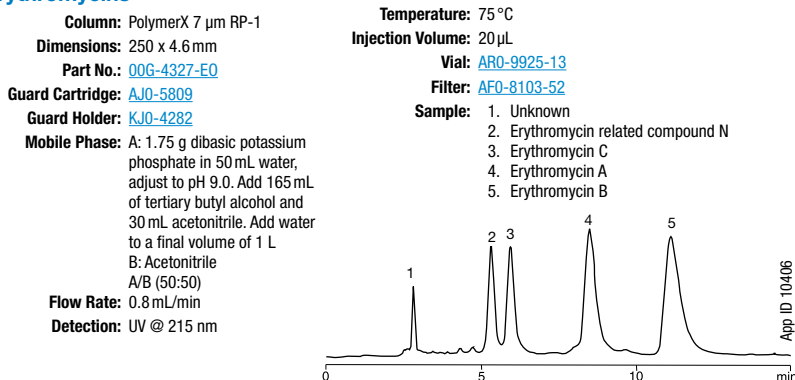
*pertains to dimethyltritylated (DMT) synthetic oligomer purification on a 150 x 4.1 mm column

Chromatographic Comparison** of Polymer Columns



**Comparative separations may not be representative of all applications.

Erythromycins



Ordering Information

	PolymerX RP-1 Columns (mm)					
	150 x 4.1	150 x 4.6	250 x 4.1	250 x 4.6	250 x 10.0	250 x 21.2
3 µm	00F-4338-Z0	—	—	—	—	—
5 µm	00F-4326-Z0	00F-4326-E0	00G-4326-Z0	00G-4326-E0	—	—
7 µm	—	—	—	00G-4327-E0	—	—
10 µm	—	—	00G-4328-Z0	00G-4328-E0	00G-4328-N0	00G-4328-P0

RP-1 SecurityGuard™ Cartridges (mm)		
4 x 3.0*	10 x 10†	15 x 21.2**
/10pk	/3pk	/ea
AJ0-5809	AJ0-7368	AJ0-8358
for ID: 3.2-8.0 mm	9-16 mm	18-29 mm



Bulk media available upon request.



For PolymerX Column Performance Check Standards, see p. 398

*SecurityGuard Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

†SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

**Prep SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)

Aqueous GFC Columns for the Separation of Polymers, Proteins and Peptides

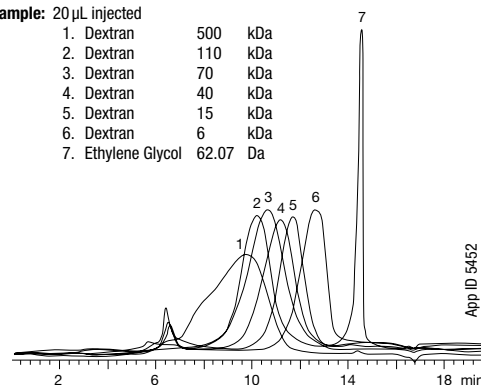
- Highly hydrophilic synthetic polymer phase
- Suitable for water-soluble polymers
- Very low nonspecific interaction with the separation matrix
- Extremely cost-effective
- High efficiencies
- Good mechanical strength

The PolySep material undergoes rigorous quality control tests, from the initial stages of testing of the starting monomers to the final product. There are at least 25 steps of quality assurance during the entire procedure. The packed column then undergoes at least five additional tests, including a batch test for the manufactured materials. Each column is then tested for column efficiency and peak symmetry and ships with a QC chromatogram. This ensures long-lasting columns with very high efficiencies.

Dextran

Column: PolySep-GFC-P4000
 Dimensions: 300 x 7.8 mm
 Part No.: CHO-9229
 Mobile Phase: Water
 Flow Rate: 0.8 mL/min
 Detection: RI
 Sample: 20 µL injected

1. Dextran	500	kDa
2. Dextran	110	kDa
3. Dextran	70	kDa
4. Dextran	40	kDa
5. Dextran	15	kDa
6. Dextran	6	kDa
7. Ethylene Glycol	62.07	Da



App ID 5452

PolySep-GFC-P Technical Data and Specifications

Phase:	1000	2000	3000	4000	5000	6000	Linear
Exclusion Limits in Daltons:							
PEG	2 x 10 ⁵	9 x 10 ⁵	5 x 10 ⁴	2 x 10 ⁵	2 x 10 ⁶	1 x 10 ⁷	1 x 10 ⁷
Pullulans	3.5 x 10 ⁵	1 x 10 ⁴	1 x 10 ⁵	3.5 x 10 ⁵	4 x 10 ⁶	2 x 10 ⁷	2 x 10 ⁷
Separation Range (Da)	20 - 3K	100 - 10K	250 - 75K	3K - 400K	50K - 2M	100K - 15M	1K - 10M
Typical Efficiency Plates/meter	22,000	50,000	32,000	32,000	32,000	32,000	32,000
Maximum Organic Modifier:							
Methanol	20%	95%	70%	70%	70%	70%	70%
Acetonitrile	20%	70%	70%	70%	70%	70%	70%
pH Range	3.0 to 12.0						
Maximum Flow Rate	Depends on backpressure, do not exceed 1000 psi						
Column Hardware	Stainless steel or PEEK (Biocompatible hardware available upon request)						
Temperature	4 to 60 °C						
Maximum Salt	Maximum allowed 0.5 M with a flow rate not to exceed 0.5 mL/min						
Storage	For overnight, pump water at 0.2 mL/min, for longer storage use 0.05% NaN ₃ in water or 10% methanol in water						
General	A guard column is recommended to improve column life						

Ordering Information

PolySep-GFC-P Columns (mm)		
	Analytical	Guards
Phases	300 x 7.8	35 x 7.8
1000	CHO-9226	CHO-9225
2000	CHO-9227	CHO-9225
3000	CHO-9228	CHO-9225
4000	CHO-9229	CHO-9225
5000	CHO-9230	CHO-9225
6000	CHO-9231	CHO-9225
Linear	CHO-9232	CHO-9225

Aqueous SEC 2 Column Check Standard

(For PolySep GFC-P and other aqueous-soluble analysis columns)

Part No.: AL0-3043

Unit quantity: 2 mL
 Contains: Ethylene Glycol
 Diluent: Water

Test Conditions

Mobile Phase: Water
 Flow Rate: 0.8 mL/min
 Injection Volume: 15 µL
 Detection: RI



For additional GFC Columns, see pp. 336-339



For HPLC Column Heater (25-90 °C), see p. 390

Guaranteed Alternative to Inertsil®

- Highly reproducible
- Long column life
- Mimics performance of GL Sciences, Inc. Inertsil®

Ordering Information

3 µm ODS-3 Columns (mm)							SecurityGuard™ Cartridges (mm)	
Phases	100 x 2.0	150 x 2.0	100 x 4.0	30 x 4.6	100 x 4.6	150 x 4.6	4 x 2.0*	4 x 3.0*
							/10pk	/10pk
ODS-3 100 Å	00D-4222-B0	00F-4222-B0	00D-4222-D0	00A-4222-E0	00D-4222-E0	00F-4222-E0	AJ0-4286	AJ0-4287
							for ID: 2.0-3.0 mm	3.2-8.0 mm

3 µm and 5 µm ODS-3V Columns (mm)		
Phases	Part No.	Size (mm)
3 µm ODS-3V	00D-4243-E0	100 x 4.6
3 µm ODS-3V	00F-4243-E0	150 x 4.6
5 µm ODS-3V	00F-4241-E0	150 x 4.6
5 µm ODS-3V	00G-4241-E0	250 x 4.6

5 µm Minibore Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0*	
				/10pk	
ODS-2 150 Å	—	00F-3300-B0	—	AJ0-4286	
ODS-3 100 Å	00B-4097-B0	00F-4097-B0	00G-4097-B0	AJ0-4286	
				for ID: 2.0-3.0 mm	

5 µm MidBore™ Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	150 x 3.0	250 x 3.0	150 x 3.2	250 x 3.2	4 x 2.0*	4 x 3.0*
					/10pk	/10pk
C8 150 Å	—	00G-3301-Y0	—	—	AJ0-4289	AJ0-4290
ODS-2 150 Å	—	—	00F-3300-R0	00G-3300-R0	AJ0-4286	AJ0-4287
ODS-3 100 Å	00F-4097-Y0	00G-4097-Y0	00F-4097-R0	00G-4097-R0	AJ0-4286	AJ0-4287
					for ID: 2.0-3.0 mm	3.2-8.0 mm

5 µm and 10 µm Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)	
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*	
						/10pk	
5 µm C8 150 Å	00A-3301-E0	00B-3301-E0	00D-3301-E0	00F-3301-E0	00G-3301-E0	AJ0-4290	
5 µm ODS-2 150 Å	00A-3300-E0	—	00D-3300-E0	00F-3300-E0	00G-3300-E0	AJ0-4287	
5 µm Silica 100 Å	—	—	—	—	00G-4098-E0	AJ0-4348	
5 µm ODS-3 100 Å	00A-4097-E0	00B-4097-E0	00D-4097-E0	00F-4097-E0	00G-4097-E0	AJ0-4287	
5 µm Phenyl-3 (PH-3) 100 Å	—	—	—	00F-4298-E0	00G-4298-E0	AJ0-4351	
10 µm Silica-3 100 Å	—	—	—	—	00G-4245-E0	AJ0-4348	
10 µm ODS-3 100 Å	—	—	—	—	00G-4244-E0	AJ0-4287	
						for ID: 3.2-8.0 mm	

5 µm and 10 µm SemiPreparative Columns (mm)		SecurityGuard™ Cartridges (mm)	
Phases	250 x 10	10 x 10*	
		/3pk	
5 µm ODS-3 100 Å	00G-4097-N0	AJ0-7221	
10 µm ODS-3 100 Å	00G-4244-N0	AJ0-7221	
		for ID: 9-16 mm	

*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)
 *SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJ0-9281](#)



For SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315

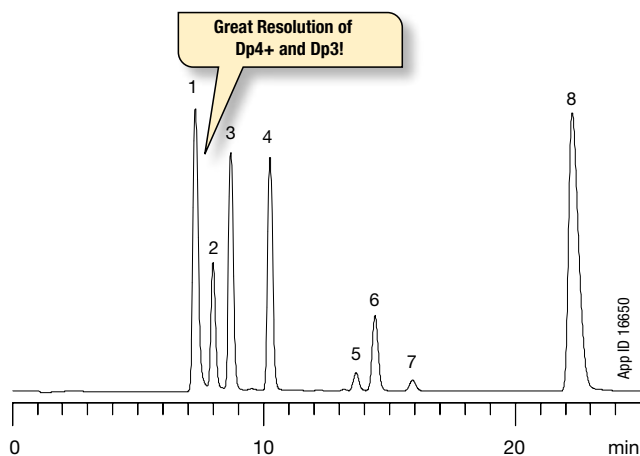


Bioethanol Fermentation Monitoring

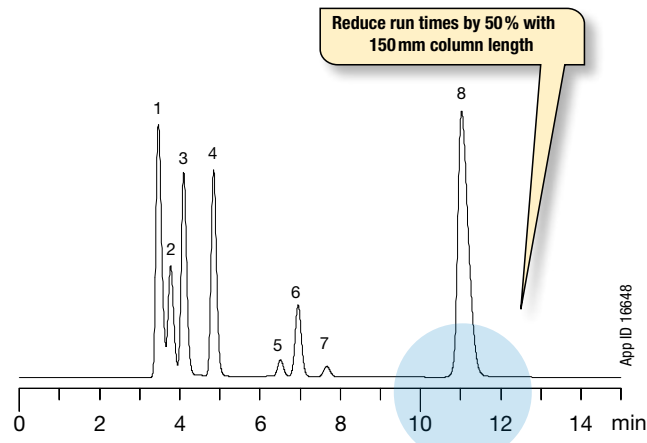
- Easy quantitation of ethanol fermentation broth components
- Monitor starches, sugars, organic acids, and ethanol in one run
- Reliable lactic acid and acetic acid monitoring
- Increase throughput by reducing run times 50% with 150 mm column length

Monitoring the key reaction components throughout the fermentation process is crucial for maximizing ethanol recovery. Rezex ROA is uniquely suited for the separation and analysis of simple and complex sugars, organic acids, and ethanol within a fermentation broth sample. With results easily obtained through an isocratic run, Rezex ROA is instrumental in helping you to accurately determine what critical steps need to be taken to ensure the maximum yield is achieved during your fermentation run.

Rezex ROA has the ability to achieve excellent baseline separation between Dp3 and Dp4+, which have proven to be a challenge within the bioethanol industry. It is this great baseline separation that affords scientists the opportunity to utilize a shorter column dimension. By using the 150 x 7.8 mm Rezex ROA column, you are able to decrease the run time by 50% when compared to the average run time on a 300 x 7.8 mm column.



Column: Rezex ROA-Organic Acid
Dimensions: 300 x 7.8 mm
Part No.: [00H-0138-K0](#)
Guard Cartridge: [AJ0-4490](#)
Guard Holder: [KJ0-4282](#)
Mobile Phase: 0.005 N Sulfuric Acid
Flow Rate: 0.6 mL/min
Detection: RI @ 40 °C
Vial: [ARO-9925-13](#)
Filter: [AF0-8103-52](#)
Temperature: 60 °C
System: Shimadzu® Prominence® LC-20A System
Sample: 1. Dp4+ 5. Lactic Acid
 2. Dp3 6. Glycerol
 3. Maltose 7. Acetic Acid
 4. Glucose 8. Ethanol



Column: Rezex ROA-Organic Acid
Dimensions: 150 x 7.8 mm
Part No.: [00F-0138-K0](#)
Guard Cartridge: [AJ0-4490](#)
Guard Holder: [KJ0-4282](#)
Mobile Phase: 0.005 N Sulfuric Acid
Flow Rate: 0.6 mL/min
Detection: RI @ 40 °C
Vial: [ARO-9925-13](#)
Filter: [AF0-8103-52](#)
Temperature: 60 °C
System: Shimadzu Prominence LC-20A System
Sample: 1. Dp4+ 5. Lactic Acid
 2. Dp3 6. Glycerol
 3. Maltose 7. Acetic Acid
 4. Glucose 8. Ethanol

Shorten GC Fuel Quality Testing
 Zebtron ZB-Bioethanol GC column can shorten your quality test down to 5 minutes! (See pp. 112-113).

Extend Column Lifetime
 Protect the Rezex column from the intrusion of the metal ions by using Phenex™ Syringe Filters and SecurityGuard™. The filters and SecurityGuard guard cartridge system work by trapping metal ions, such as calcium, magnesium, and iron, which can damage the column and cause it to lose or change separation efficiency. (See pp. 10 and 311).

Rezex™ Organic Acid and Carbohydrate Columns

Rezex™ vs. Bio-Rad® Aminex®

Phenomenex guarantees satisfaction when using Rezex HPLC columns. As illustrated below, Rezex offers advantages that enhance chromatographic results, increase throughput, and simplify quantitation.

Easier, Accurate Quantitation

Due to improved peak shape

Saccharides

Conditions for both columns:

Column: Rezex RCM-Monosaccharide
Aminex HPX-87C

Dimensions: 300 x 7.8 mm

Mobile Phase: Water

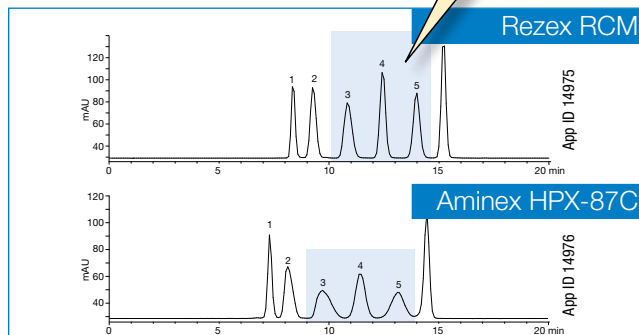
Flow Rate: 0.6 mL/min

Detection: ELSD

Temperature: 80 °C

Sample: 1. Melezitose 4. Mannose
2. Maltose 5. Fructose
3. Glucose 6. Ribitol

Superior
Peak Shape



Comparative separations may not be representative of all applications.

Baseline Separation of Critical Sample Components

Due to improved resolution

Sugars

Conditions for both columns:

Column: Rezex RCM-Monosaccharide
Aminex HPX-87C

Dimensions: 300 x 7.8 mm

Mobile Phase: Water

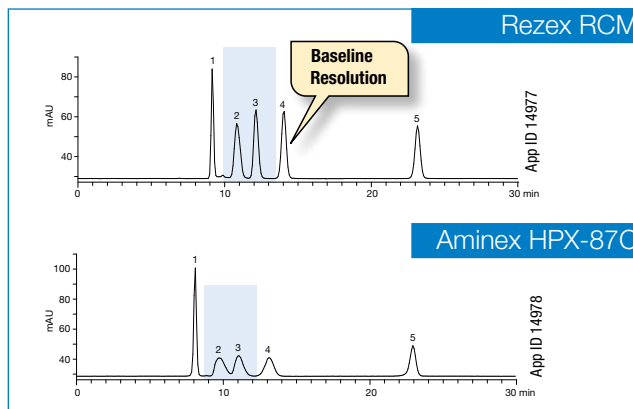
Flow Rate: 0.6 mL/min

Detection: ELSD

Temperature: 80 °C

Sample: 1. Sucrose 4. Fructose
2. Glucose 5. Sorbitol
3. Galactose

Baseline
Resolution



Applications

Food Softeners

Column: Rezex RCM-Monosaccharide

Dimensions: 300 x 7.8 mm

Part No.: [0QH-0130-K0](#)

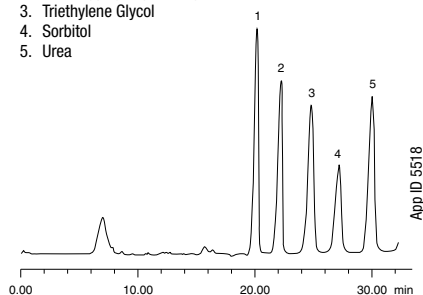
Mobile Phase: Water

Flow Rate: 0.5 mL/min

Detection: RI

Temperature: 60 °C

Sample: 1. Glycerol
2. Methoxypolyethylene Glycol
3. Triethylene Glycol
4. Sorbitol
5. Urea



Amino Sugars

Column: Rezex ROA-Organic Acid

Dimensions: 300 x 7.8 mm

Part No.: [0QH-0138-K0](#)

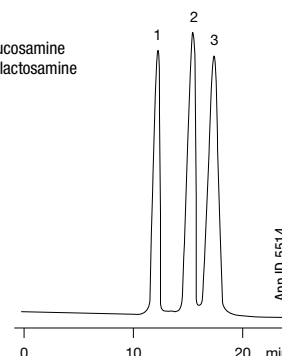
Mobile Phase: 1% Phosphoric Acid

Flow Rate: 0.6 mL/min

Detection: RI

Temperature: Ambient

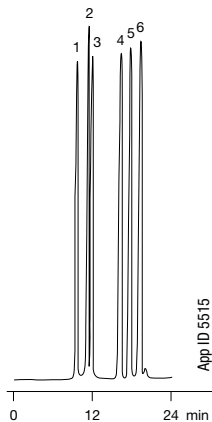
Sample: 1. Glucose
2. N-Acetylglucosamine
3. N-Acetylgalactosamine



Rezex™ Organic Acid and Carbohydrate Columns

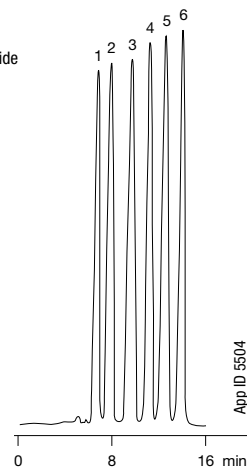
Organic Acids

Column: Rezex ROA-Organic Acid
Dimensions: 300 x 7.8 mm
Part No.: [00H-0138-KO](#)
Guard Cartridge: [AJO-4490](#)
Guard Holder: [KJO-4282](#)
Mobile Phase: 0.005 N Sulfuric Acid
Flow Rate: 0.5 mL/min
Detection: UV @ 210 nm
Vial: [ARO-9925-13](#)
Filter: [AFO-8103-52](#)
Temperature: 55 °C
Sample: 1. Oxalic
 2. Citric
 3. Tartaric
 4. Succinic
 5. Formic
 6. Acetic



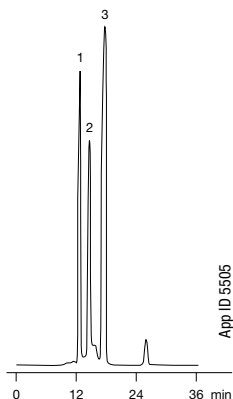
Saccharides

Column: Rezex RCM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: [00H-0130-KO](#)
Guard Cartridge: [AJO-4493](#)
Guard Holder: [KJO-4282](#)
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: RI
Vial: [ARO-9925-13](#)
Filter: [AFO-8103-52](#)
Temperature: 85 °C
Sample: 1. Melezitose
 2. Maltose
 3. Glucose
 4. Mannose
 5. Fructose
 6. Ribitol



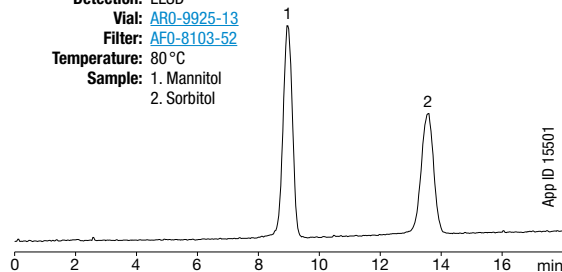
Apple Juice

Column: Rezex RCM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: [00H-0130-KO](#)
Guard Cartridge: [AJO-4493](#)
Guard Holder: [KJO-4282](#)
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: RI
Vial: [ARO-9925-13](#)
Filter: [AFO-8103-52](#)
Temperature: 75 °C
Sample: 1. Sucrose
 2. Glucose
 3. Fructose



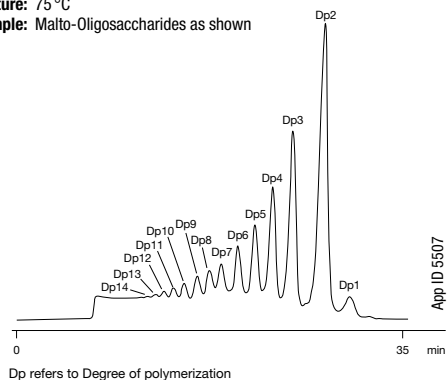
Mannitol and Sorbitol

Column: Rezex RPM-Monosaccharide
Dimensions: 100 x 7.8 mm
Part No.: [00D-0135-KO](#)
Guard Cartridge: [AJO-4492](#)
Guard Holder: [KJO-4282](#)
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: ELSD
Vial: [ARO-9925-13](#)
Filter: [AFO-8103-52](#)
Temperature: 80 °C
Sample: 1. Mannitol
 2. Sorbitol



Oligosaccharides

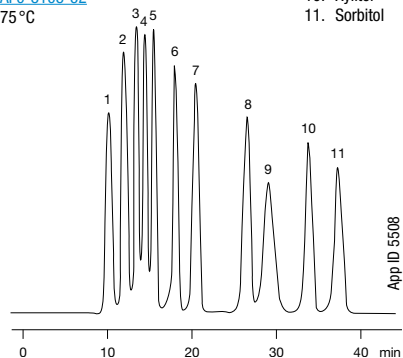
Column: Rezex RSO-Oligosaccharide
Dimensions: 200 x 10 mm
Part No.: [00P-0133-NO](#)
Mobile Phase: Water
Flow Rate: 0.3 mL/min
Detection: RI
Vial: [ARO-9925-13](#)
Filter: [AFO-8103-52](#)
Temperature: 75 °C
Sample: Malto-Oligosaccharides as shown



Saccharides

Column: Rezex RPM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: [00H-0135-KO](#)
Guard Cartridge: [AJO-4492](#)
Guard Holder: [KJO-4282](#)
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: RI
Vial: [ARO-9925-13](#)
Filter: [AFO-8103-52](#)
Temperature: 75 °C

Sample: 1. Stachyose
 2. Maltose
 3. Glucose
 4. Xylose
 5. Galactose
 6. Fructose
 7. Meso-Erythritol
 8. Mannitol
 9. Salicin
 10. Xylitol
 11. Sorbitol




Rezex™ Organic Acid and Carbohydrate Columns

Specifications and Operating Recommendations


	RCM-Monosaccharide	RSO-Oligosaccharide	RNO-Oligosaccharide	RNM-Carbohydrate	RAM-Carbohydrate
Part Number	00H-0130-K0	00P-0133-N0	00P-0137-N0	00H-0136-K0	00H-0131-K0
Ionic Form	Calcium	Silver	Sodium	Sodium	Silver
Standard Dimensions	300 x 7.8 mm	200 x 10 mm	200 x 10 mm	300 x 7.8 mm	300 x 7.8 mm
Matrix	Sulfonated Styrene-divinylbenzene				
Cross Linking	8%	4%	4%	8%	8%
Particle Size	8 µm	12 µm	12 µm	8 µm	8 µm
Min. Efficiency (p/m) based on last peak	35,000	N/A	N/A	30,000	35,000
Typical Pressure (psi @ Testing Flow Rate)	260	115	130	170	285
Max. Pressure (psi @ Max Flow Rate)	1,000	300	300	1,000	1,000
Max. Flow Rate (mL/min)	1.0 (see pressure)	0.3	0.3	1.0	1.0
Max. Temperature (°C)	85	85	85	85	85
Typical Mobile Phase	Water	Water	Water	Water	Water
pH Range	Neutral	Neutral	Neutral	Neutral	Neutral
Guard Column Part No.	03B-0130-K0	03R-0133-N0	03R-0137-N0	03B-0136-K0	03B-0131-K0

Cleaning, Regeneration and Storage

Organic Modifiers (Max)	5% Methanol, IPA, EtOH				
Inorganic Modifiers	5% CaSO ₄ , Ca(NO ₃) ₂ , CaCl ₂	5% Silver Nitrate	5% Sodium Salts	5% Sodium Salts	2% Silver Nitrate
Avoid 	Acids, Bases, Non-Calcium Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Non-Silver Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Non-Sodium Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Non-Sodium Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Non-Silver Salts/ Metal Ions, >30% Acetonitrile
Cleaning Solvent	100% Water	100% Water	100% Water	100% Water	100% Water
Flow Rate (mL/min)	0.4	0.1	0.1	0.4	0.4
Temperature (°C)	85	85	85	85	85
Duration (hrs)	12	12	12	12	12
Regeneration Solvent	0.1 M Ca(NO ₃) ₂	0.1 M AgNO ₃	0.1 M NaNO ₃	0.1 M NaNO ₃	0.1 M AgNO ₃
Flow Rate (mL/min)	0.2	0.1	0.2	0.2	0.2
Temperature (°C)	85	85	85	85	85
Duration (hrs)	4-16	4-16	4-16	4-16	4-16
Ship/Storage Solvent	Water	Water	Water	Water	Water

	RPM-Monosaccharide	RHM-Monosaccharide	ROA-Organic Acid	RFQ-Fast Acid	RCU-Sugar Alcohols
Part Number	00H-0135-K0	00H-0132-K0	00H-0138-K0	00D-0223-K0	00G-0130-D0
Ionic Form	Lead	Hydrogen	Hydrogen	Hydrogen	Calcium
Standard Dimensions	300 x 7.8 mm	300 x 7.8 mm	300 x 7.8 mm	100 x 7.8 mm	250 x 4.0 mm
Matrix	Sulfonated Styrene-divinylbenzene				
Cross Linking	8%	8%	8%	8%	8%
Particle Size	8 µm	8 µm	8 µm	8 µm	8 µm
Min. Efficiency (p/m) based on last peak	35,000	35,000	50,000 (Acetic Acid)	30,000	12,000
Typical Pressure (psi @ Testing Flow Rate)	190	275	580	365	90
Max. Pressure (psi @ Max Flow Rate)	1,000	1,000	1,000	1,000	1,000
Max. Flow Rate (mL/min)	1.0	1.0	1.0	1.0	0.5
Max. Temperature (°C)	85	85	85	85	85
Typical Mobile Phase	Water	Water	0.005 N H ₂ SO ₄	0.005 N H ₂ SO ₄	Water
pH Range	Neutral	1-8	1-8	1-8	Neutral
Guard Column Part No.	03B-0135-K0	03B-0132-K0	03B-0138-K0	03B-0223-K0	03A-0130-D0

Cleaning, Regeneration and Storage

Organic Modifiers (Max)	5% Methanol, IPA, EtOH				
Inorganic Modifiers	5% Lead Nitrate	5% HNO ₃ , H ₃ PO ₄	5% HNO ₃ , H ₃ PO ₄	5% HNO ₃ , H ₃ PO ₄	5% CaSO ₄ , Ca(NO ₃) ₂ , CaCl ₂
Avoid 	Acids, Bases, Non-Lead Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Salts, Metal Ions, pH > 3, >30% Acetonitrile	Acids, Bases, Salts, Metal Ions, pH > 3, >30% Acetonitrile	Acids, Bases, Non-Calcium Salts, or Metal Ions, >30% Acetonitrile
Cleaning Solvent	100% Water	100% Water	100% Water	100% Water	100% Water
Flow Rate (mL/min)	0.4	0.4	0.4	0.4	0.1
Temperature (°C)	85	85	85	85	85
Duration (hrs)	12	12	12	12	12
Regeneration Solvent	0.1 M Pb(NO ₃) ₂	0.025 M H ₂ SO ₄	0.025 M H ₂ SO ₄	0.025 M H ₂ SO ₄	0.1 M Ca(NO ₃) ₂
Flow Rate (mL/min)	0.2	0.2	0.2	0.2	0.1
Temperature (°C)	85	85	85	85	85
Duration (hrs)	4-16	4-16	4-16	4-16	4-16
Ship/Storage Solvent	Water	Water	0.005 N H ₂ SO ₄	0.005 N H ₂ SO ₄	Water

Rezex™ Organic Acid and Carbohydrate Columns

Retention Times for Some Carbohydrates and Sugar Alcohols

Counter Ion	Analyte	RAM Ag ⁺	RCM Ca ⁺²	RNM Na ⁻	RHM H ⁻	RPM Pb ⁺²
	Adonitol (Ribitol)	11.54	14.93	11.10	11.11	20.15
	D-Altrose	11.95	12.71	11.45	10.21	15.82
	D-(-)-Arabinose	13.01	13.56	12.65	11.24	16.47
	D-(+)-Cellobiose	8.86	8.60	8.49	8.02	11.00
	D-(+)-Digitoxose	11.90	13.82	11.39	12.59	15.32
	Dulcitol	11.64	21.61	11.10	10.71	33.25
	Meso-Erythritol	12.31	15.49	11.78	12.14	19.82
	D-(-)-Fructose	12.05	13.65	11.76	10.31	17.71
	L-(-)-Fucose	12.75	13.19	12.30	11.65	16.19
	D-(+)-Galactose	11.87	11.73	11.47	10.19	14.94
	Gentiobiose	8.70	8.40	8.40	7.87	10.53
	D-(+)-Glucose	11.04	10.37	10.71	9.62	12.92
	Inositol	12.59	13.35	12.14	9.98	18.87
	Isomaltose	9.11	8.74	8.76	8.02	11.28
	Lactose	9.27	9.03	8.78	8.32	11.89
	Lactulose	9.75	10.32	9.23	8.57	13.95
	D- Lyxose	12.41	14.06	11.98	10.68	16.66
	D- Maltose	9.16	8.81	8.75	8.18	11.59
	Maltotriose	8.27	8.10	7.94	7.51	11.02
	Maltulose	9.25	9.47	8.82	8.27	12.40
	D- Mannitol	11.36	17.82	10.80	10.59	24.90
	D-(+)-Mannose	12.04	12.04	11.54	10.16	16.39
	Melibiose	9.26	9.04	8.82	8.14	11.97
	D-(+)-Melezitose	8.00	7.93	7.66	7.54*	9.94
	D-(+)-Raffinose	8.10	8.16	7.76	7.88*	10.28
	L-(+)-Rhamnose	11.50	12.18	11.00	10.90	14.47
	D-(-)-Ribose	14.59	23.38	14.34	11.42	33.48
	Salicin	18.51	18.58	17.36	14.98	26.81
	D-Sorbitol	11.91	22.45	11.39	10.83	35.97
	Stachyose	7.60	7.59	7.30	7.27	9.72
	Sucrose	9.03	8.71	8.65	9.24*	11.00
	Trehalose	8.91	8.72	8.49	8.32	11.01
	Xylitol	12.69	22.01	12.16	11.78	32.38
	D-(+)-Xylose	12.06	11.62	11.68	10.24	13.84

* Partial hydrolysis results.

Conditions:

Dimensions: 300 x 7.8 mm
Mobile Phase: Water (degassed)
Flow Rate: 0.6 mL/min
Temperature: 80 °C
Detection: RI @ 40 °C

Column Cross Reference Chart

Phenomenex Rezex™	Bio-Rad® Aminex®	Supelco® SUPELCOGEL™	Waters® Sugar-Pak™	Transgenomic® CARBOSEP™	Sepax® Carbomix®
RCM-Monosaccharide	HPX-87C 125-0095	Supelcogel Ca	Sugar-Pak 1	CARBOSep CHO-820	Carbomix Ca
RHM-Monosaccharide	HPX-87H 125-0140	Supelcogel C-610H & H	N/A	ICSep ION-300	Carbomix H
RPM-Monosaccharide	HPX-87P 125-0098	Supelcogel Pb	N/A	CARBOSEP COREGEL-87P	Carbomix Pb
RNM-Carbohydrate	HPX-87N 125-0143	N/A	N/A	N/A	Carbomix Na
RSO-Oligosaccharide	HPX-42A 125-0097	Supelcogel Ag1 & Ag2	N/A	N/A	N/A
ROA-Organic Acid	HPX-87H 125-0140	Supelcogel C-610H & H	N/A	N/A	N/A
RFQ-Fast Acid	Fast Acid 125-0100	N/A	N/A	N/A	N/A
RKP-Potassium	HPX-87K 125-0142	Supelcogel K	N/A	CARBOSEP COREGEL-87K	Carbomix K
RCU-USP Sugar Alcohols	Sugar Alcohols 125-0094	N/A	N/A	N/A	N/A

Ordering Information

Columns				Guards		SecurityGuard™ Cartridges (mm)
Description	Part No.	Cross Linkage	Ionic Form	Size (mm)	Part No.	Size (mm)
RCM-Monosaccharide	00F-0130-KO	8%	Calcium	150 x 7.8	03B-0130-KO	50 x 7.8
RCM-Monosaccharide	00H-0130-KO	8%	Calcium	300 x 7.8	03B-0130-KO	50 x 7.8
RHM-Monosaccharide	00H-0132-KO	8%	Hydrogen	300 x 7.8	03B-0132-KO	50 x 7.8
RAM-Carbohydrate	00H-0131-KO	8%	Silver	300 x 7.8	—	—
RSO-Oligosaccharide	00P-0133-NO	4%	Silver	200 x 10.0	03R-0133-NO	60 x 10.0
RNO-Oligosaccharide	00P-0137-NO	4%	Sodium	200 x 10.0	03R-0137-NO	60 x 10.0
RPM-Monosaccharide	00H-0135-KO	8%	Lead	300 x 7.8	03B-0135-KO	50 x 7.8
RPM-Monosaccharide	00D-0135-KO	8%	Lead	100 x 7.8	03B-0135-KO	50 x 7.8
RNM-Carbohydrate	00H-0136-KO	8%	Sodium	300 x 7.8	03B-0136-KO	50 x 7.8
ROA-Organic Acid	00F-0138-EQ	8%	Hydrogen	150 x 4.6	—	—
ROA-Organic Acid	00G-0138-EQ	8%	Hydrogen	250 x 4.6	—	—
ROA-Organic Acid	00F-0138-KO	8%	Hydrogen	150 x 7.8	03B-0138-KO	50 x 7.8
ROA-Organic Acid	00H-0138-KO	8%	Hydrogen	300 x 7.8	03B-0138-KO	50 x 7.8
RKP-Potassium	00H-3252-KO	8%	Potassium	300 x 7.8	—	—
RFQ-Fast Acid	00D-0223-KO	8%	Hydrogen	100 x 7.8	03B-0223-KO	50 x 7.8
RCU-USP Sugar Alcohols	00G-0130-DO	8%	Calcium	250 x 4.0	03A-0130-DO	30 x 4.0

for ID: 3.2-8.0 mm

*SecurityGuard Analytical Cartridges require universal holder Part No.: [KJO-4282](#)



For Column Heater, see p. 390



For our full line of Column Performance Check Standards, see pp. 398-399

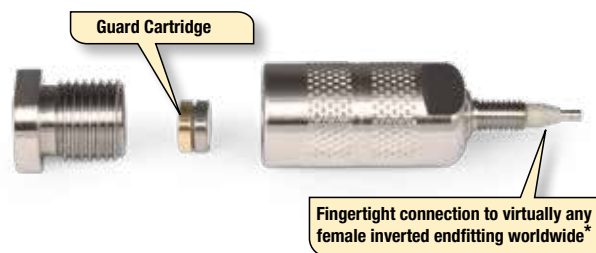
SecurityGuard™ Standard HPLC and SFC Column Protection

U.S. Patent No. 6, 162, 362

Column Protection for UHPLC, HPLC, SFC to PREP Your Results and Your Column are Too Important Not to Protect

- Protect HPLC and UHPLC columns and extend lifetime
- Virtually no change in chromatography
- Available in analytical, semi-prep, and preparative sizes
- Simple to use

Did you know a common cause of high backpressure, split peaks, broad peaks, baseline noise, baseline drift and loss of resolution is contaminants? The fact is all mobile phases contain some chemical contaminants or microparticulates, from the sample, solvent, or wear on the polymeric seals of the pump or injector. These contaminants can clog frits, irreversibly bind to columns, degrade performance, and even damage the flow cell. An easy solution, SecurityGuard™ is a universal column protection system designed to effectively (and inexpensively), protect your valuable columns, from the damaging effects of chemical contaminants, without altering your chromatographic results.

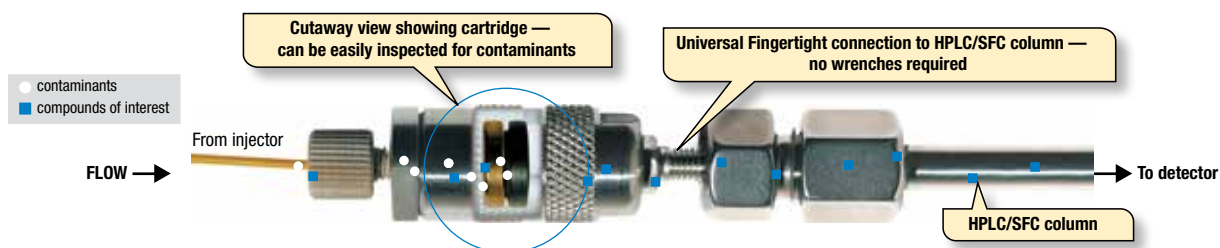


A Universal Guard Cartridge System

How SecurityGuard Standard Works*

The SecurityGuard Standard analytical cartridge holder (patented) directly finger-tightens into virtually any manufacturer's non core-shell and $\geq 3 \mu\text{m}$ particle columns. Contaminants are retained by

an inexpensive, 4 mm, disposable cartridge instead of fouling your expensive analytical column.



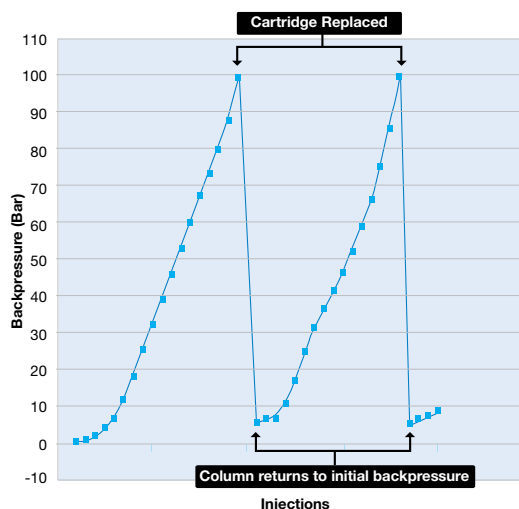
Increases HPLC Column Lifetime, Guaranteed!

Simply replace SecurityGuard cartridges instead of your expensive HPLC/SFC columns. In this graph, once the expired SecurityGuard Standard cartridge was replaced, the pressure immediately dropped and the column performance was restored allowing for extended column use.



The SecurityGuard Standard holder and cartridges are pressure rated to 5000 psi (345 bar).

For all core-shell and / or $< 3 \mu\text{m}$ particle columns, and all applications at higher pressures, use SecurityGuard ULTRA, see p.316. For available Semi-Preparative and PREP sizes, see pp. 313-315. For preparative SFC applications, use holder [AJ0-8617](#) for 15x21.2 mm cartridges or [AJ0-8618](#) for 15x30 mm cartridges. For Kinetex and Aeris Core-Shell SecurityGuard SemiPrep and PREP cartridges, see p. 315.



*Feature applies to traditional analytical-sized guard system only, and does not apply to SemiPrep or PREP guard cartridges.

Accelerated lifetime test using endogenous biomolecule matrix on a reversed phase C18 column, 5 μm , 50 x 4.6 mm with SecurityGuard Standard C18 cartridges. Backpressure values represent additional backpressure contributed by SecurityGuard.

SecurityGuardTM Standard HPLC and SFC Column Protection

U.S. Patent No. 6, 162, 362

See Your “Dirt” Feature

The “see your dirt” feature lets you know exactly when it’s time to replace your cartridge.

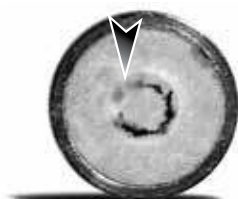
Visually inspect the surface of the cartridge’s packing material any time, without disturbing the packing bed. Now you can easily monitor visual contaminant build-up, and change your guard cartridge before it’s too late!

If your contaminants are colorless, replace the cartridge as often as needed to maintain chromatographic performance.



CLEAN

If it looks clean, the cartridge may be reinserted for further use.



DIRTY

If either discoloration or particle build-up is observed, it’s time to replace the cartridge.

“The SecurityGuard is easy to use and cartridge replacement is simple.”

F. Shakir, Sheffield Pharmaceuticals

“We didn’t see any change in retention time or difference in the peaks. The SecurityGuard has increased the life of the column.”

B. Dietz, ADM

The opinions stated herein are solely those of the individual and not necessarily those of any company or organization.

Analytical HPLC/SFC Holder Kit and Replacement Accessories

For 2.0 and 3.0 mm ID cartridges, use with 2.0 to 8.0 mm ID columns

Ordering Information

Analytical Kit

Part No.	Description
KJO-4282	SecurityGuard Standard Kit* (includes holder)

Replacement Parts and Accessories

Part No.	Description	Unit
AJ0-4283	PEEK Ferrules	3/pk
AJ0-4285	Stacking Rings	2/pk
AQ0-1389	PEEK Fingertight Fittings	10/pk
AJ0-4284	SecurityGuard Wrenches	2/pk

UHPLC / HPLC / SFC / PREP Guard Finder

Having a difficult time finding the best column protection device for your specific UHPLC, HPLC, SFC or Prep column?

- Guard Finder matches over 57,000 column part numbers
- Interactive selection tool finds the appropriate column guard in seconds
- Quickly find column protection for any column from any of the top column manufacturers
- Search by brand, part number, technique, or column phase

*Kit KJO-4282 Includes:



SecurityGuardTM PREP HPLC/SFC Column Protection

Semi-Preparative HPLC/SFC Holder

For 10.0 mm ID cartridges, use with 9 to 16 mm ID columns

Ordering Information

SecurityGuard SemiPrep Guard Cartridge Holder

Part No.	Description	Unit
AJ0-9281	Holder for 10.0 mm ID cartridges	ea

Accessories

Part No.	Description	Unit
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Nut and Ferrule

AQ0-3018	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea
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Sure-LokTM Fingertight Fittings

AQ0-1388	PEEK Sure-Lok Male Nut	ea
AQ0-1389	PEEK Sure-Lok Male Nut	10/pk

Sure-LokTM Couplers

AQ0-1392	PEEK Sure-Lok Coupler	ea
AQ0-1393	PEEK Sure-Lok Coupler	10/pk

Column Sealing Plugs

AQ0-0217	Column Sealing Plug, 10-32 Thread size	10/pk
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SemiPrep Guard Holder Wrench

AQ0-8904	Wrench, Open End, 1/2 x 9/16 in.	ea
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For Semi-Preparative and Preparative Cartridges, see pp. 314-315

Preparative HPLC/SFC Holder (Two Sizes)

For 21.2 mm ID cartridges, use with 18 to 29 mm ID columns

Ordering Information

SecurityGuard Prep Guard Cartridge Holders

Part No.	Description	Unit
AJ0-8223	HPLC Holder Kit for 21.2 mm ID cartridges, includes column coupler	ea
AJ0-8617	SFC Holder Kit for 21.2 mm ID cartridges, includes column coupler	ea

For 30.0 mm ID cartridges, use with 30 to 49 mm ID columns

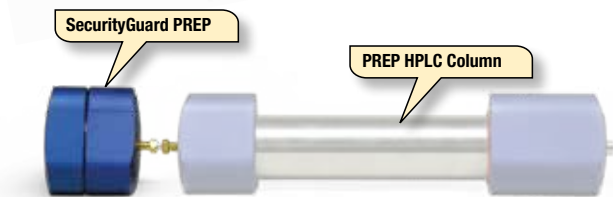
Ordering Information

SecurityGuard Prep Guard Cartridge Holder

Part No.	Description	Unit
AJ0-8277	HPLC Holder Kit for 30.0 mm ID cartridges, includes column coupler	ea
AJ0-8618	SFC Holder Kit for 30.0 mm ID cartridges, includes column coupler	ea

Replacement Parts and Accessories

Part No.	Description	Unit
AQ0-8376	PREP Coupler, SS Tube, Nuts, and Ferrules, 10-32 Threads, 1/16 in. OD x 0.030 in. ID	ea
AQ0-8222	PREP Replacement O-Rings, Kalrez [®] For 15 x 21.2 mm SG HPLC Holder, Size 2-021	2/pk
AQ0-8318	PREP Replacement O-Rings, Kalrez [®] For 15 x 30 mm SG HPLC Holder, Size 2-025	2/pk
AQ0-8500	PREP Replacement O-Rings, Teflon [®] For 15 x 21.2 mm SG SFC Holder, Size 2-021	2/pk
AQ0-8501	PREP Replacement O-Rings, Teflon [®] For 15 x 30 mm SG SFC Holder, Size 2-025	2/pk
AT0-0465	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 10 cm length	5/pk
AT0-0466	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 20 cm length	5/pk
AQ0-8903	Wrench, Open End, 1/4 x 9/16 in.	ea

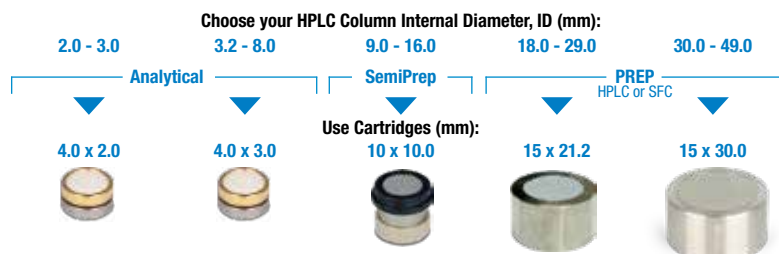


Holders		Cartridges
PREP	SFC	
21.2 mm ID HPLC Holder	21.2 mm ID SFC Holder	Cartridge (15 x 21.2 mm ID)
30 mm ID HPLC Holder	30 mm ID SFC Holder	Cartridge (15 x 30.0 mm ID)
O-Rings		Coupler
Kalrez O-Rings	Teflon O-Rings	PREP Coupler

Cartridges and Holders

Step 1: Choose column ID

Step 2: Match column phase



Ordering Information

Material	Description	pH Stability	2.0 - 3.0	3.2 - 8.0	9.0 - 16.0	18.0 - 29.0	30.0 - 49.0
Cartridges for General Purpose/Pharmaceutical			/10pk	/10pk	/3pk	ea	ea
C18	(ODS, Octadecyl)	1.5 - 10	AJ0-4286	AJ0-4287	AJ0-7221	AJ0-7839	AJ0-8301
C12	(Dodecyl)	1.5 - 10	AJ0-6073	AJ0-6074	AJ0-7275	AJ0-7842	AJ0-8304
C8	(MOS, Octyl)	1.5 - 10	AJ0-4289	AJ0-4290	AJ0-7222	AJ0-7840	AJ0-8302
C5	(Pentyl)	1.5 - 10	AJ0-4292	AJ0-4293	AJ0-7372	—	—
C1	(TMS)	2 - 9	—	AJ0-4299	—	—	—
Silica	—	—	AJ0-4347	AJ0-4348	AJ0-7223	AJ0-7229	AJ0-8312
HILIC	(HILIC)	1.5 - 8	AJ0-8328	AJ0-8329	AJ0-8902	—	—
NH ₂	(Amino, Aminopropyl)	1.5 - 11	AJ0-4301	AJ0-4302	AJ0-7364	AJ0-8162	AJ0-8309
CN	(Cyano, Cyanopropyl)	2 - 7.5	AJ0-4304	AJ0-4305	AJ0-7313	AJ0-8220	AJ0-8311
Phenyl	(Phenylhexyl)	1.5 - 10	AJ0-4350	AJ0-4351	AJ0-7314	AJ0-7841	AJ0-8303
PPFP(2)	(Pentafluorophenyl)	1.5 - 8	AJ0-8326	AJ0-8327	AJ0-8376	AJ0-8377	AJ0-8378
SCX	(SA, Strong Cation Exchanger)	2.5 - 7.5	AJ0-4307	AJ0-4308	—	—	AJ0-8596
SAX	(SB, Strong Anion Exchanger)	2.5 - 7.5	—	AJ0-4311	—	—	—
RP-1	(Reversed Phase - Polymer)	0 - 14	—	AJ0-5809	AJ0-7368	AJ0-8358	—
Polar-RP	(Ether-linked Phenyl)	1.5 - 7	AJ0-6075	AJ0-6076	AJ0-7276	AJ0-7845	—
Fusion-RP	(C18 Polar Embedded)	1.5 - 10	AJ0-7556	AJ0-7557	AJ0-7558	AJ0-7844	—
AQ C18	(Polar Endcapped C18)	1.5 - 7.5	AJ0-7510	AJ0-7511	AJ0-7512	AJ0-7843	AJ0-8305
Gemini [®] NX-C18	(C18 Twin-NX™ Technology)	1 - 12	AJ0-8367	AJ0-8368	AJ0-8369	AJ0-8370	AJ0-8371
Gemini C18	(C18 Twin™ Technology)	1 - 12	AJ0-7596	AJ0-7597	AJ0-7598	AJ0-7846	AJ0-8308
Gemini C6-Phenyl	(C6-Phenyl Twin Technology)	1 - 12	AJ0-7914	AJ0-7915	AJ0-9156	AJ0-9157	AJ0-9158
Luna [®] Omega Polar C18	(Polar Functional C18)	1.5 - 10	AJ0-7600	AJ0-7601	AJ0-9519	AJ0-7603	AJ0-7604
Luna Omega PS C18	(Mixed-Mode C18)	1.5 - 10	AJ0-7605	AJ0-7606	AJ0-9520	AJ0-7608	AJ0-7609
Cartridges for Chiral			/10pk	/10pk	/3pk	ea	ea
<i>For use with chiral columns, such as Lux[®] Cellulose-1, -2, -3, -4, i-Cellulose-5, i-Amylose-1, & Amylose-1, -2 (Phenomenex); CHIRALCEL[®] OD-H[®], OJ-H[®] & CHIRALPAK[®] AD[®]-H, IA[®], IC[®], IG[®] (DAICEL Corporation)</i>							
Lux i-Amylose-1	Amylose tris (3, 5-dimethylphenylcarbamate)	2 - 9	—	AJ0-8641	AJ0-8642	AJ0-8643	AJ0-8644
Lux i-Amylose-3	Amylose tris (3-chloro-5-methylphenylcarbamate)	2 - 9	AJ0-8651	AJ0-8650	AJ0-8652	AJ0-8653	AJ0-8654
Lux i-Cellulose-5	Cellulose tris (3, 5-dichlorophenylcarbamate)	2 - 9	AJ0-8631	AJ0-8632	AJ0-8633	AJ0-8634	—
Lux Cellulose-1	Cellulose tris (3, 5-dimethylphenylcarbamate)	2 - 9	AJ0-8402	AJ0-8403	AJ0-8404	AJ0-8405	AJ0-8406
Lux Cellulose-2	Cellulose tris (3-chloro-4-methylphenylcarbamate)	2 - 9	AJ0-8398	AJ0-8366	AJ0-8399	AJ0-8400	—
Lux Cellulose-3	Cellulose tris (4-methylbenzoate)	2 - 9	AJ0-8621	AJ0-8622	AJ0-8623	AJ0-8624	AJ0-8625
Lux Cellulose-4	Cellulose tris (4-chloro-3-methylphenylcarbamate)	2 - 9	AJ0-8626	AJ0-8627	AJ0-8628	AJ0-8629	AJ0-8630
Lux Amylose-1	Amylose tris (3, 5-dimethylphenylcarbamate)	2 - 9	AJ0-9337	AJ0-9336	AJ0-9344	AJ0-9338	AJ0-9339
Lux Amylose-2	Amylose tris (5-chloro-2-methylphenylcarbamate)	2 - 9	AJ0-8471	AJ0-8470	AJ0-8472	AJ0-8473	—
Lux AMP	—	1 - 11.5	AJ0-8475	AJ0-8476	—	—	—
HPLC Guard Cartridge Holders (one-time purchase only)			/kit	/holder	/kit	/kit	/kit
Reusable Holder			KJ0-4282	AJ0-9281	AJ0-8223	AJ0-8277	
SFC Guard Cartridge Holders			/kit	/holder	/kit	/kit	
Reusable Holder			KJ0-4282	AJ0-9281	AJ0-8617	AJ0-8618	

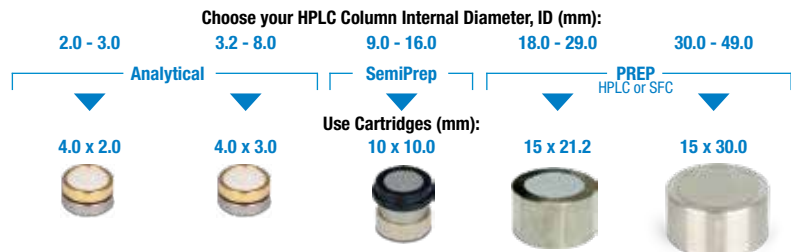
*For all core-shell and/or < 3µm particle columns use 2.1 to 4.6mm ID SecurityGuard ULTRA Holder and Cartridges, see page 316

Continued on next page

Cartridges and Holders (cont'd)

Step 1: Choose column ID

Step 2: Match column phase



Ordering Information (continued)

Material	Description	pH Stability					
Cartridges for Core-Shell Media			—	—	/3pk	ea	ea
<i>For core-shell media columns, such as Kinetex® and Aeris™ (Phenomenex).</i>							
EVO C18	(ODS, Octadecyl)	1 - 12	*	*	AJO-9306	AJO-9304	AJO-9305
C18	(ODS, Octadecyl)	1.5 - 8.5	*	*	AJO-9278	AJO-9145	AJO-9204
C8	(MOS, Octyl)	1.5 - 8.5	*	*	—	AJO-9205	—
PFP	(Pentafluorophenyl)	1.5 - 8.5	*	*	—	AJO-9146	—
F5	(Pentafluorophenylpropyl)	1.5 - 8.5	*	*	AJO-9323	AJO-9324	—
Phenyl-Hexyl	(Phenylhexyl)	1.5 - 9	*	*	—	AJO-9147	AJO-9216
Biphenyl	(Biphenyl)	1.5 - 8.5	*	*	AJO-9280	AJO-9272	—
HILIC	(HILIC)	2 - 7.5	*	*	—	AJO-9277	—
C18-Peptide	(ODS, Octadecyl)	1.5 - 9	*	*	AJO-9317	AJO-9318	—
Cartridges for Protein and Polypeptide Reversed Phase			/10pk	/10pk	/3pk	ea	ea
<i>For use with silica columns for separation of proteins & peptides, such as Jupiter® (Phenomenex) and other widepore or 300 Å brands.</i>							
Widepore C18	(ODS, Octadecyl)	1.5 - 10	AJO-4320	AJO-4321	AJO-7224	AJO-7230	AJO-8313
Widepore C5	(Pentyl)	1.5 - 10	AJO-4326	AJO-4327	AJO-7371	—	—
Widepore C4	(Butyl)	1.5 - 10	AJO-4329	AJO-4330	AJO-7225	AJO-7231	AJO-8314
<i>For use with columns like bioZen™ (Phenomenex).</i>							
Peptide PS-C18	(Positive Functional C18)	1.5 - 8.5	AJO-7605	AJO-7606	—	—	—
Ion-Exchange	(Weak Cation Exchanger)	2 - 12	AJO-9401	AJO-9400	—	—	—
Cartridges for Synthetic DNA / RNA Analysis			/10pk	/10pk	/3pk	ea	ea
<i>For use with columns like Clarity® (Phenomenex).</i>							
Oligo-RP™	(C18 Twin Technology)	1 - 12	AJO-8134	AJO-8135	AJO-8136	AJO-8210	—
Oligo-WAX™	(WA, Weak Anion Exchanger)	1.5 - 11	—	AJO-8324	AJO-8325	—	—
Oligo-XT	(ODS, Octadecyl)	1 - 12	*	*	AJO-9516	AJO-9517	AJO-9518
Cartridges for Silica GFC (Gel Filtration Chromatography)			—	/10pk	—	ea	—
<i>(Aqueous SEC) For use with silica GFC columns, such as Yarra™ and BioSep™ (Phenomenex); ZORBAX® GF-Series (Agilent); Bio-Sil® (Bio-Rad®).</i>							
GFC-2000	—	2 - 7.5	—	AJO-4487	—	AJO-8588	—
GFC-3000	—	2 - 7.5	—	AJO-4488	—	AJO-8589	—
GFC-4000	—	2 - 7.5	—	AJO-4489	—	AJO-8590	—
Cartridges for Polymer GPC (Gel Permeation Chromatography)			—	/3pk	—	—	—
<i>(Organic GPC) For use with polymer GPC columns, such as Phenogel™ (Phenomenex); PLgel™ (Agilent®); SDV® (PSS); Styragel® (Waters®); GPC Series (Shodex®); TSKgel® (Tosoh Bioscience®)</i>							
GPC***	—	0 - 14	—	AJO-9292	—	—	—
Cartridges for Carbohydrate/Organic Acid			—	/10pk	—	—	—
<i>For organic acid and carbohydrate analysis, such as Rezex™ (Phenomenex); Aminex® (Bio-Rad); Sugar-Pak™ (Waters).</i>							
Carbo-H ⁺	—	1 - 8	—	AJO-4490	—	—	—
Carbo-Ag ⁺	—	Neutral	—	AJO-4491	—	—	—
Carbo-Pb ⁺²	—	Neutral	—	AJO-4492	—	—	—
Carbo-Ca ⁺²	—	Neutral	—	AJO-4493	—	—	—
HPLC Guard Cartridge Holders (one-time purchase only)			/kit	/holder	/kit	/kit	/kit
Reusable Holder	KJO-4282		AJO-9281		AJO-8223		AJO-8277
SFC Guard Cartridge Holders			/kit	/holder	/kit	/kit	/kit
Reusable Holder	KJO-4282		AJO-9281		AJO-8617		AJO-8618

*For all core-shell and/or < 3 µm particle columns use 2.1 to 4.6 mm ID SecurityGuard ULTRA Holder and Cartridges, see page 316

**For use with saccharide and oligosaccharide columns in Ag⁺ form.

***Not compatible with HFIP solvent.

UHPLC Column Protection

- Extends HPLC, core-shell, and < 3µm particle column lifetime
- Virtually no change in chromatography
- Pressure rated to 20000 psi (1378 bar)
- Simple to use

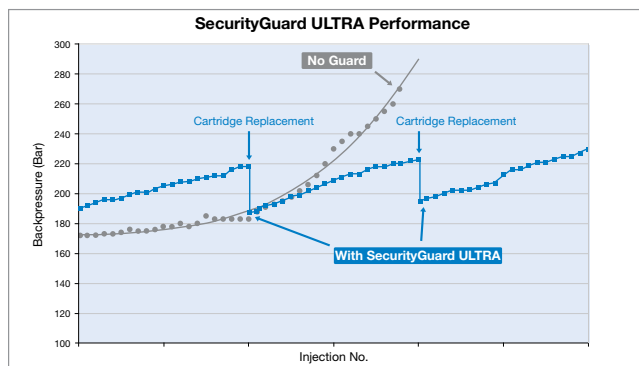
Universal Fit

Use SecurityGuard ULTRA with virtually all UHPLC columns 2.1 to 4.6mm ID. The extremely low dead volume of this unique product minimizes sample peak dispersion. It will efficiently remove microparticulates and chemical contaminants from the flow stream without contributing to system backpressure or dead volume (<0.3 µL).

Increases Column Lifetime, Guaranteed!

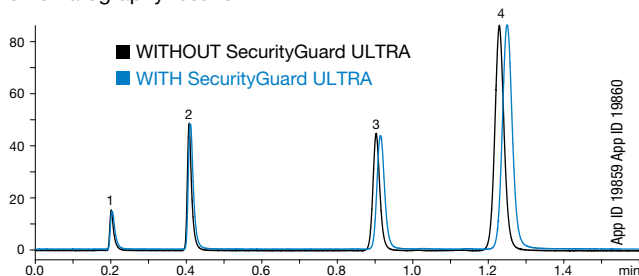
When contaminants and particulates build up at the head of your column or on the guard cartridge, system backpressures can increase dramatically. By simply replacing the SecurityGuard ULTRA cartridge, instead of your column, you are able to regain normal operating conditions and reclaim original column performance.

Accelerated lifetime test using endogenous biological matrix on Kinetex 2.6µm C18 50 x 4.6 mm ID column



Protects with No Loss of Column Performance!

SecurityGuard ULTRA's unique design minimizes sample peak dispersion to maintain column performance without altering your chromatography results.



Conditions for both columns:

Column: Kinetex 1.7µm XB-C18
Dimensions: 50 x 2.1 mm

Guard Cartridge: SecurityGuard ULTRA C18 (ODS) 2.1 mm ID
Part No.: [AJ0-8768](#)

Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.5 mL/min

Detection: UV @ 254 nm

Sample: 1. Uracil
2. Acetophenone
3. Toluene
4. Naphthalene

App ID 19859 App ID 19860

2012 R&D 100
Award Recipient



SecurityGuard ULTRA Cartridges

Ordering Information

Material	Description	pH Stability	Column ID (mm)		
			2.1	3.0	4.6
Cartridges for General Purpose/ Pharmaceutical					
			/3pk	/3pk	/3pk
EVO C18	(ODS, Octadecyl)	1.0 – 12.0	AJ0-9298	AJ0-9297	AJ0-9296
C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-8782	AJ0-8775	AJ0-8768
C8	(MOS, Octyl)	1.5 – 8.5*	AJ0-8784	AJ0-8777	AJ0-8770
PFP	(Pentafluorophenyl)	1.5 – 8.5	AJ0-8787	AJ0-8780	AJ0-8773
F5	(Pentafluorophenyl)	1.5 – 8.5	AJ0-9322	AJ0-9321	AJ0-9320
Biphenyl	(Biphenyl)	1.5 – 8.5*	AJ0-9209	AJ0-9208	AJ0-9207
Phenyl	(Phenylhexyl)	1.5 – 8.5*	AJ0-8788	AJ0-8781	AJ0-8774
HILIC	(HILIC)	2.0 – 7.5	AJ0-8786	AJ0-8779	AJ0-8772
Polar C18	(Polar Functional C18)	1.5 – 8.5*	AJ0-9532	AJ0-9531	AJ0-9530

Cartridges for General Purpose/Pharmaceutical (Fully Porous Columns)

For fully porous columns like Luna® Omega (Phenomenex)

C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-9502	AJ0-9501	AJ0-9500
Polar C18	(Polar Functional C18)	1.5 – 8.5*	AJ0-9505	—	—
PS C18	(Positive Functional C18)	1.5 – 8.5*	AJ0-9508	—	—

Cartridges for Protein and Peptide Reversed Phase

For use with columns like Aeria™ (Phenomenex)

Widepore C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-8783	—	AJ0-8769
Widepore C8	(MOS, Octyl)	1.5 – 8.5*	AJ0-8785	—	AJ0-8771
Widepore C4	(Butyl)	1.5 – 8.5*	AJ0-8899	—	AJ0-8901
Peptide C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-8948	—	AJ0-8946

For use with columns like bioZen™ (Phenomenex)

Glycan	(Amide Polyol)	2.0 – 7.5	AJ0-9800	—	—
Peptide PS-C18	(Positive Functional C18)	1.5 – 8.5	AJ0-9803	—	—
Peptide XB-C18	(ODS, Octadecyl)	1.5 – 9.0**	AJ0-9806	—	AJ0-9808
Intact C4	(Butyl)	1.5 – 9.0**	AJ0-9809	—	AJ0-9811
Intact XB-C18	(MOS, Octyl)	1.5 – 9.0**	AJ0-9812	—	AJ0-9814
SEC-2	(Silica)	2.5 – 7.5	—	—	AJ0-9850
SEC-3	(Silica)	2.5 – 7.5	—	—	AJ0-9851

Cartridges for Synthetic DNA / RNA Analysis

For use with columns like Clarity® (Phenomenex)

Oligo-MS C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-9068	—	—
Oligo-XT	(ODS, Octadecyl)	1.0 – 12.0	AJ0-9515	—	AJ0-9514

Cartridges for Silica GFC (Gel Filtration Chromatography)

(Aqueous SEC) For use with silica GFC columns such as Yarra™ (Phenomenex)

X150	—	1.5 – 8.5	—	—	AJ0-9512
X300	—	1.5 – 8.5	—	—	AJ0-9513

*pH stable 1.5–8.5 under gradient conditions. pH stable 1.5–10 under isocratic conditions.

**pH range is 1.5–9 under gradient conditions. pH range is 1.5–10 under isocratic conditions.

[AJ0-9000](#) is the universal holder designed for use with 2.1 mm, 3.0 mm and 4.6 mm ID cartridges.



Holder



Holder with cartridge, assembled

SecurityGuard ULTRA Cartridge Holder

Ordering Information

Part No.	Description	Unit
AJ0-9000	SecurityGuard ULTRA Cartridge Holder	ea

Initial SecurityGuard ULTRA installation and cartridge replacement, requires 3 wrenches, which must be purchased separately: one 3/8 in. wrench ([AQ0-8959](#); fits Kinetex, Aeria, and Oligo-MS column end-fittings), and two 5/16 in. wrenches ([AQ0-8903](#); fits ULTRA cartridge and holder). See p. 401



SecurityLINK UHPLC Connections in a Click

The SecurityLINK UHPLC fingertight fitting system simplifies your system and column connections and provides consistent performance with torque limiting technology that prevents column damaging overtightening.

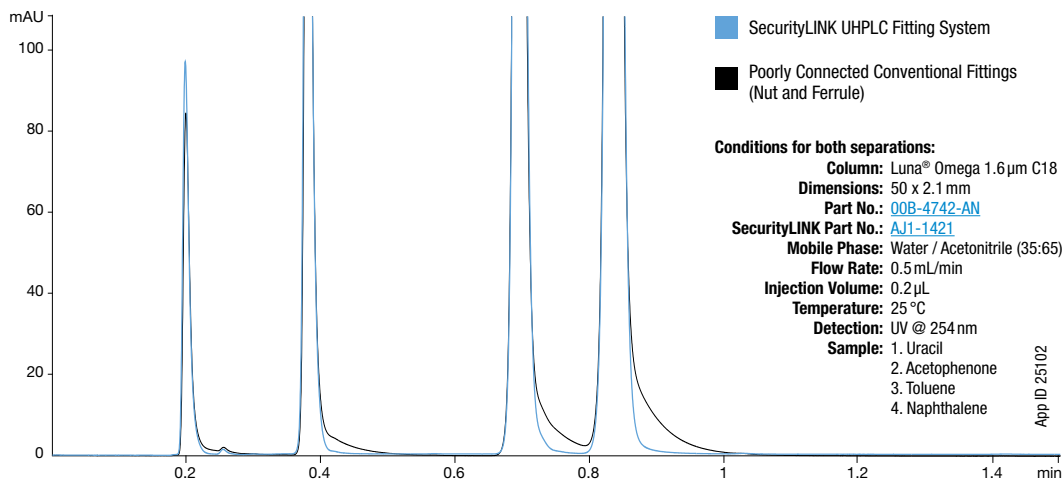


SecurityLINK UHPLC Fittings

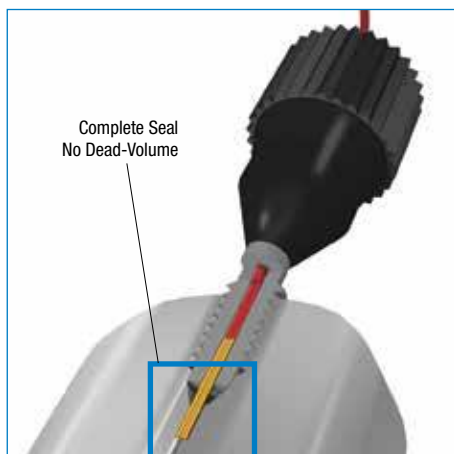
- No tools required for quick and easy installation
- Fitting self-adjusts at column inlet to ensure zero dead-volume for better chromatographic results
- Torque limiting technology prevents system and column port damage
- UHPLC and HPLC compatibility: pressure rated to 19,000 psi (1,310 bar)

SecurityLINK vs. Poorly Connected Conventional Fittings

Poorly connected fittings are often the causes of carryover, band broadening, and peak tailing. SecurityLINK offers zero dead-volume connections every time.

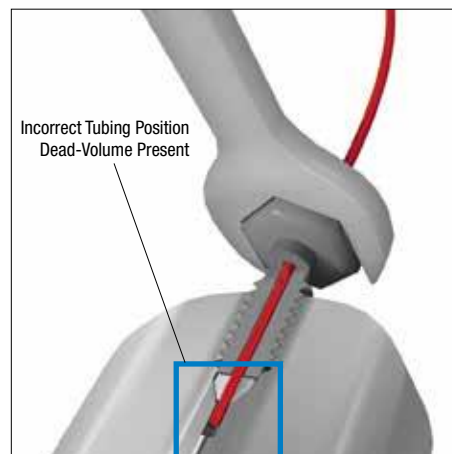


SecurityLINK UHPLC Fitting System



VS.

Poorly Connected Conventional Fittings (Nut and Ferrule)



Installation Instructions

1. Insert SecurityLINK UHPLC fitting into column port



2. Fingertighten until first "CLICK" feedback is received. Connection Complete!



Ordering Information

PEEKsil™



PEEKsil Double-Sided 10-32 Fittings for 1/16 in. Ports

Part No.	ID (µm)	Length (mm)
AJ1-2111	25	100
AJ1-2121	25	150
AJ1-2141	25	250
AJ1-2151	25	300
AJ1-2171	25	500
AJ1-2191	25	750
AJ1-21A1	25	1000
AJ1-2211	50	100
AJ1-2221	50	150
AJ1-2231	50	200
AJ1-2241	50	250
AJ1-2251	50	300
AJ1-2271	50	500
AJ1-2291	50	750
AJ1-22A1	50	1000
AJ1-2321	75	150
AJ1-2341	75	250
AJ1-2371	75	500
AJ1-23A1	75	1000
AJ1-2411	100	100
AJ1-2421	100	150
AJ1-2441	100	250
AJ1-2471	100	500
AJ1-24A1	100	1000

Stainless Steel



Stainless Steel Double-Sided 10-32 Fittings for 1/16 in. Ports

Part No.	ID (µm)	Length (mm)
AJ1-1421	100	150
AJ1-1441	100	250
AJ1-1461	100	350
AJ1-1471	100	500
AJ1-1481	100	600
AJ1-1521	125	150
AJ1-1541	125	250
AJ1-1561	125	350
AJ1-1571	125	500
AJ1-1581	125	600
AJ1-1621	254	150
AJ1-1641	254	250
AJ1-1661	254	350
AJ1-1671	254	500
AJ1-1681	254	600

PEEK-Lined Stainless Steel



PEEK-Lined Stainless Steel Double-Sided 10-32 Fittings for 1/16 in. Ports

Part No.	ID (µm)	Length (mm)
AJ1-3121	25	150
AJ1-3141	25	250
AJ1-3161	25	350
AJ1-3171	25	500
AJ1-3181	25	600
AJ1-3221	50	150
AJ1-3241	50	250
AJ1-3261	50	350
AJ1-3271	50	500
AJ1-3281	50	600
AJ1-3321	75	150
AJ1-3341	75	250
AJ1-3361	75	350
AJ1-3371	75	500
AJ1-3381	75	600
AJ1-3421	100	150
AJ1-3441	100	250
AJ1-3461	100	350
AJ1-3471	100	500
AJ1-3481	100	600

PEEKsil



PEEKsil Single-Sided Fittings 1/32 in. OD PEEKsil Tubing with One 10-32 Fitting for 1/16 in. Ports, and One Side with No Fitting

Part No.	ID (µm)	Length (mm)
AJ1-2224	50	150
AJ1-2274	50	500
AJ1-2294	50	750
AJ1-22A4	50	1000

SecurityLINK tubing material includes a sleeve that provides: ID, length and part number information.

Phenomenex Column / Tubing ID Recommendation Chart

	Column ID	Tubing ID
Nano	0.05 - 0.1 mm (50 µm - 100 µm)	25 µm
Microbore	0.3 - 0.5 mm (300 µm - 500 µm)	50 µm
	1 mm	50 µm - 75 µm
Analytical	2.1 mm	100 µm
	3 mm	100 µm
	4.6 mm	100 µm
Semi-Prep	7.8 mm	120 µm
	9.0 - 16.0 mm	254 µm

 The "CLICK" Feedback indicates the SecurityLINK Connection is Secure! This Prevents Overtightening & Saves Your Column.

By Showa Denko K.K.

- High efficiency polymer columns
- Wide application range



Guide for Shodex Column Selection

Solubility	Molecular Weight	Separation Mode	Column	Page
Sample	Water-insoluble	over 2000	SEC — GPC KF-803-805	319
		under 2000	SEC — GPC KF-802	319
	Water-soluble	over 2000	SEC — RSpak DE-413, 413L, DM-614	321
			SEC — OHpak SB-803-806HQ, SUGAR KS-803-804, PROTEIN KW-802.5-804	320
		under 2000	IEC — IEC QA-825, DEAE-825, SP-825, CM-825	321
			HIC — HIC PH-814	321
Water-soluble	over 2000	SEC — SB-802-802.5HQ, SUGAR KS-801, 803-804	320	
		LEC — SUGAR SC1011, SP0810	321	
		IEX — RSpak KC-811, SUGAR SH1011, SUGAR SH1821	320, 321	
	under 2000	IC — IC SI-90 4E, SI-50 4E, IC I-524A, YK-421	321	
		RPC — RSpak DE-613, 413	321	
		NPC — SUGAR SZ5532	321	

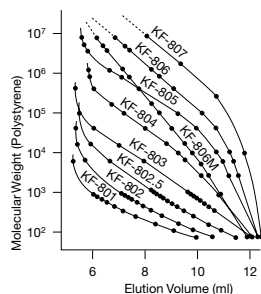
Organic GPC Columns

Shodex has a wide variety of columns for GPC (or SEC) using organic solvents. The columns are packed with porous S-DVB gels specially developed for GPC use.

Series Name	In-column Solvent	Applications
GPC KF-800 series	THF (tetrahydrofuran)	General purpose GPC

Calibration Curves for GPC KF-800 Series

Column: Shodex GPC KF-800 series
Dimensions: 8 x 300 mm



App ID 10766

Ordering Information

Standard Columns

Column Type / Part No.

THF	ID x Length (mm)	Plate Number	Exclusion Limit
GPC KF-802	8 x 300	>16,000	5 x 10 ³
GPC KF-803	8 x 300	>16,000	7 x 10 ⁴
GPC KF-804	8 x 300	>16,000	4 x 10 ⁵
GPC KF-805	8 x 300	>10,000	4 x 10 ⁶

NOTE: Exclusion Limits in parentheses, (), are estimated values.

Note: 803, 804, and 805 are available packed in HFIP.

By Showa Denko K.K.

GFC (Aqueous GPC) Columns

Shodex has a wide variety of columns for GFC. Three types of GFC columns packed with different gel materials are available.

Series Name	Packing Material	Applications
OHpak SB-800HQ	PHM gel	Used for general purpose GFC of water-soluble polymers, proteins and enzymes
SUGAR KS-800	Sulfonated PS gel	Mono, di, tri, oligo and polysaccharides, starches and celluloses
PROTEIN KW-800	Porous silica gel	GFC of proteins, glycoproteins and peptides

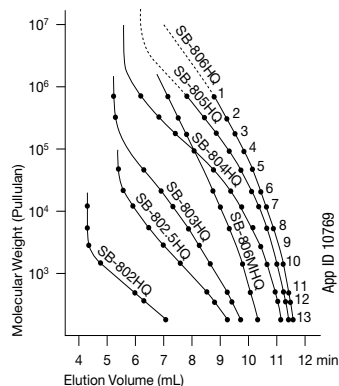
Calibration Curves for OHpak SB-800HQ Series

Column: Shodex OHpak SB-800HQ

Dimensions: 8 x 300 mm

Eluent: Water

- Sample:
1. P-800
 2. P-400
 3. P-200
 4. P-100
 5. P-50
 6. P-20
 7. P-10
 8. P-5
 9. P-3
 10. P-1
 11. Maltotriose
 12. Maltose
 13. Glucose



Ordering Information

Aqueous GPC Columns

Column Type/Part No.	ID x Length (mm)	Plate Number	Exclusion Limit
OHpak SB-802HQ	8 x 300	>10,000	4 x 10 ³
OHpak SB-802.5HQ	8 x 300	>15,000	1 x 10 ⁴
OHpak SB-803HQ	8 x 300	>15,000	1 x 10 ⁵
OHpak SB-804HQ	8 x 300	>15,000	1 x 10 ⁶
OHpak SB-805HQ	8 x 300	>10,000	4 x 10 ⁶
OHpak SB-806HQ	8 x 300	>10,000	(2 x 10 ⁷)
OHpak SB-806MHQ	8 x 300	>10,000	(2 x 10 ⁷)
SUGAR KS-801 (Na ⁺)	8 x 300	>15,000	1 x 10 ³
SUGAR KS-803 (Na ⁺)	8 x 300	>15,000	5 x 10 ⁴
SUGAR KS-804 (Na ⁺)	8 x 300	>15,000	4 x 10 ⁵
PROTEIN KW-802.5	8 x 300	>20,000	5 x 10 ⁴
PROTEIN KW-803	8 x 300	>20,000	1.5 x 10 ⁵
PROTEIN KW-804	8 x 300	>10,000	6 x 10 ⁵

Note: Exclusion Limits in parentheses, (), are estimated values.

Calibration Standards

Ordering Information

Calibration Standards

Standard Type/Part No.	Material	Content	MW Range	Applications
STANDARD P-82	Pullulan	0.2 g x 8 grades	5,000 - 800,000	GFC (aqueous GPC)

Columns for Organic Acids

KC-811 enables an effective organic acids separation using a mixed mode of IEX, SEC and P&A. Organic acids also can be separated by RPC using RSpak DE-613.

Ordering Information

RSpak

Column Type*/Part No.	ID x Length (mm)	Plate Number	Packing Material	Counter Ion
RSpak KC-811	8 x 300	>17,000	S-DVB gel	H+

*Note: RSpak KC-811 was formerly known as Ionpak KC-811.

By Showa Denko K.K.

Ion Chromatography Columns

- Great alternative to Dionex® IonPac® AS4, AS4A, and AS14 columns
- High efficiency, general purpose IC column

Shodex offers an innovative IC column for the suppressor method that improves both the separation speed and resolution of anions in most matrices. With high theoretical plates (>5000/m for Sulfate), the column easily and efficiently separates organic and inorganic anions such as EPA Method 300 analytes, acetate, formate, methacrylate and oxalate. High loading and exceptional resistance to loading combine with features such as improved separation of the fluoride peak from the water dip.

Ordering Information

IC Columns

Column Type/ Part No.	ID x Length (mm)	Plate Number	Packing Material	Functional Group	Applications
IC SI-90 4E	4.0 x 250	>5,000 (S04)	PVA	Quaternary ammonium	Inorganic anions and organic acids
IC SI-90 G	4.6 x 10	(Guard)	—	—	(General purpose)
IC SI-50 4E*	4.0 x 250	>14,000	PVA	Quaternary ammonium	Inorganic anions and organic acids
IC I-524A	4.6 x 100	>2,000	PHM gel	Quaternary ammonium	Inorganic anions
IC YK-421	4.6 x 125	>2,500	Hydrophilic Polymer	Carboxyl Coated Silica	Simultaneous separation of monovalent and divalent cations
IC YS-50 (CH0-8194)	4.6 x 125	≥5,500	PVA	Carboxyl	Suppressor and non-suppressor methods
IC YS-G (CH0-8195)	4.6 x 10	(Guard)	—	—	—

*Use IC SI-90G guard.

Columns for Proteins and Nucleic Acids

Ion-Exchange Columns

IEC series columns are suited for the analysis of proteins and nucleic acids.

Ordering Information

IEC Series Columns

Column Type/Part No.	ID x Length (mm)	Plate Number	Packing Material	Functional Group
IEC QA-825	8 x 75	>2,000	PHM gel	Quaternary ammonium (strong anion)
IEC DEAE-825	8 x 75	>2,000	PHM gel	Diethylaminoethyl (weak anion)
IEC SP-825	8 x 75	>2,000	PHM gel	Sulfopropyl (strong cation)
IEC CM-825	8 x 75	>2,000	PHM gel	Carboxymethyl (weak cation)

Other Columns

Column Type/Part No.	ID x Length (mm)	Plate Number	Packing Material	Functional Group	Separation Mode	Applications
HIC PH-814	8 x 75	>2,000	PHM gel	Phenyl	HIC	Proteins

Columns for Sugar Analysis

Ordering Information

Sugar Columns

Column Type/ Part No.	ID x Length (mm)	Plate Number	Exclusion Limit	Packing Material	Counter Ion	Separation Mode
SUGAR SH1011	8 x 300	>15,000	1,000	S-DVB gel	H ⁺	SEC + IEX
SUGAR SH1821	8 x 300	>15,000	10,000	S-DVB gel	H ⁺	SEC + IEX
SUGAR SC1011	8 x 300	>12,000	1,000	S-DVB gel	Ca ²⁺	SEC + IEX
SUGAR SP0810	8 x 300	>10,000	1,000	S-DVB gel	Pb ²⁺	SEC + LEC
SUGAR SC1211	6 x 250	>5,000		S-DVB gel	Ca ²⁺	P&A + LEC
SUGAR SZ5532	6 x 150	>5,000		S-DVB gel	Zn ²⁺	P&A + LEC
SUGAR KS-801	8 x 300	>15,000	1,000	S-DVB gel	Na ⁺	SEC + LEC



For improved carbohydrate retention and separation under HILIC conditions, see Luna Omega SUGAR p. 279

Polymer-Based Reversed Phase Columns

RSpak

Applications

DE	Suited for wide applications because its characteristics are similar to those of ODS columns.
DM	Suited for analysis of amino acids and polypeptides.

Ordering Information

RSpak Columns

Column Type/Part No.	Plate Number	ID x Length (mm)
RSpak DE-613	>7,000	6.0 x 150
RSpak DE-413	>11,000	4.6 x 150
RSpak DE-413L	>17,000	4.6 x 250
RSpak DE-G (DE-613P)	(guard column)	4.6 x 10
RSpak DM-614	>4,000	6.0 x 150

SphereClone™ Guaranteed Replacement to Spherisorb®

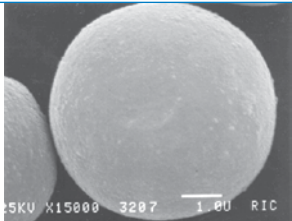
Guaranteed Replacement to Spherisorb®

- Highly reproducible
- Long column life
- Mimics performance of Waters® Spherisorb®
- Economically priced

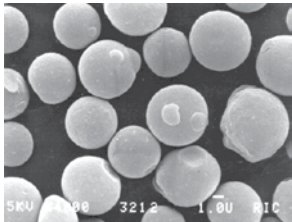
Phenomenex SphereClone columns have been developed to provide chromatographic behavior that mimics that of Waters Spherisorb columns. For comparative applications, please contact your local Phenomenex representative.

SphereClone™

SEM of Base Silica



Surface
15,000x Magnification



Physical Mass Distribution and Shape
4,000x Magnification

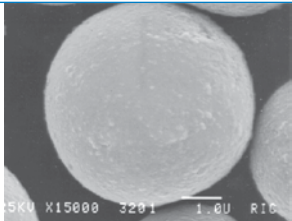
VS.

Material Characteristics

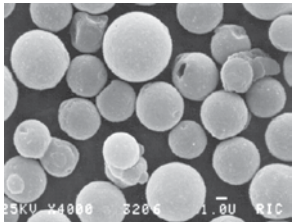
SphereClone™		Spherisorb®†	
3, 5, 10 µm	Particle Size	3, 5, 10 µm	
80 Å	Pore Size	80 Å	
200 m²/g	Surface Area	200 m²/g	
Carbon Load			
—	Silica	—	
6%	C6	6%	
6%	C8	6%	
7%	ODS(1)	6.2%	
12%	ODS(2)	12%	
2%	NH₂	2%	

Spherisorb®†

SEM of Base Silica



Surface
15,000x Magnification



Physical Mass Distribution and Shape
4,000x Magnification

Ordering Information

3 µm Columns (mm)			SecurityGuard™ Cartridges (mm)	
Phases	50 x 4.6	100 x 4.6	150 x 4.6	4 x 3.0
				/10pk
C8	—	00D-4133-E0	—	AJ0-4290
ODS(1)	—	00D-4134-E0	00F-4134-E0	AJ0-4287
ODS(2)	00B-4135-E0	00D-4135-E0	00F-4135-E0	AJ0-4287
NH₂	—	—	00F-4137-E0	AJ0-4302

for ID: 3.2-8.0 mm

5 µm Columns (mm)			SecurityGuard™ Cartridges (mm)	
Phases	150 x 4.6	250 x 4.6	4 x 3.0	
			/10pk	
Silica	00F-4139-E0	00G-4139-E0	AJ0-4348	
C6	00F-4141-E0	00G-4141-E0	—	
C8	00F-4142-E0	00G-4142-E0	AJ0-4290	
ODS(1)	00F-4143-E0	00G-4143-E0	AJ0-4287	
ODS(2)	00F-4144-E0	00G-4144-E0	AJ0-4287	
NH₂	00F-4147-E0	00G-4147-E0	AJ0-4302	
SAX	00F-4149-E0	00G-4149-E0	AJ0-4311	

for ID: 3.2-8.0 mm

10 µm Columns (mm)		SecurityGuard™ Cartridges (mm)	
Phases	250 x 4.6	4 x 3.0	
		/10pk	
ODS(2)	00G-4156-E0	AJ0-4287	
SAX	00G-4160-E0	AJ0-4311	

for ID: 3.2-8.0 mm



For SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315

SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

*Comparative separations may not be representative of all applications.
 †Spherisorb columns used for comparison studies were purchased from manufacturer.

Star-Ion™ A300

Suppressed Mode Anion Analysis for EPA Method 300

- Excellent separation of inorganic anions and some common organic anions
- High resolution and peak symmetry
- An alternative to Dionex® IonPac® AS4A

Material Specifications

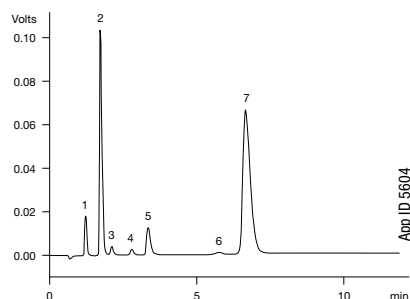
Material Type	PSDVB with quaternary amine functionality
Mode of IC	Suppressed (optimized)
Max. Temperature	45 °C
Max. Pressure	1000 psi without guard column 1200 psi with guard column
Solvent Limitations	No organic solvents are recommended for use with STAR-ION



EPA Method 300

Column: STAR-ION A300
Dimensions: 100 x 4.6 mm
Part No.: [00D-4090-E0-BV](#)
Eluent: 1.7 mM NaHCO₃/ 1.8 mM Na₂CO₃
Flow Rate: 2.0 mL/min
Detection: Suppressed Conductivity
Injection Volume: 20 µL
Sample:

1. Fluoride	2 mg/L
2. Chloride	20 mg/L
3. Nitrite	2 mg/L
4. Bromide	2 mg/L
5. Nitrate	10 mg/L
6. Phosphate	2 mg/L
7. Sulfate	60 mg/L



Ordering Information

Suppressed Mode Anion Analysis for EPA Method 300

Part No.	Description	Dimensions (mm)	Unit
00D-4090-E0-BV	STAR-ION A300 Anion column (PEEK)	100 x 4.6	ea
ALO-3420	STAR-ION A300 Test Mix		ea
AQO-3351	PEEK ¼ in. - 28 to 10-32 Adapter to connect STAR-ION A300 analytical column to Dionex IC systems (use 2 fittings, one for each end of column)		ea
AQO-1388	PEEK long-nut fitting		ea
ATO-1107	PEEK capillary tubing ¼ in. OD x 0.010 in. D x 5 ft. L		ea
ATO-1110	Polymer tubing cutter		ea



For HPLC Column Heater (25-90°C), see p. 390

Full Range Selectivity for Reversed Phase Separation

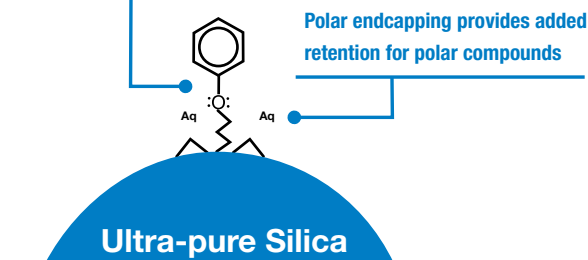
Many different mechanisms of retention are utilized within reversed phase chromatography in order to retain and separate target analytes. Whether your compounds are hydrophobic or polar, Synergi columns provide you with a full range of selectivity, ensuring separation of extremely challenging and complex mixtures.

Synergi Polar-RP

Phenyl Ether-Linked

For polar and aromatic mixtures

Ether linkage increases aromaticity of the phenyl group and also provides $\pi-\pi$ interactions with conjugated compounds



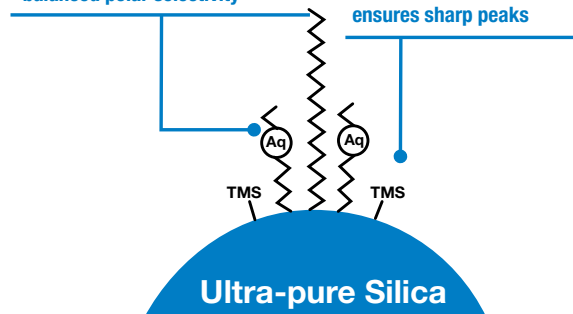
Synergi Fusion-RP

C18 Polar Embedded

Balanced non-polar and polar performance

Embedded polar group complements C18 ligand with balanced polar selectivity

TMS endcapping ensures sharp peaks

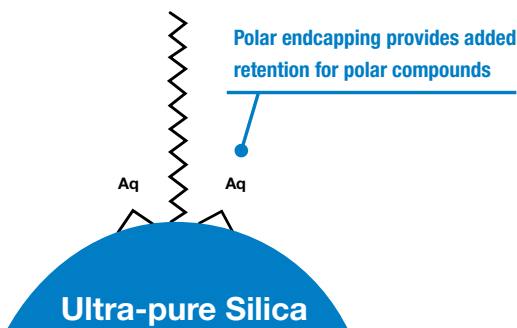


Synergi Hydro-RP

C18 Polar Endcapped

Strong non-polar and polar retention

Polar endcapping provides added retention for polar compounds

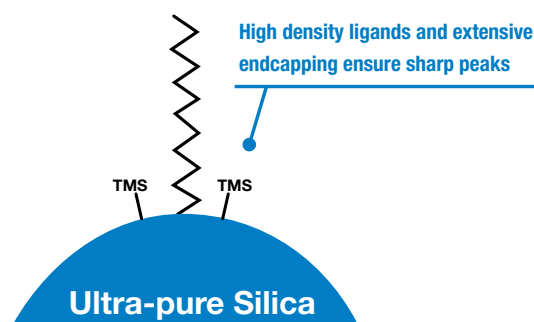


Synergi Max-RP

C12 TMS Endcapped

Excellent for basic compounds at neutral pH

High density ligands and extensive endcapping ensure sharp peaks

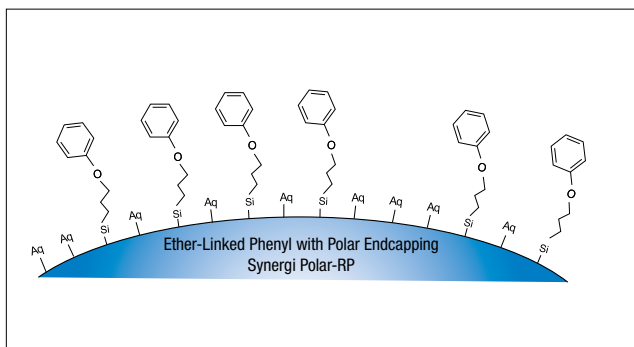


Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m ² /g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m ²)	End Capping
Synergi Max-RP	Spher. 2.5	100	—	400	17	—	TMS
Synergi Hydro-RP	Spher. 2.5	100	—	400	19	—	Hydrophilic
Synergi Polar-RP	Spher. 2.5	100	—	400	11	—	Hydrophilic
Synergi Fusion-RP	Spher. 2.5	100	—	400	12	—	TMS
Synergi Max-RP	Spher. 4, 10	80	1.05	475	17	3.21	TMS
Synergi Hydro-RP	Spher. 4, 10	80	1.05	475	19	2.45	Hydrophilic
Synergi Polar-RP	Spher. 4, 10	80	1.05	475	11	3.15	Hydrophilic
Synergi Fusion-RP	Spher. 4, 10	80	1.05	475	12	N/A	TMS

Synergi Polar-RP

An Ether-linked Phenyl Column with Polar Endcapping



Synergi Polar-RP

USP: L11

pH Stability: 1.5 – 7.0

Particle Size: 2.5 µm, 4 µm, and 10 µm

Phase: Ether-linked phenyl with polar endcapping

Application: For extreme retention of polar and aromatic compounds

Strength: Improved peak shape for acidic and basic analytes and aromatic selectivity with methanol containing mobile phases

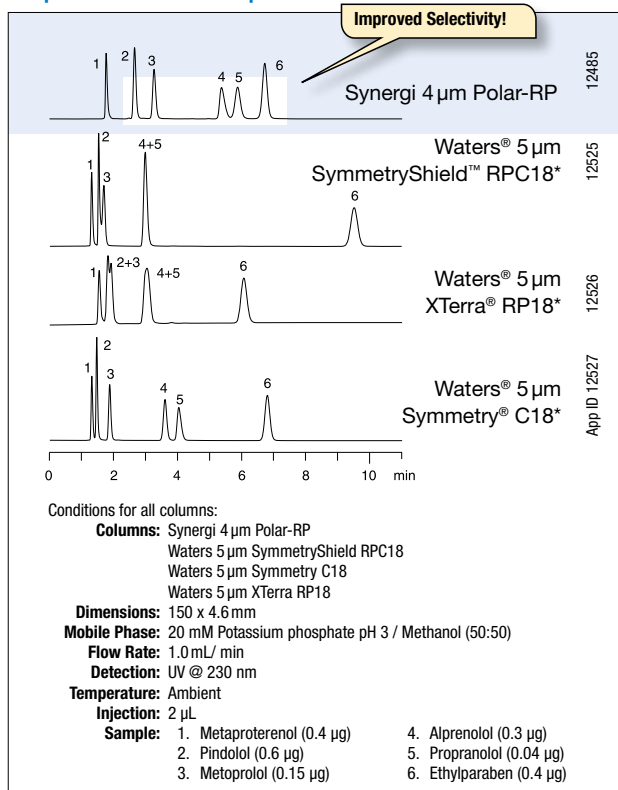
Sample Challenge:

You need greater separation between polar and aromatic compounds with only slight differences chemically or structurally.

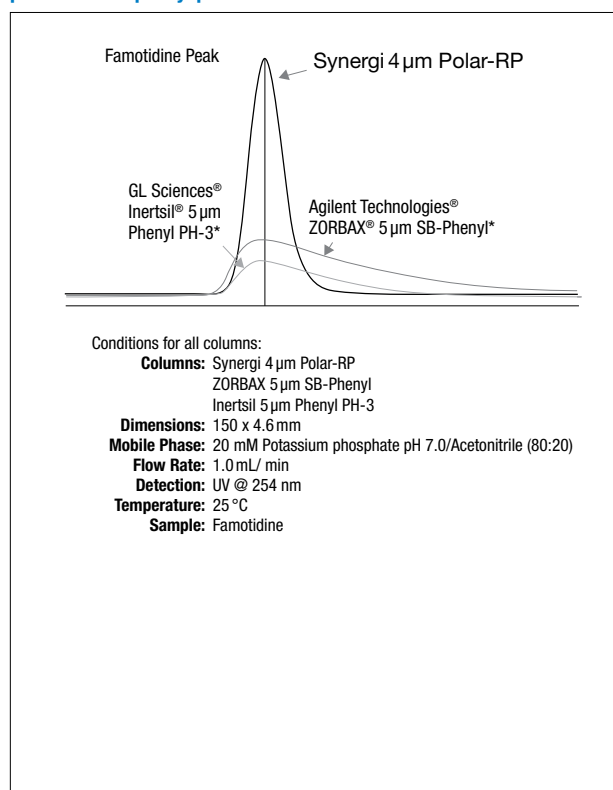
Selectivity Solution:

The slightest variations in polarity and aromaticity are exploited by Synergi Polar-RP in order to achieve the greatest separation between polar and/or aromatic compounds.

Increased resolution of polar compounds with Synergi Polar-RP compared to traditional C18 phases



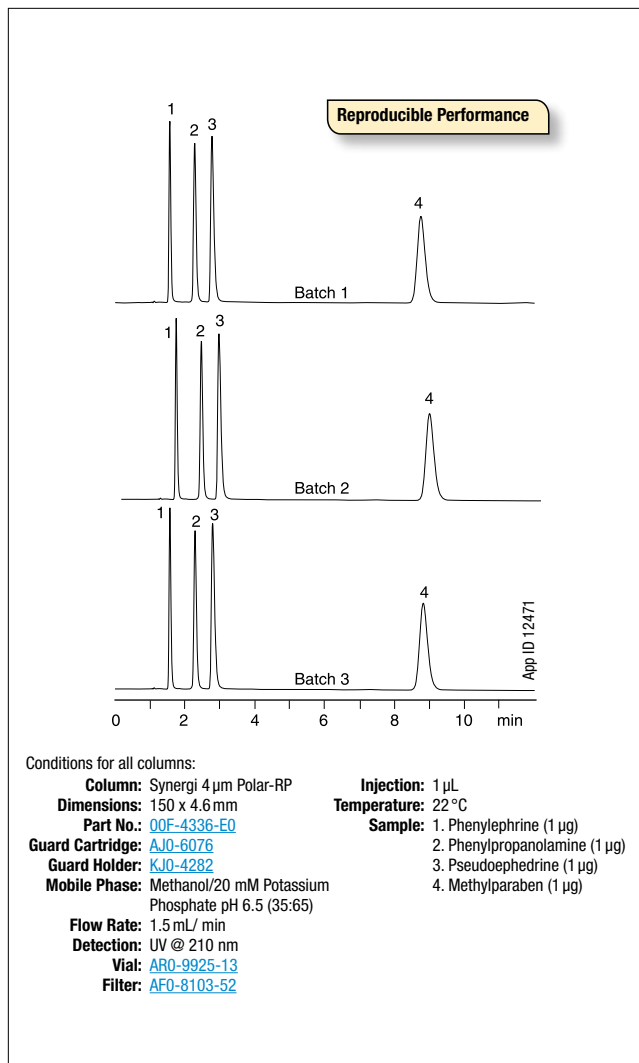
Improve peak symmetry of polar compounds with Synergi Polar-RP compared to other phenyl phases



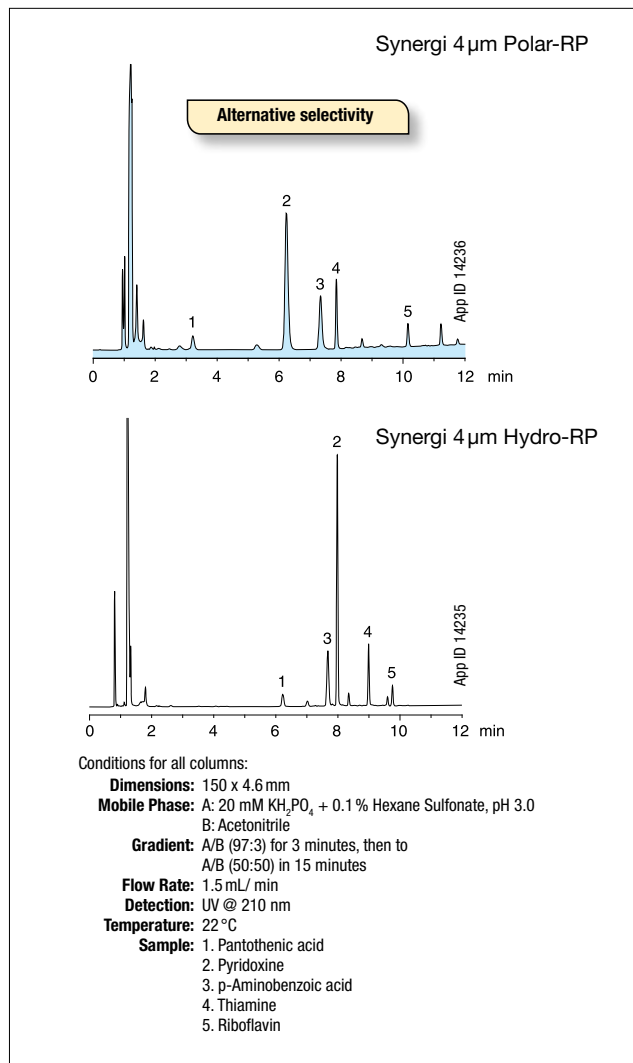
*See p. 330 for disclaimer information. Comparative separations may not be representative of all applications.

Synergi Polar-RP (cont'd)

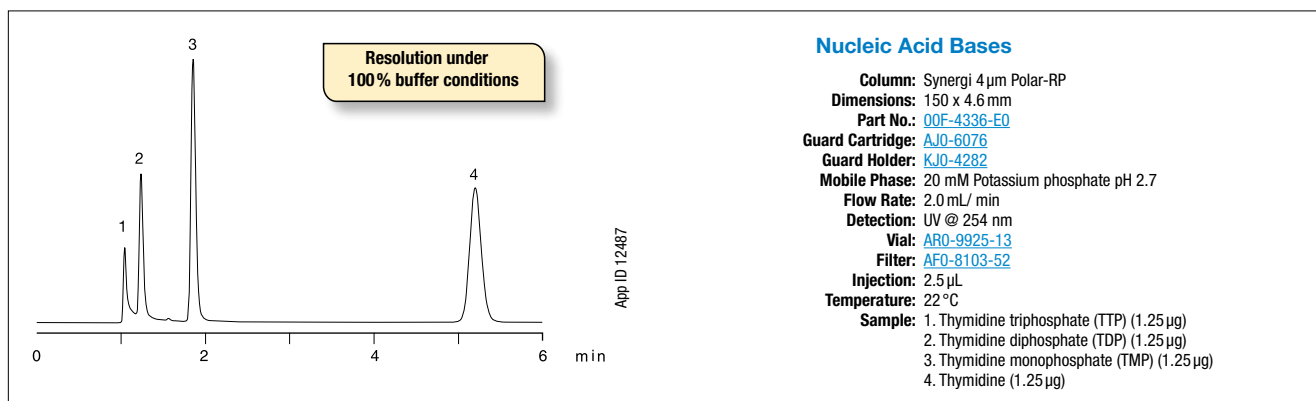
Synergi Polar-RP is highly reproducible



The selectivity of Synergi Polar-RP can provide differences in peak elution order for confirmation or better separation

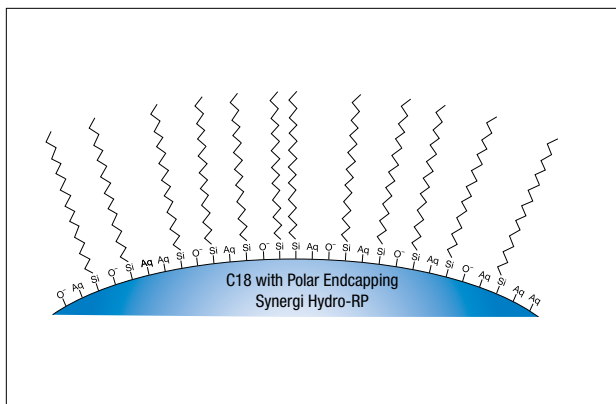


100% buffer mobile phase stability allows for separation of extremely polar compounds, like nucleic acid bases, on Synergi Polar-RP



Synergi Hydro-RP

A Polar Endcapped C18 Column



Sample Challenge:

Your sample contains multiple analytes with only slight variations in hydrophobicity.

Selectivity Solution:

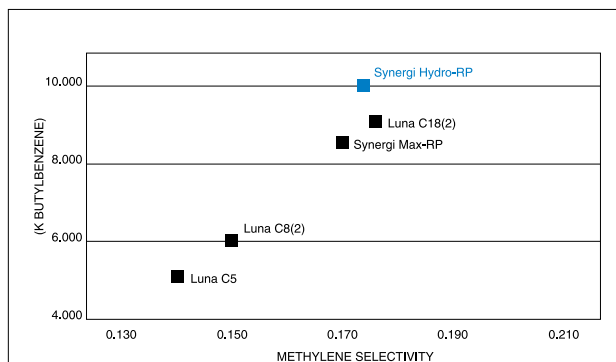
The extreme hydrophobic selectivity offered by Synergi Hydro-RP is needed to amplify the small differences in selectivity and get greater separation.

Synergi Hydro-RP

USP: L1

pH Stability:	1.5 – 7.5
Particle Size:	2.5 µm, 4 µm, and 10 µm
Phase:	C18 with polar endcapping
Application:	For extreme retention of non-polar and extremely polar alkyl compounds
Strength:	Resolution of highly polar compounds under 100% buffer mobile phase conditions

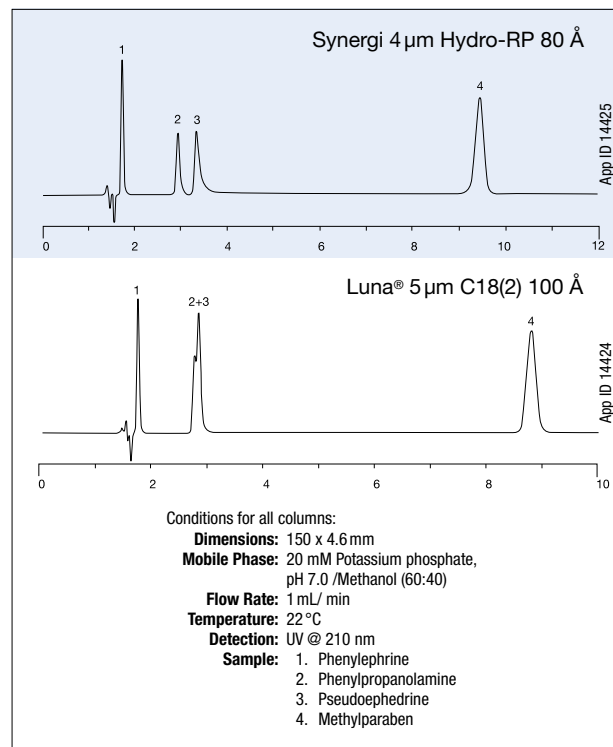
Extreme hydrophobic retention relative to other hydrophobic selectivity phases



Conditions for all columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: Acetonitrile/20 mM Potassium phosphate pH 7.0 (65:35)
Flow Rate: 1.5 mL/min
Temperature: Ambient
Sample: 1. Butylbenzene
 2. Amylbenzene

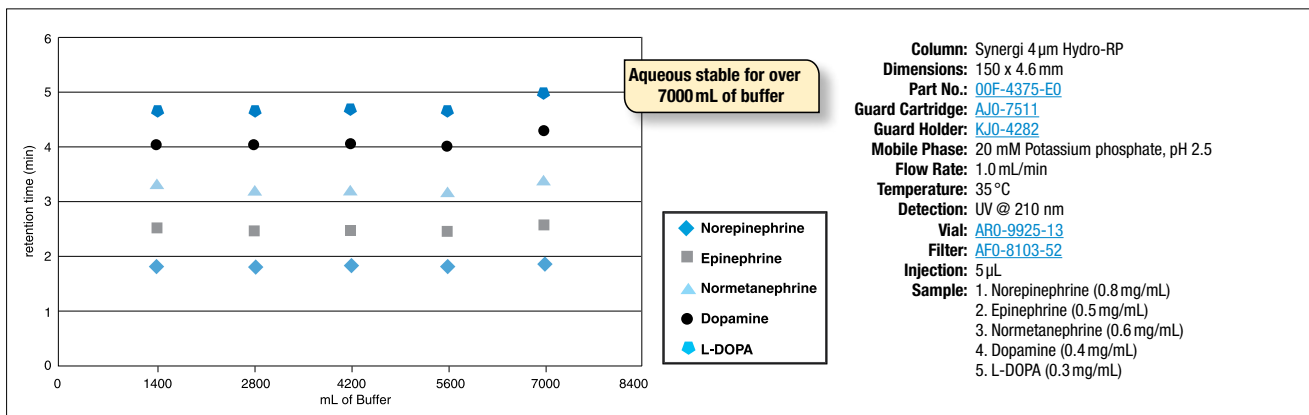
The chart was obtained by plotting hydrophobic retention (k for butylbenzene vs. methylene selectivity ($\log k$ for amylbenzene vs. the number of methyl groups) under the stated conditions. A column with high hydrophobicity will better resolve two analytes which subtly differ in their overall hydrophobicity than a column with lower hydrophobic selectivity.

Additional polar selectivity provides separation where traditional C18 columns cannot

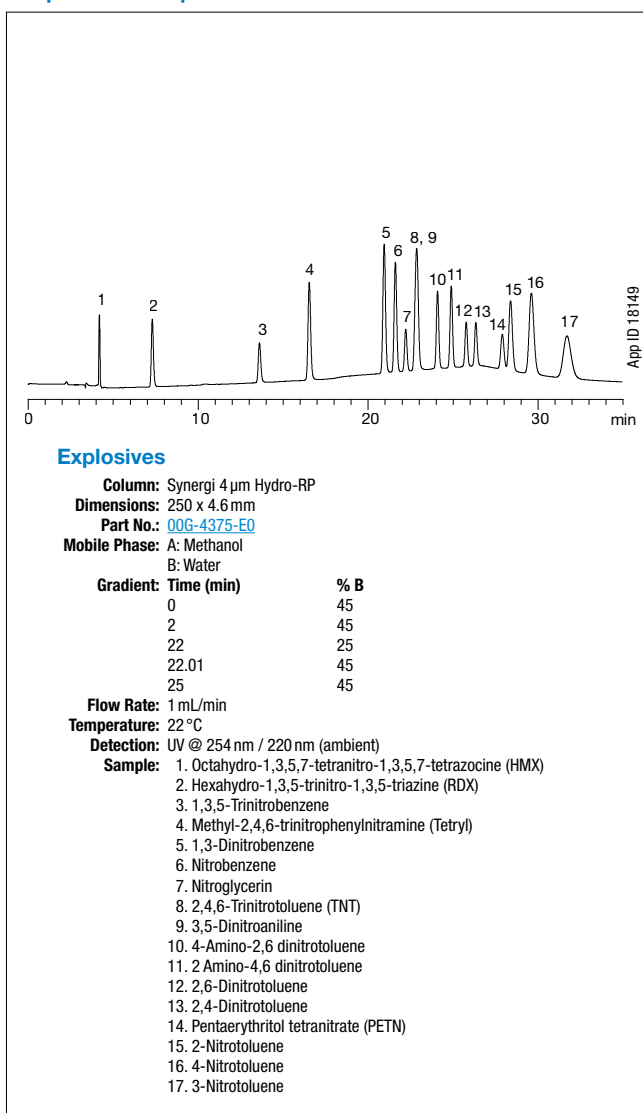
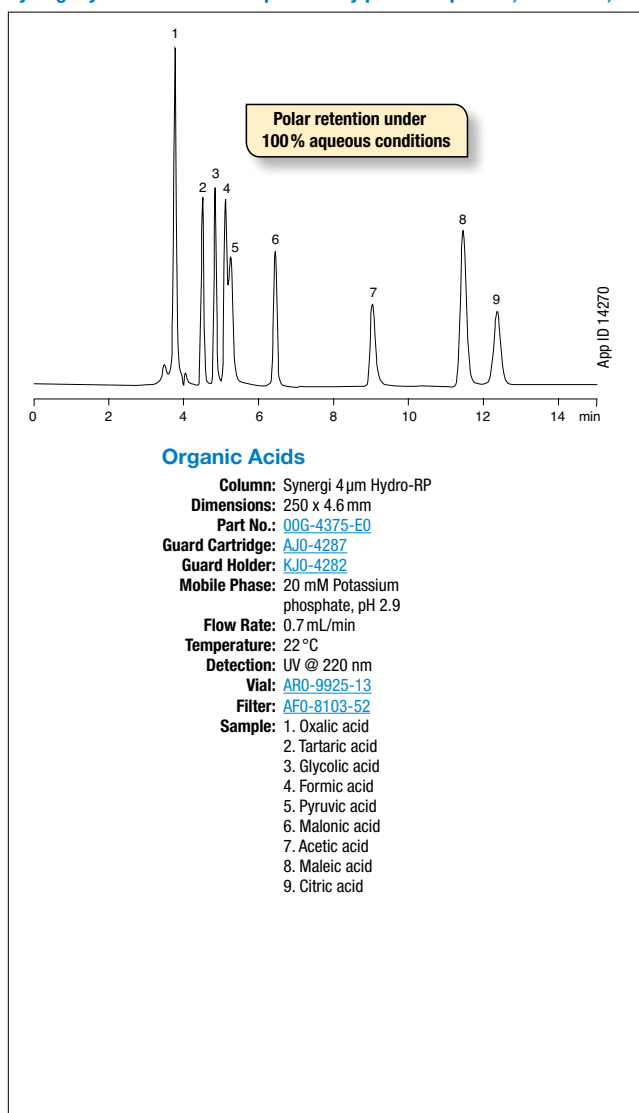


Synergi Hydro-RP (cont'd)

Synergi Hydro-RP is stable in 100% aqueous mobile phase, providing improved retention of extremely polar compounds

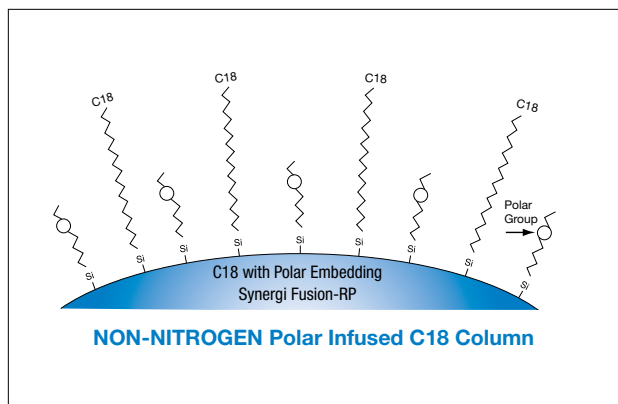


Synergi Hydro-RP is able to separate very polar compounds, as well as, mixtures of polars and non-polars



Synergi Fusion-RP

A Polar Embedded C18 Column



Synergi Fusion-RP

USP: L1

LC-MS Certified

pH Stability: 1.5 – 9.0**

Particle Size: 2.5 µm, 4 µm, and 10 µm

Phase: Polar embedded C18

Application: For a balanced retention of polar, basic compounds and moderate retention of hydrophobics over a broad pH range

Strength: Analysis of polar, basic compounds with little or no MS phase bleed

** pH range is 1.5 - 10.0 under isocratic conditions.
pH range is 1.5 - 9 under gradient conditions.

Sample Challenge:

You need greater separation of compounds that exhibit moderately polar and hydrophobic characteristics.

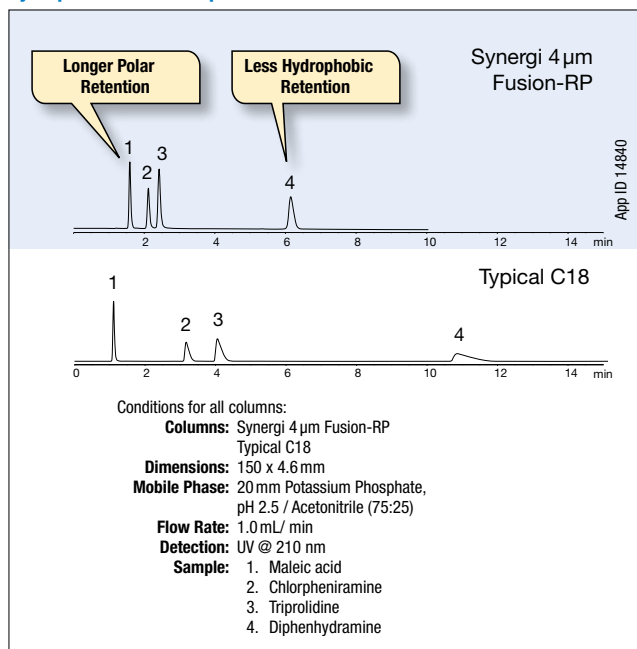
Selectivity Solution:

Offering a balanced combination of hydrophobic and polar selectivity, Synergi Fusion-RP will allow you to separate compounds exhibiting polar and hydrophobic characteristics.

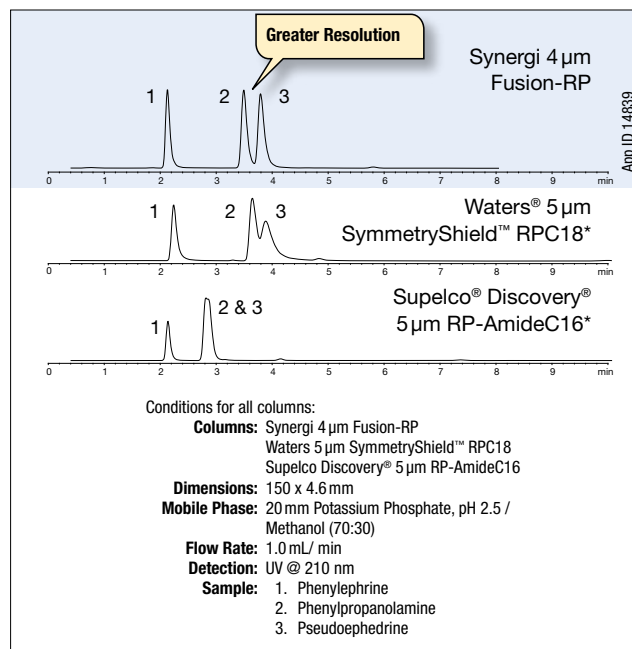


Balanced Polar and Hydrophobic Retention Allows for Superior Selectivity

Hydrophobic Basic Compounds



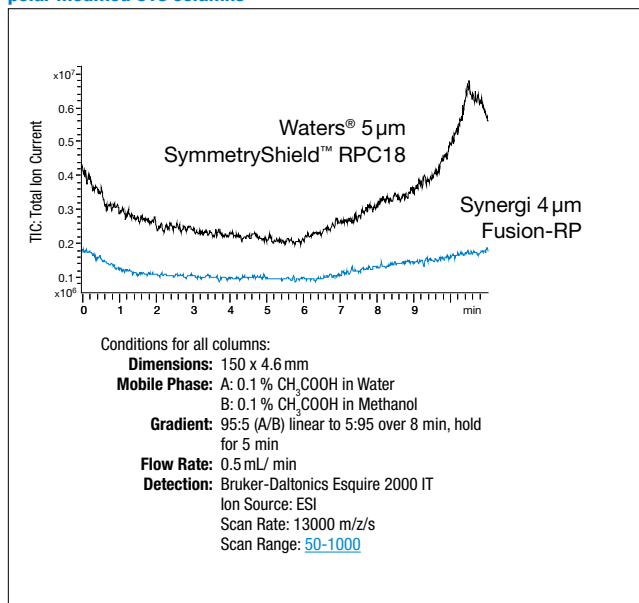
Antihistamines



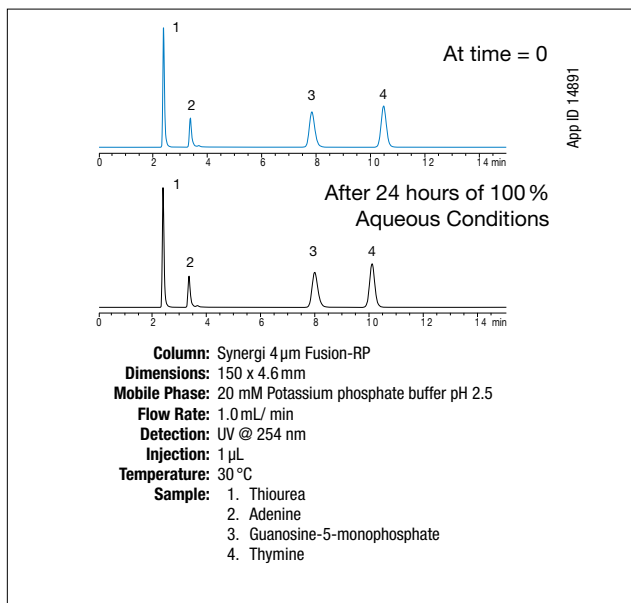
*See p. 330 for disclaimer information. Comparative separations may not be representative of all applications.

Synergi Fusion-RP (cont'd)

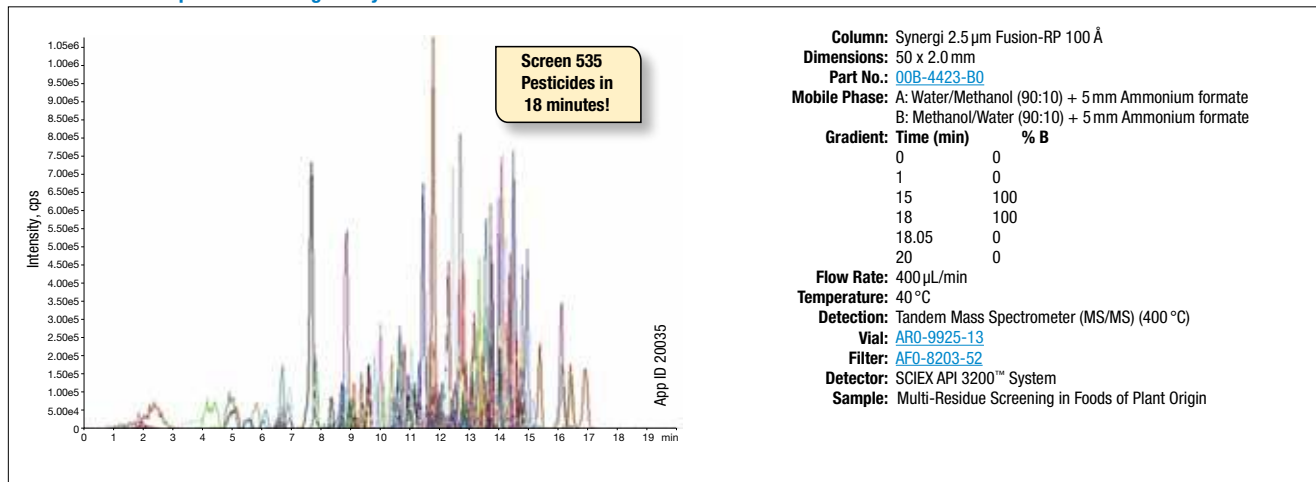
Synergi Fusion-RP has negligible MS bleed compared to other polar modified C18 columns



100% aqueous stable for added method flexibility



Excellent Multi-Compound Screening Ability

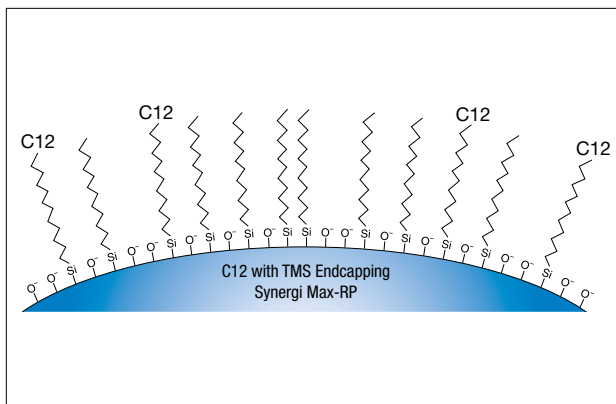


*Comparative separations may not be representative of all applications.

Columns used for comparison studies were manufactured by and purchased from Agilent Technologies Inc., Waters Corporation, GL Sciences Inc., Macherey-Nagel, and Sigma-Aldrich Co., LLC.



Synergi Max-RP A Reversed Phase C12 Column



Synergi Max-RP

USP: L87

LC-MS
Certified

pH Stability: 1.5 – 9.0**

Particle Size: 2.5 µm, 4 µm, and 10 µm

Phase: Reversed phase C12

Application: For hydrophobic, non-polar compounds over a wide pH range, with little or no MS phase bleed

Strength: Sharp peak shape for basic compounds at neutral pH

**pH range is 1.5 - 10.0 under isocratic conditions.
pH range is 1.5 - 9 under gradient conditions.

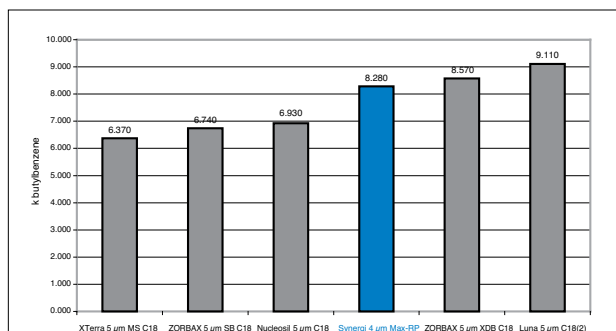
Sample Challenge:

You need to retain compounds based on hydrophobic selectivity exclusively, but cannot accomplish peak separation with C18 column.

Selectivity Solution:

The C12 ligands on Synergi Max-RP give a hydrophobic selectivity that may separate peaks where C18 columns cannot.

Hydrophobic Retention: Synergi Max-RP (C12) Performs Like a C18*

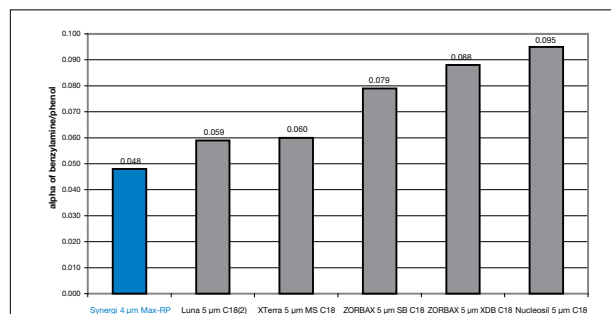


Conditions for all columns:

Columns: Waters XTerra 5 µm MS C18
Agilent Technologies ZORBAX 5 µm SB C18
Macherey Nagel Nucleosil 5 µm C18
Synergi 4 µm Max-RP
Agilent Technologies ZORBAX 5 µm XDB C18
Luna 5 µm C18(2)

Dimensions: 150 x 4.6 mm
Mobile Phase: Acetonitrile/Water (80:20)
Flow Rate: 1 mL/min
Detection: UV @ 254 nm
Injection: 1 µL
Temperature: Ambient
Sample: Butylbenzene

Silanol Activity at Low pH: C12 vs. C18 Phases



Conditions for all columns:

Columns: Waters XTerra 5 µm MS C18
Agilent Technologies ZORBAX 5 µm SB C18
Macherey Nagel Nucleosil 5 µm C18
Synergi 4 µm Max-RP
Agilent Technologies ZORBAX 5 µm XDB C18
Luna 5 µm C18(2)

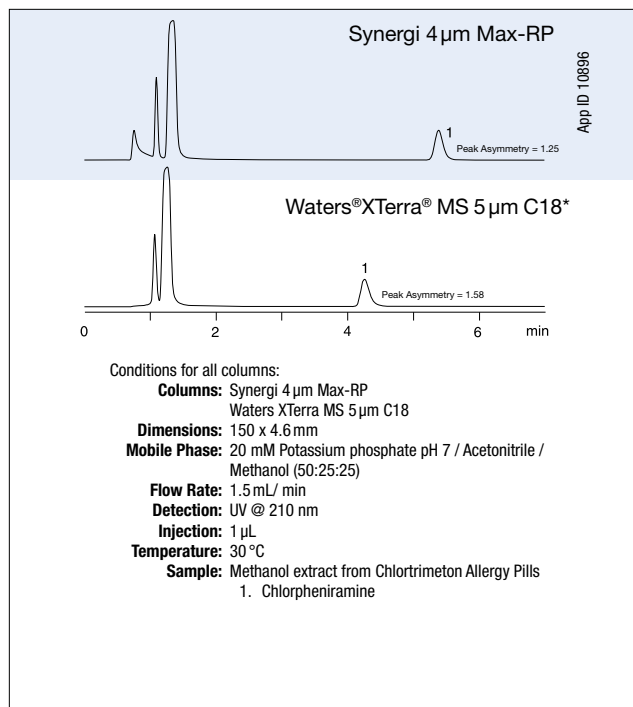
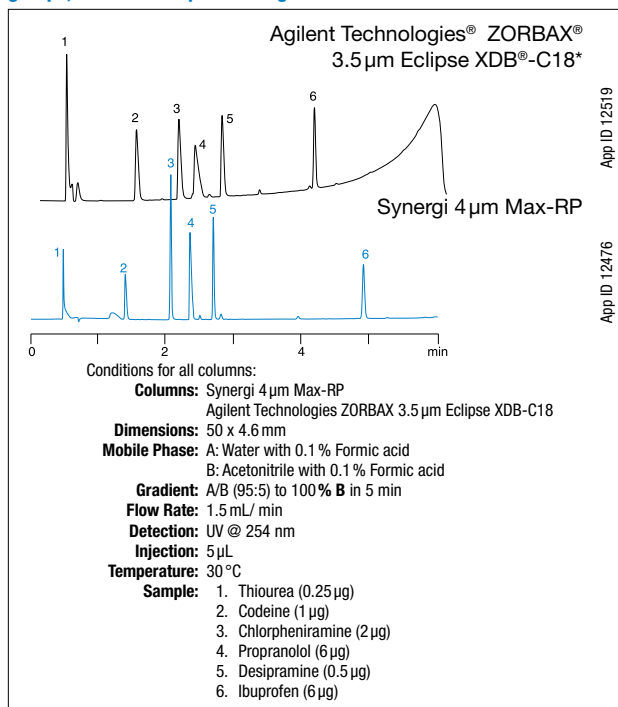
Dimensions: 150 x 4.6 mm
Mobile Phase: Methanol/20 mM Potassium phosphate, pH 2.5 (30:70)
Flow Rate: 1 mL/min
Detection: UV @ 254 nm
Injection: 5 µL
Temperature: Ambient
Sample: 1. Benzylamine
2. Phenol

*See p. 330 for disclaimer information. Comparative separations may not be representative of all applications.

Synergi Max-RP (cont'd)

Sharper Peaks

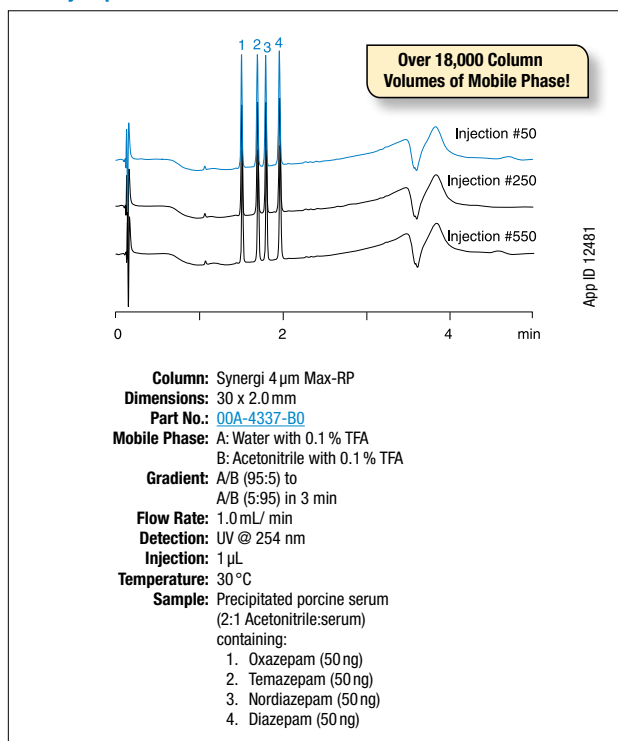
The Synergi Max-RP C12 ligands are densely bound to silica surface, significantly decreasing the number of active silanol groups, which cause peak tailing



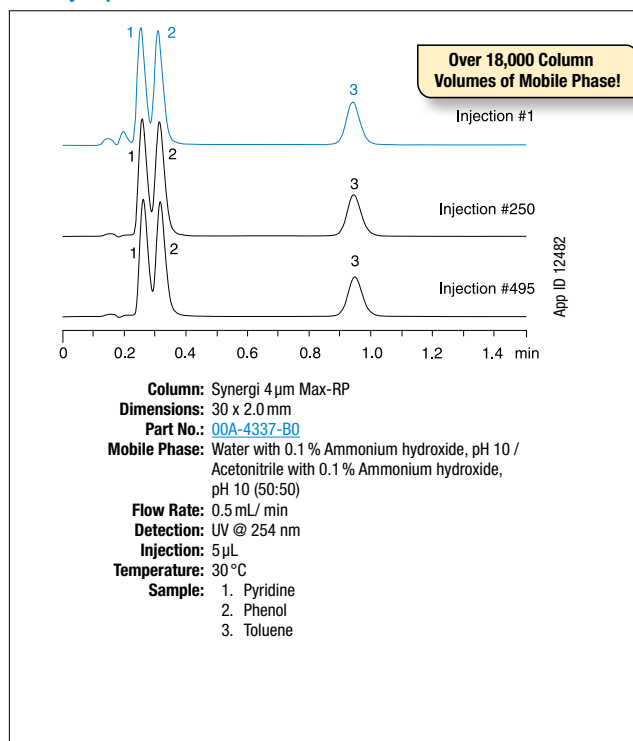
*See p. 330 for disclaimer information. Comparative separations may not be representative of all applications.

Achieve Reproducibility and Long Column Lifetimes Even at pH Extremes with Synergi Max-RP

Stability @ pH 1.5



Stability @ pH 10.0



Fast LC Solutions

Ordering Information

2.5 µm High Speed Technology (HST) Columns (mm)						
Phases	30 x 2.0	50 x 2.0	100 x 2.0	50 x 3.0	100 x 3.0	50 x 4.6
Max-RP	00A-4372-B0	00B-4372-B0	00D-4372-B0	00B-4372-Y0	00D-4372-Y0	00B-4372-E0
Hydro-RP	00A-4387-B0	00B-4387-B0	00D-4387-B0	00B-4387-Y0	00D-4387-Y0	00B-4387-E0
Polar-RP	00A-4371-B0	00B-4371-B0	00D-4371-B0	00B-4371-Y0	00D-4371-Y0	00B-4371-E0
Fusion-RP	00A-4423-B0	00B-4423-B0	00D-4423-B0	00B-4423-Y0	00D-4423-Y0	00B-4423-E0



For information about HST Columns, contact your Phenomenex technical consultant or local distributor.

Ordering Information

2.5 µm MercuryMS LC-MS Cartridges (mm)					Columns (mm)	
Phases	10 x 2.0	10 x 4.0	20 x 2.0	20 x 4.0	20 x 2.0	20 x 4.0
Max-RP	00N-4372-B0-CE	—	00M-4372-B0-CE	00M-4372-D0-CE	—	—
Hydro-RP	00N-4387-B0-CE	—	00M-4387-B0-CE	—	—	—
Polar-RP	00N-4371-B0-CE	00N-4371-D0-CE	00M-4371-B0-CE	—	00M-4377-B0	—
Fusion-RP	00N-4423-B0-CE	—	—	—	—	00M-4423-D0

MercuryMS™ Cartridge Holders



Direct-Connect Holder



Standard Holder

Ordering Information

Direct-Connect Cartridge Holders

Part No.	Description
CHO-7187	10 mm direct-connect holder
CHO-7188	20 mm direct-connect holder

Standard Cartridge Holders

Part No.	Description
CHO-5846	10 mm standard holder
CHO-5845	20 mm standard holder



Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 391-392

Capillary Columns

Ordering Information

4 µm Synergi Capillary Columns (mm)					
Phases	50 x 0.30	150 x 0.30	50 x 0.50	150 x 0.50	250 x 0.50
Max-RP	—	—	00B-4337-AF	00F-4337-AF	—
Hydro-RP	00B-4375-AC	00F-4375-AC	00B-4375-AF	—	00G-4375-AF
Fusion-RP	—	00F-4424-AC	—	00F-4424-AF	—
Polar-RP	—	—	—	00F-4336-AF	—

HPLC Columns

Ordering Information

4 µm Microbore and Minibore Columns (mm)							SecurityGuard™ Cartridges (mm)	
Phases	50 x 1.0	150 x 1.0	30 x 2.0	50 x 2.0	75 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0* /10pk
Max-RP	00B-4337-AO	—	00A-4337-B0	00B-4337-B0	00C-4337-B0	00F-4337-B0	—	AJO-6073
Hydro-RP	00B-4375-AO	00F-4375-AO	00A-4375-B0	00B-4375-B0	00C-4375-B0	00F-4375-B0	00G-4375-B0	AJO-7510
Polar-RP	—	—	00A-4336-B0	00B-4336-B0	00C-4336-B0	00F-4336-B0	00G-4336-B0	AJO-6075
Fusion-RP	00B-4424-AO	00F-4424-AO	00A-4424-B0	00B-4424-B0	00C-4424-B0	00F-4424-B0	00G-4424-B0	AJO-7556

for ID: 2.0-3.0 mm

4 µm MidBore™ Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phases	30 x 3.0	50 x 3.0	150 x 3.0	250 x 3.0	4 x 2.0* /10pk
Max-RP	—	00B-4337-YO	00F-4337-YO	00G-4337-YO	AJO-6073
Hydro-RP	—	00B-4375-YO	00F-4375-YO	00G-4375-YO	AJO-7510
Polar-RP	00A-4336-YO	00B-4336-YO	00F-4336-YO	00G-4336-YO	AJO-6075
Fusion-RP	—	00B-4424-YO	00F-4424-YO	00G-4424-YO	AJO-7556

for ID: 2.0-3.0 mm



For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 317-318

4 µm Analytical Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	30 x 4.6	50 x 4.6	75 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0* /10pk
Max-RP	00A-4337-E0	00B-4337-E0	00C-4337-E0	00F-4337-E0	00G-4337-E0	AJO-6074
Hydro-RP	00A-4375-E0	00B-4375-E0	00C-4375-E0	00F-4375-E0	00G-4375-E0	AJO-7511
Polar-RP	—	00B-4336-E0	00C-4336-E0	00F-4336-E0	00G-4336-E0	AJO-6076
Fusion-RP	—	00B-4424-E0	00C-4424-E0	00F-4424-E0	00G-4424-E0	AJO-7557

for ID: 3.2-8.0 mm

Preparative Columns

Ordering Information

Axia™ Packed Preparative Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	15 x 21.2**
4 µm					
Max-RP	—	—	00F-4337-PO-AX	00G-4337-PO-AX	AJO-7842
Hydro-RP	00B-4375-PO-AX	—	00F-4375-PO-AX	00G-4375-PO-AX	AJO-7843
Polar-RP	00B-4336-PO-AX	00D-4336-PO-AX	00F-4336-PO-AX	00G-4336-PO-AX	AJO-7845
Fusion-RP	—	00D-4424-PO-AX	00F-4424-PO-AX	00G-4424-PO-AX	AJO-7844
10 µm					
Hydro-RP	—	—	Inquire	00G-4376-PO-AX	AJO-7843
Polar-RP	—	—	Inquire	00G-4351-PO-AX	AJO-7845
Fusion-RP	—	—	00F-4425-PO-AX	00G-4425-PO-AX	AJO-7844

for ID: 18-29 mm

Ordering Information

Axia™ Packed Preparative Columns (mm) continued		SecurityGuard™ Cartridges (mm)
Phases	250 x 30	15 x 30.0*
4 µm		
Max-RP	00G-4337-UO-AX	AJO-8304

for ID: 30-49 mm

Ordering Information

4 µm Semi-Prep Columns (mm)		SecurityGuard™ Cartridges (mm)
Phases	250 x 10	10 x 10†
4 µm		
Max-RP	00G-4337-NO	AJO-7275
Hydro-RP	00G-4375-NO	AJO-7512
Polar-RP	00G-4336-NO	AJO-7276
Fusion-RP	00G-4424-NO	AJO-7558

for ID: 9-16 mm

*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJO-4282](#)
 †SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJO-9281](#)
 **PREP SecurityGuard™ Cartridges require holder, Part No.: [AJO-8223](#)
 †PREP SecurityGuard™ Cartridges require holder, Part No.: [AJO-8277](#)



For more dimensions and phases of Axia packed preparative columns, see pp. 361-362, or contact your Phenomenex Technical Consultant

Pilot Scale Columns and Bulk Material

Ordering Information

10 µm Analytical and Semi-Prep Columns (mm)			SecurityGuard™ Cartridges (mm)	
Phases	250 x 4.6	250 x 10	4 x 3.0*	10 x 10†
10 µm				
Max-RP	—	00G-4350-NO	AJO-6074	AJO-7275
Hydro-RP	00G-4376-E0	00G-4376-NO	AJO-7511	AJO-7512
Polar-RP	00G-4351-E0	00G-4351-NO	AJO-6076	AJO-7276
Fusion-RP	00G-4425-E0	00G-4425-NO	AJO-7557	AJO-7558

for ID: 3.2-8.0 mm 9-16 mm

10 µm Bulk Packings

Phases	100 g	1 kg
Max-RP	04G-4350	04K-4350
Hydro-RP	04G-4376	04K-4376
Polar-RP	04G-4351	04K-4351
Fusion-RP	04G-4425	04K-4425

Larger quantities of bulk media available upon request.

Synergi Bulk Media

Beyond our largest preparative column dimensions, Synergi phases are available in bulk quantities for HPLC purification at the process, pilot, and commercial scale. These medias offer a complementary selectivity to the standard C18, C8, or Silica phases traditionally employed in larger scale HPLC. Additionally, due to the diverse chemical properties of each of the Synergi phases, dramatic differences in chromatographic parameters such as retention time, selectivity, and resolution are often observed. For those challenging purifications where chromatography still makes the most sense, the Synergi family offers an excellent alternative to evaluate! Get your Synergi preparative scout column(s) and evaluate these phases today!



Ultracarb™

- Excellent peak shape for basic compounds, free fatty acids, triglycerides, fat-soluble vitamins, and other lipophilic compounds

Ultracarb C8 offers a high carbon load material with somewhat different selectivity than the two Ultracarb ODS phases.

Ordering Information

Analytical Columns (mm)					SecurityGuard™ Cartridges (mm)
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0
3 µm ODS (20)	00B-0205-E0	00D-0205-E0	00F-0205-E0	—	AJ0-4287
5 µm C8	—	—	00F-2134-E0	00G-2134-E0	AJ0-4290
5 µm ODS (20)	—	—	00F-0206-E0	00G-0206-E0	AJ0-4287
5 µm ODS (30)	—	00D-0351-E0	00F-0351-E0	00G-0351-E0*	AJ0-4287

for ID: 3.2-8.0 mm



*IMPORTANT: Phenomenex highly recommends the use of 150 mm column length, as opposed to the “traditional” 250 mm column length, when the 5 µm ODS (30) phase is desired. In those cases when the additional retention and resolution of a 250 mm column is desired, please be aware that column backpressure with Ultracarb 5 µm ODS (30) can be 50 to 100 % higher than that experienced with “standard” ODS columns. This relatively high backpressure is a function of the hydrophobicity of the 5 µm ODS (30) phase; higher backpressure is completely “natural” with this phase and will have no ill consequence for the column.

SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

Ultremex™

- For all new methods we recommend Luna columns
- Spherical, silica material

Ordering Information

5 µm Analytical Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	150 x 4.6	250 x 4.6	4 x 3.0
C8	00F-0047-E0	—	AJ0-4290
C18	00F-0048-E0	00G-0048-E0	AJ0-4287

for ID: 3.2-8.0 mm

SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

Ultron® ES

Manufactured by Shinwa Chemical Industries, Ltd.

- Two complementary protein-based chiral stationary phases
- Easy to use with reversed-phase mobile phases
- Racemic separation without derivatization
- pH range from 3.0 to 7.5

Ordering Information

Ultron ES Chiral Columns			
Column	µm	Size (mm)	ES-OVM
Analytical	5	150 x 4.6	702111651
Analytical & Guard	5	150 x 4.6	702111651A



Protect your valuable column investment with the disposable KrudKatcher™ pre-column filter, see p. 17

For In-line Filters specifically designed to protect your chiral column investment, see p. 17



For Chiral Column Performance Check Standards, see p. 399



For HPLC Column Heater System (25-90 °C), see p. 390

Affordable, Ultra-High Resolution Size Exclusion Chromatography for HPLC/UHPLC Systems

- Save money with extremely affordable prices
- Achieve better results through larger exclusion ranges and higher efficiencies
- Enhance recovery using more inert Yarra particles
- Gain time with faster, more productive HPLC/UHPLC runs
- Feel at ease knowing you have an unmatched product guarantee

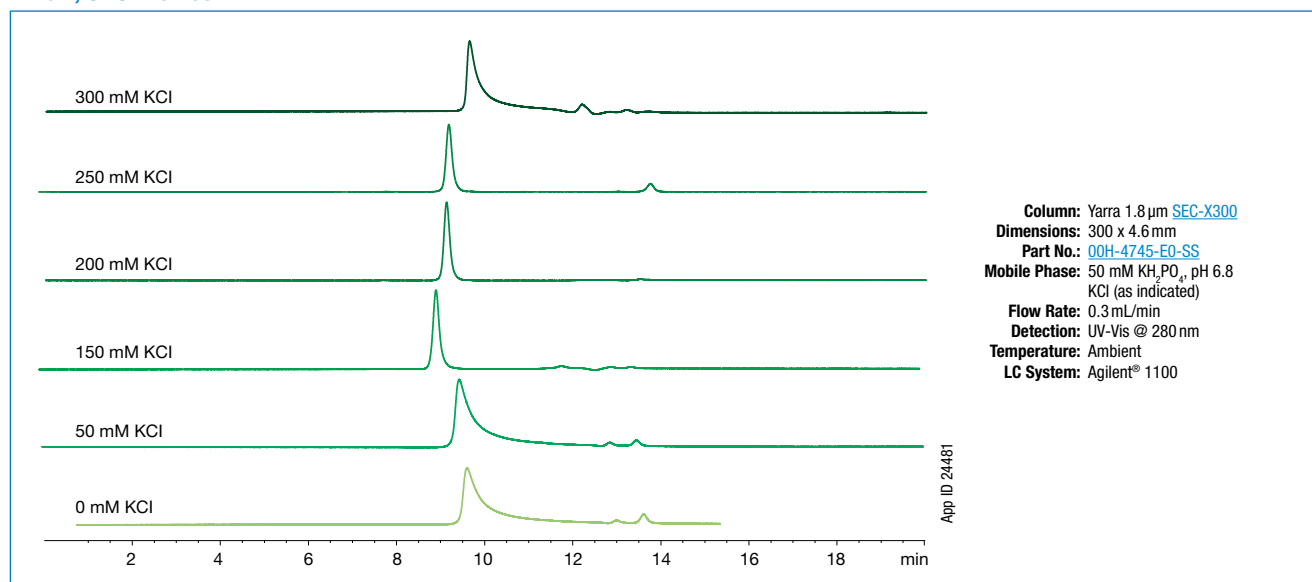
Yarra vs. Waters® BEH SEC

Yarra 1.8 μm 150 x 4.6 mm		vs.	Waters 1.7 μm 150 x 4.6 mm	
			BEH125 SEC	BEH200 SEC
1.8	1.8	Particle Size (μm)	1.7	1.7
150	300	Pore Size (Å)	125	200
1 k - 450 k	10 k-700 k	MW Range in native conditions (Da)	1 k - 80 k	10 k - 450 k
>30,000	>30,000	Efficiency (plates/column)	>30,000	>30,000

*Waters specifications taken from Waters website.

Buffer Optimization for mAb Aggregate Analysis

mAb 1, SEC Profiles



PROTEINS/PEPTIDES | YARRA | HPLC/UHPLC

Ordering Information

Yarra 1.8 μm SEC Stainless Steel Columns (mm)			SecurityGuard ULTRA Cartridges***
Phases	150 x 4.6	300 x 4.6	3/pk
Yarra 1.8 μm SEC-X150	00F-4631-E0-SS	00H-4631-E0-SS	AJ0-9512
Yarra 1.8 μm SEC-X300	00F-4743-E0-SS	00H-4743-E0-SS	AJ0-9513

***SecurityGuard ULTRA cartridges require holder, Part No.: AJ0-9000

High Resolution Size Exclusion for Biomolecules

- Extremely high efficiency 3 μm particle
- Huge cost savings
- Extreme surface inertness

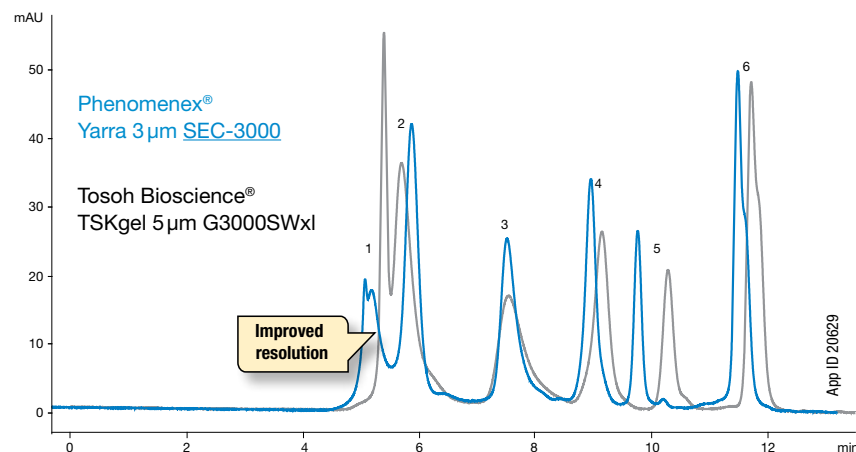
Starting with 3 μm ultra-pure silica, Yarra particles are densely bonded with a proprietary hydrophilic surface chemistry. Coupled with tight particle and pore size distribution as well as strict packing and QC specifications, Yarra columns allow for very high efficiency and resolution.

Higher Efficiency, Much Lower Price Compared to TSKgel® — GUARANTEED!

Yarra			VS.	TSKgel*†		
3	3	3		G2000SWxl	G3000SWxl	G4000SWxl
			Particle Size (μm)	5	5	8
145	290	500	Pore Size (Å)	125	250	450
1 k - 300 k	5 k - 700 k	15 k - 1,500 k	MW Range in native conditions (Da)	5 k - 150 k	10 k - 500 k	20 k - 7,000 k
2.5 - 7.5	2.5 - 7.5	2.5 - 7.5	pH Stability	2.5 - 7.5	2.5 - 7.5	2.5 - 7.5
3000	3000	1700	Maximum Backpressure (psi)	1015	1015	508
50	50	50	Maximum Temperature (°C)	30	30	30
1.5	1.5	1.2	Maximum Flow Rate (mL/min)	1.2	1.2	1.2
48,000	48,000	38,000	Efficiency (minimum theoretical plates)	20,000	20,000	16,000

*Also guaranteed against other aqueous GFC columns 3 μm or above.

Compare Yarra's Resolving Power to TSKgel's



Conditions for both columns:
Columns: Yarra 3 μm SEC-3000
 TSKgel 5 μm G3000SWxl
Dimensions: 300 x 7.8 mm
Mobile Phase: 50 mM Sodium Phosphate pH 6.8 / 0.3 M Sodium Chloride
Flow Rate: 1 mL/min
Backpressure: 99 bar
Temperature: Ambient
Detection: UV @ 220 nm
Sample: 1. IgM
 2. Thyroglobulin (669 kDa)
 3. Beta Amylase
 4. Ovalbumin (44 kDa)
 5. Myoglobin (17 kDa)
 6. Uridine

Comparative separations may not be representative of all applications.
 †All TSKgel specifications were taken from Tosoh Bioscience 2004-5 Laboratory Products Catalog

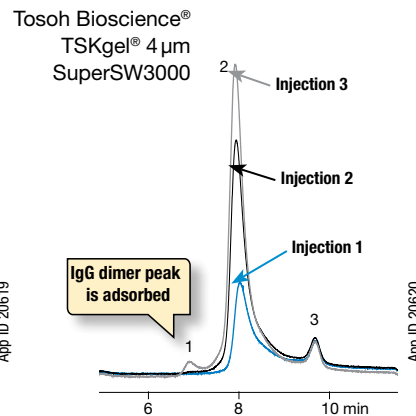
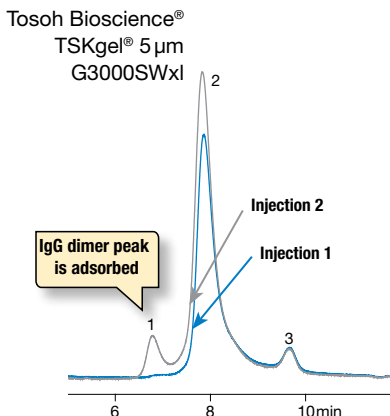
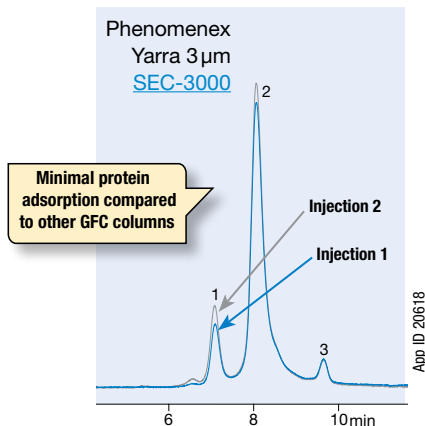
Yarra™ 3 μm Aqueous GFC/SEC Columns

Extreme Surface Inertness for Accurate and Confident Recoveries

Phenomenex's proprietary surface chemistry provides an inertness hard to match by other GFC columns. The result is minimal

adsorption of proteins and other protein aggregates leading to more accurate quantitation.

Minimal "Priming Effect" with Yarra Columns



Conditions for all columns (except where noted):

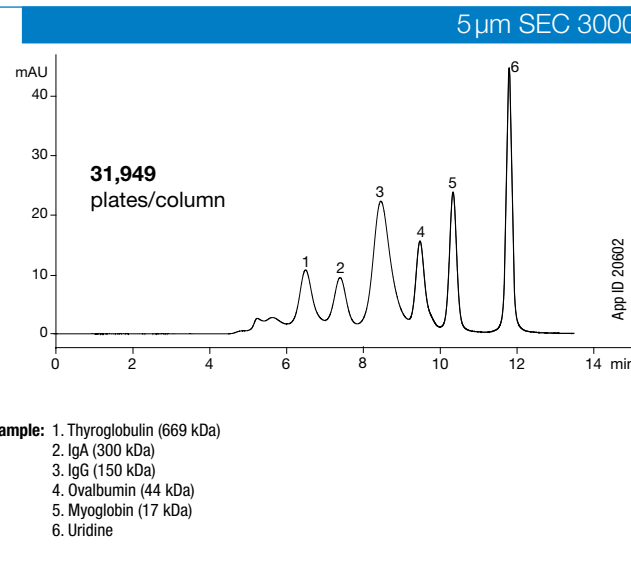
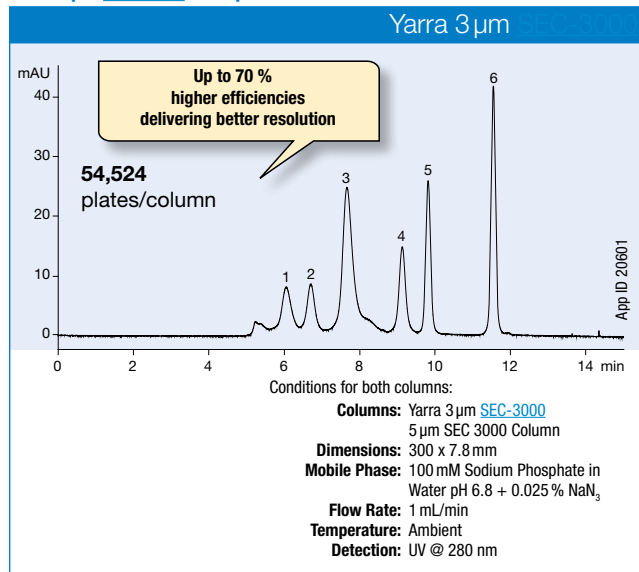
Columns: Yarra 3 μm SEC-3000
TSKgel 5 μm G3000SWxl
TSKgel 4 μm SuperSW3000
Dimensions: 300 x 7.8 mm

Mobile Phase: 50 mM Sodium Phosphate pH 5.0/ 0.1 M Sodium Sulfate
Flow Rate: 1 mL/min 0.35 mL/min (SuperSW3000)
Temperature: Ambient

Detection: UV @ 280 nm
Sample: 1. IgG Dimer
2. IgG Monomer
3. Albumin

Ultra-High Resolution Size Exclusion for Biomolecules

Yarra 3 μm SEC-3000 vs. 5 μm SEC 3000 Column



Comparative separations may not be representative of all applications.

Ordering Information

Yarra 3 μm SEC Columns (mm)	Narrow Bore	Analytical	Analytical	SecurityGuard™ Cartridges (mm)
Phases	300 x 4.6	150 x 7.8	300 x 7.8	4 x 3.0*
Yarra 3 μm SEC-2000	00H-4512-E0	00F-4512-K0	00H-4512-K0	AJO-4487
Yarra 3 μm SEC-3000	00H-4513-E0	00F-4513-K0	00H-4513-K0	AJO-4488
Yarra 3 μm SEC-4000	00H-4514-E0	—	00H-4514-K0	AJO-4489

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJO-4282

for ID: 4.6 - 7.8 mm



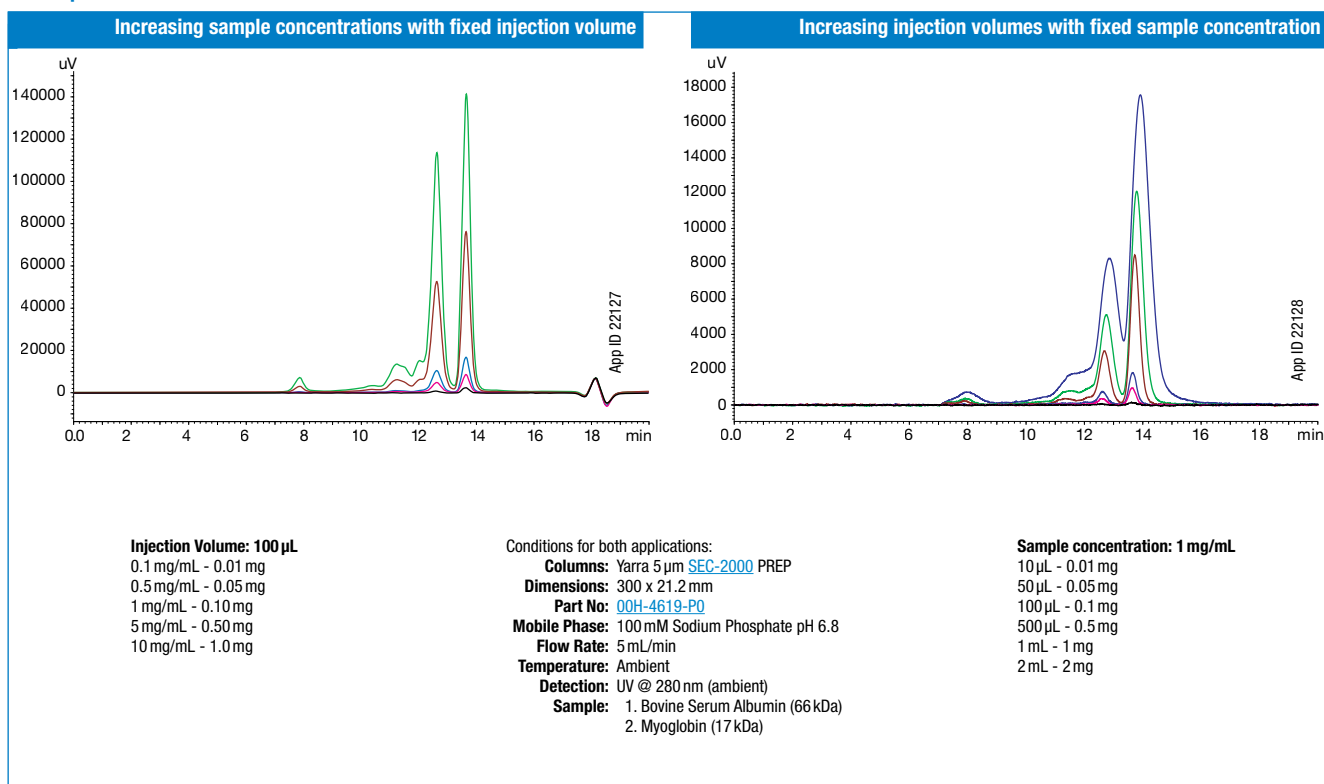
For information on SecurityGuard column protection, see p. 311

Yarra™ 5 μm PREP Aqueous GFC/SEC Columns

Higher Performance for Preparative BioSeparations at a Lower Price

Enjoy the same selectivity and ultra-high efficiency of Yarra 3 μm for your preparative gel filtration applications. Yarra SEC PREP features a 5 μm particle size version of the original Yarra 3 μm particle with the same chemistry on a 21.2 mm ID column for preparative purification, desalting, and characterization of biomolecules. Yarra 5 μm PREP is available at an affordable price while maintaining the high performance given with the analytical columns.

Yarra 5 μm SEC/GFC PREP Column



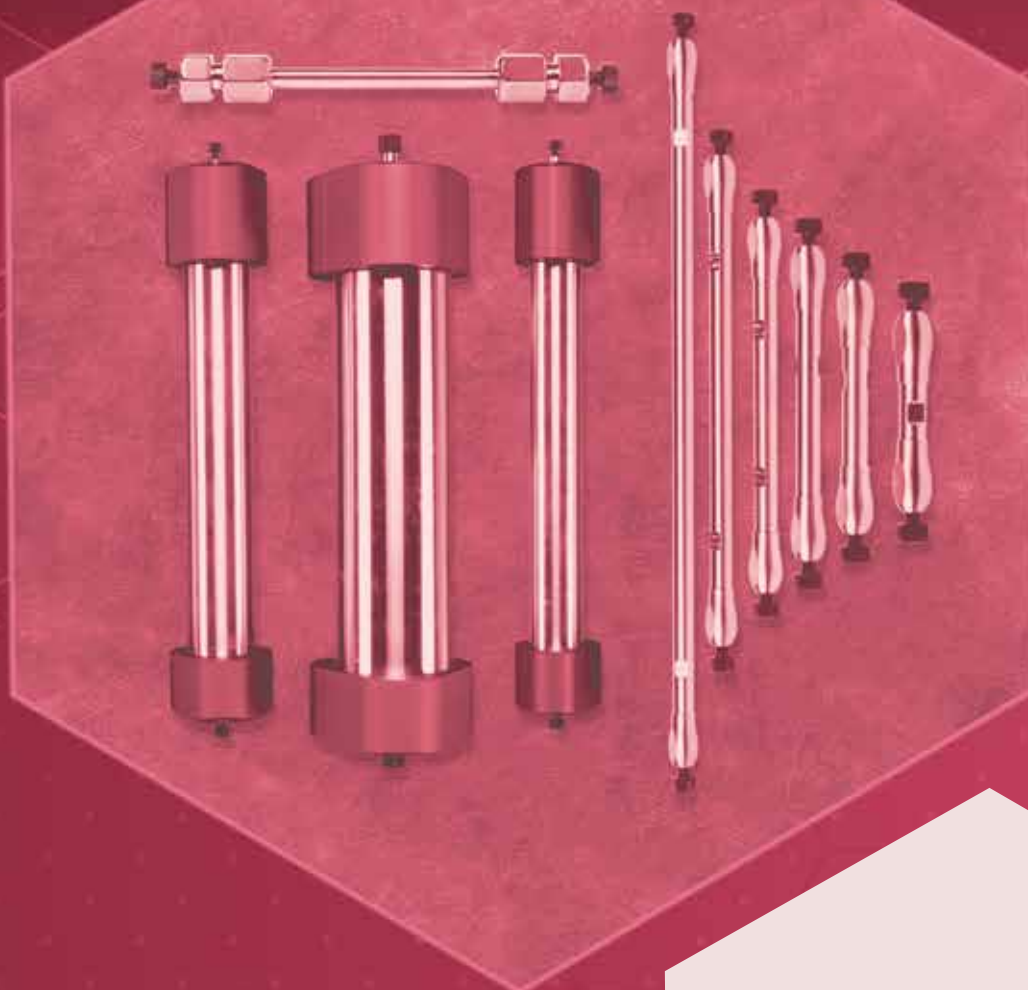
Yarra 5 μm PREP SEC Columns (mm)	Preparative	SecurityGuard™ Cartridges (mm)
Phases	300 x 21.2	15 x 21.2**
		/ea
Yarra 5 μm SEC-2000 PREP	00H-4619-P0	AJO-8588
Yarra 5 μm SEC-3000 PREP	00H-4620-P0	AJO-8589
Yarra 5 μm SEC-4000 PREP	00H-4621-P0	AJO-8590

**PREP SecurityGuard™ Cartridges require holder, Part No.: AJO-8223 for ID: 18 - 29 mm



Industry Focused Guides





“ You have very intelligent chromatographers on hand to answer method development questions. ”

Timothy E. Mason
AkzoNobel

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

SFC Media

Chiral: Lux SFC Media	342
Achiral: Kinetex, Luna and Synergi SFC Media	348
Preparative SFC Media	347

Supercritical Fluid Chromatography (SFC)

SFC is recognized by scientists worldwide as a clean, green, and efficient tool for analysis and purification. With recent advancements and accessibility of instrumentation, improved column hardware, and the wide variety of surface chemistries available, SFC has enjoyed an ever-increasing range of applications in many industries:

- Pharmaceutical
- Nutraceutical
- Petrochemical
- Natural Products
- Food & Beverage
- Environmental
- Academic
- and more...

Complete SFC Product Offering

Phenomenex offers solutions for your SFC needs.

- Over 20 selectivities for use in SFC
- Chiral and achiral phases available
- Multiple particle sizes ranging from 1.7 μm to 20 μm^*
- Scalable packed column dimensions (2.0mm – 50.0mm ID)

Chiral columns (pp. 343-347)

6 Coated Lux Polysaccharide Chiral Stationary Phases

- Lux Amylose-1
- Lux Amylose-2
- Lux Cellulose-1
- Lux Cellulose-2
- Lux Cellulose-3
- Lux Cellulose-4

2 Immobilized Lux Phases

- Lux i-Amylose-1
- Lux i-Amylose-3
- Lux i-Cellulose-5

*Not all media available in a full range of particle sizes, please inquire.



Expanding the Range of Selectivity for SFC

Selecting a column is one of the most critical parameters during SFC method development. Having a variety of complementary and orthogonal selectivities to choose from can mean the difference between partial or no separation and achieving an optimal fully resolved separation that can be validated and scaled-up in your lab or contract lab.

Phenomenex offers a large collection of packed SFC analytical and preparative columns that have earned their reputations for performance, reliability, high efficiency, reproducibility, and long lifetimes.

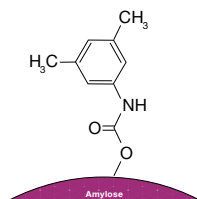
Achiral columns (pp. 348-350)

- Kinetex Phenyl-Hexyl
- Kinetex F5
- Kinetex Biphenyl
- Kinetex HILIC
- Luna HILIC
- Luna PFP(2)
- Luna NH₂
- Luna Si
- Luna CN
- Synergi Polar-RP



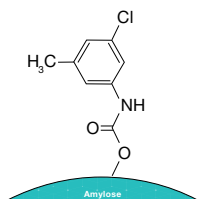
Chiral SFC Media

Three Robust Immobilized Chiral Columns



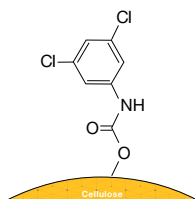
Lux i-Amylose-1

Amylose tris
(3,5-dimethylphenylcarbamate)



Lux i-Amylose-3

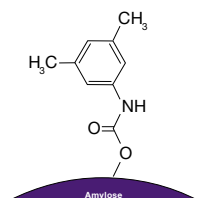
Amylose tris
(3-chloro-5-methylphenylcarbamate)



Lux i-Cellulose-5

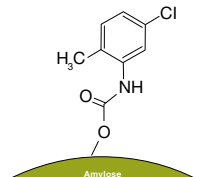
Cellulose tris
(3,5-dichlorophenylcarbamate)

Combined with Six Coated Lux Polysaccharide LC/SFC Chiral Stationary Phases



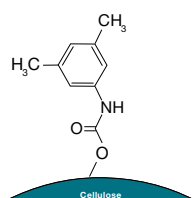
Lux Amylose-1

Amylose tris
(3,5-dimethylphenylcarbamate)



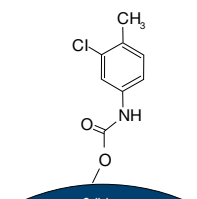
Lux Amylose-2

Amylose tris
(5-chloro-2-methylphenylcarbamate)



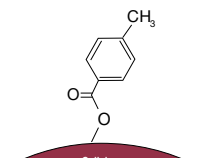
Lux Cellulose-1

Cellulose tris
(3,5-dimethylphenylcarbamate)



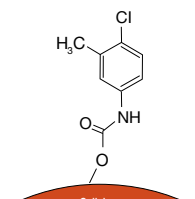
Lux Cellulose-2

Cellulose tris
(3-chloro-4-methylphenylcarbamate)



Lux Cellulose-3

Cellulose tris
(4-methylbenzoate)



Lux Cellulose-4

Cellulose tris
(4-chloro-3-methylphenylcarbamate)

Easily upgrade from your existing chiral columns to Lux LC/SFC columns!

If you are using one of the DAICEL® columns below:	Guaranteed alternative:	Phase description:
CHIRALPAK® IA® and IA-3	Lux i-Amylose-1	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK IG® and IG-3	Lux i-Amylose-3	Amylose tris(3-chloro-5-methylphenylcarbamate)
CHIRALPAK IC® and IC-3	Lux i-Cellulose-5	Cellulose tris(3,5-dichlorophenylcarbamate)
CHIRALPAK AD®, AD-H®, AD-3, AD-RH®, and AD-3R	Lux Amylose-1	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK AY®, AY-H®, AY-3, AY-RH®, and AY-3R	Lux Amylose-2	Amylose tris(5-chloro-2-methylphenylcarbamate)
CHIRALCEL® OD®, OD-H®, OD-3, OD-RH®, and OD-3R	Lux Cellulose-1	Cellulose tris(3,5-dimethylphenylcarbamate)
CHIRALCEL OZ®, OZ-H®, OZ-3, OZ-RH®, and OZ-3R	Lux Cellulose-2	Cellulose tris(3-chloro-4-methylphenylcarbamate)
CHIRALCEL OJ®, OJ-H®, OJ-3, OJ-RH®, and OJ-3R	Lux Cellulose-3	Cellulose tris(4-methylbenzoate)
CHIRALCEL OX-H, OX-3, OX-RH, and OX-3R	Lux Cellulose-4	Cellulose tris(4-chloro-3-methylphenylcarbamate)

Chiral SFC Media (cont'd)

Exceptional Stability and Separating Power under SFC Conditions

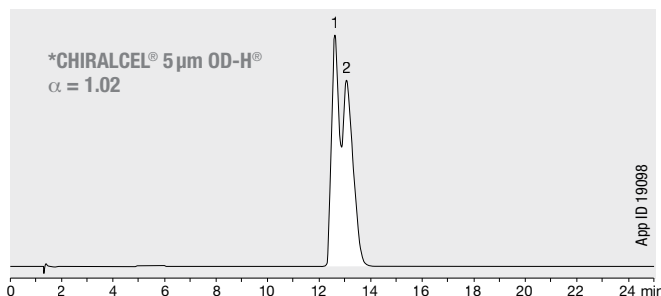
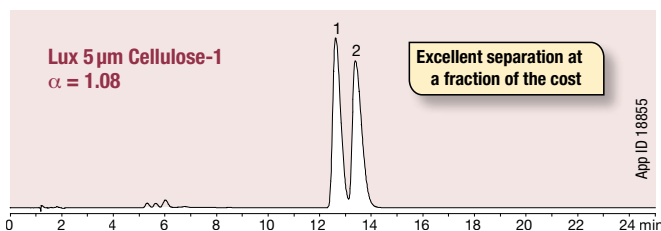
- Multiple complementary polysaccharide stationary phases
- High efficiency and loading capacity
- Pressure stability up to 300 bar
- 3 μm , 5 μm packed columns and 10 and 20 μm bulk media for scale-up

Extreme Stability and Separating Power under SFC Conditions.

Never fear crushed media or loss in efficiency again. With a pressure stability up to 300 bar (4350 psi), you can feel confident about running at high operating pressures (if necessary). Lux media is

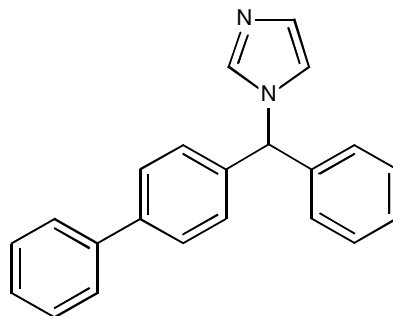
SFC approved and versatile enough to satisfy all of your chiral separation needs.

Bifonazole



Conditions for both columns:

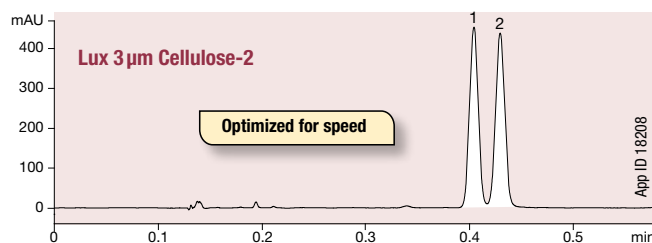
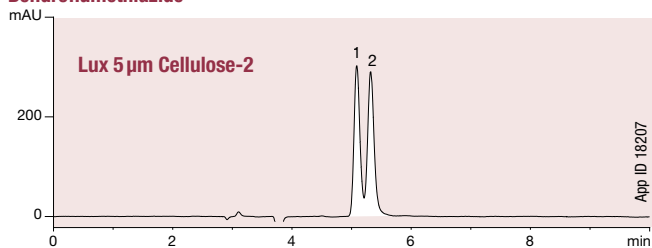
- Dimensions:** 250 x 4.6 mm
- Mobile Phase:** 0.1 % Diethylamine in Methanol / Carbon Dioxide (15:85)
- Flow Rate:** 2.5 mL/min
- Temperature:** 35 °C
- Detection:** Diode Array Detector



Smaller Particles for Higher Efficiency

Scaling down to a 3 μm particle gives you exceptional efficiencies and significantly reduced runtimes without compromising enantioselectivity.

Bendroflumethiazide



- Column:** Lux 5 μm Cellulose-2
- Dimensions:** 250 x 4.6 mm
- Part No.:** [00G-4457-E0](#)
- Mobile Phase:** 0.1 % Diethylamine with 0.1 % Trifluoroacetic acid in Methanol / Carbon Dioxide (30:70)
- Flow Rate:** 2 mL/min
- Detection:** UV @ 273 nm
- Temperature:** Ambient

- Column:** Lux 3 μm Cellulose-2
- Dimensions:** 50 x 4.6 mm
- Part No.:** [00B-4456-E0](#)
- Mobile Phase:** 0.1 % Diethylamine with 0.1 % Trifluoroacetic acid in Methanol / Carbon Dioxide (30:70)
- Flow Rate:** 4 mL/min
- Detection:** UV @ 273 nm
- Temperature:** Ambient

* Comparative separations may not be representative of all applications. Columns used for comparison were manufactured by DAICEL Corporation.

Chiral SFC Media (cont'd)

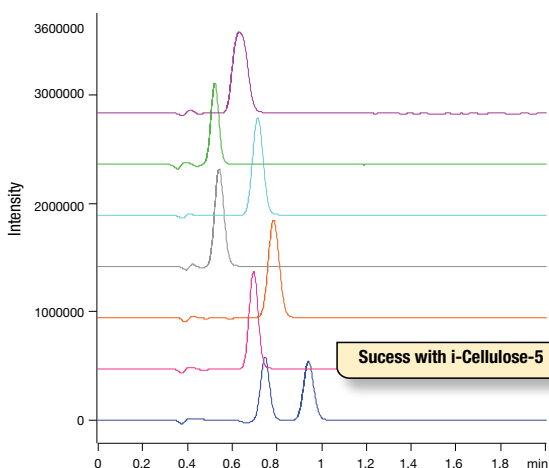
Eight distinct yet complementary Lux® CSPs allow for excellent success rate over reversed phase, polar organic, normal phase, and SFC conditions, with the i-Amylose-3, i-Cellulose-5, and i-Amylose-1, adding strong solvent capability to this versatile family of products.

For SFC, having this breadth of selectivities is incredibly useful for

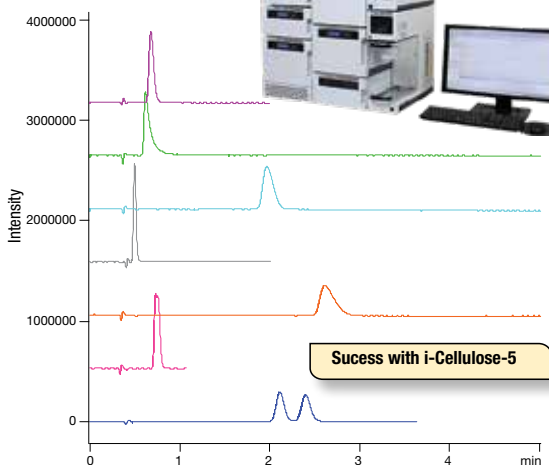
A variety of compounds were separated including:

- Beta-Blockers
- Anti-Anxiety
- Pain Relievers
- Anti-Allergenic agents
- Anti-Arrhythmia
- Anti-Asthmatic
- Anti-Coagulants
- Anti-Depressive
- Anti-Inflammatory
- Calcium Channel Blockers

Nimopidine



Acebutolol

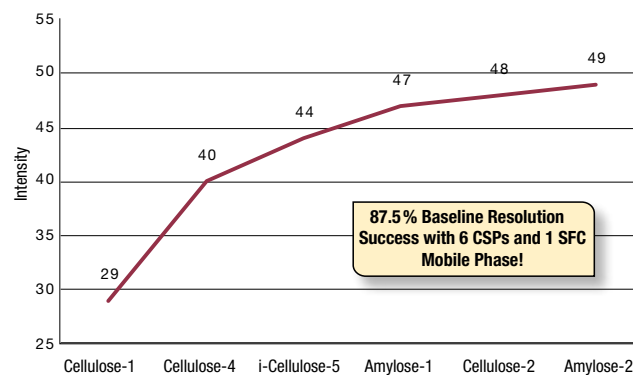


Nimopidine and Acebutolol

- Columns:** Lux 3 µm Amylose-2
 Lux 3 µm Amylose-1
 Lux 3 µm Cellulose-4
 Lux 3 µm Cellulose-3
 Lux 3 µm Cellulose-2
 Lux 3 µm Cellulose-1
 Lux 3 µm i-Cellulose-5
- Dimensions:** 150 x 3.0 mm

screening and discovery work. Below is a portion of a study where 56 racemic pharmaceutical compounds were run on a variety of Lux stationary phases under various mobile phase options to help develop useful screening protocols. Over the course of the study, it was determined that with one SFC mobile phase and the use of 6 different Lux CSPs, a lab could get 87.5% success (baseline resolution).

Cumulative baseline separation with Lux phases



SFC Screen

- Columns:** Lux 5 µm Cellulose-1
 Lux 5 µm Cellulose-4
 Lux 5 µm i-Cellulose-5
 Lux 5 µm Amylose-1
 Lux 5 µm Cellulose-2
 Lux 5 µm Amylose-2

Dimensions: 250 x 4.6 mm

Conditions for all columns:

- Mobile Phase:** 80% CO₂ / 20% Methanol + 0.1% Isopropylamine and 0.1% TFA
- Flow Rate:** 3 mL/min
- Detection:** UV @ 220 nm
- Temperature:** 30 °C
- System:** JASCO® 4000 Series Analytical SFC



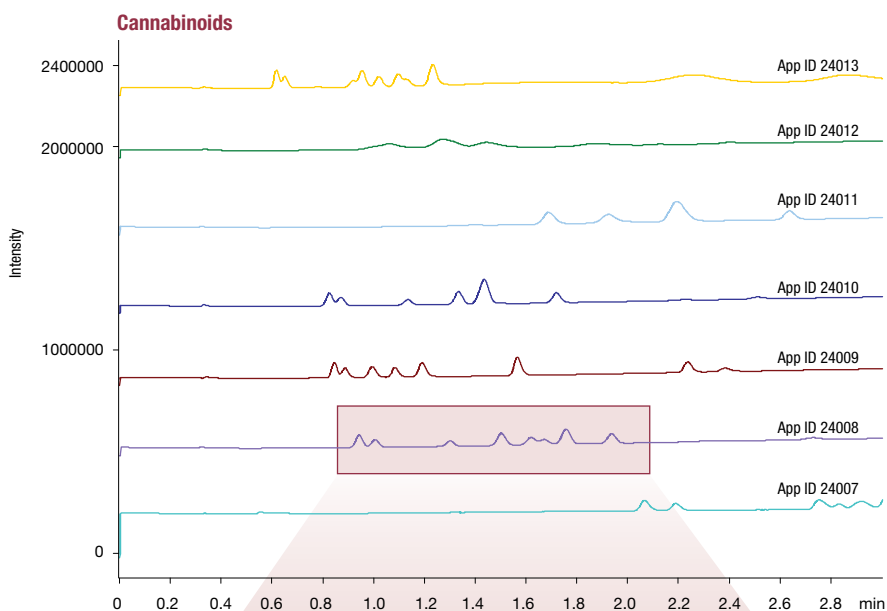
Lux columns are interchangeable between normal phase and SFC modes with a simple solvent switch. Request Technical Note, [TN-9004](#), for more details on chiral SFC screening strategies.

Chiral SFC Media (cont'd)

Achiral SFC Success with Chiral Columns!

While the incredible range of interaction mechanisms (polar, electrostatic, hydrophobic, van der Waals, and others) present in each Lux material are fundamental for ensuring baseline separation of chiral compounds, these same interaction mechanisms can also be used as an excellent screening tool for achiral work. Here we

present an achiral screening of natural cannabinoids using 7 Lux selectivities under one SFC mobile phase. The initial resolution and separation provided by the Lux Cellulose-2 was then further optimized to provide even greater resolution.



Conditions for all columns:

Columns: Lux 3 μ m i-Cellulose-5
 Lux 3 μ m Amylose-2
 Lux 3 μ m Amylose-1
 Lux 3 μ m Cellulose-4
 Lux 3 μ m Cellulose-3
 Lux 3 μ m Cellulose-2
 Lux 3 μ m Cellulose-1

Dimensions: 150 x 3.0 mm

Mobile Phase: A: Carbon Dioxide
 B: Methanol

Gradient:	Time (min)	% B
	0	5
	2.5	25
	3	25

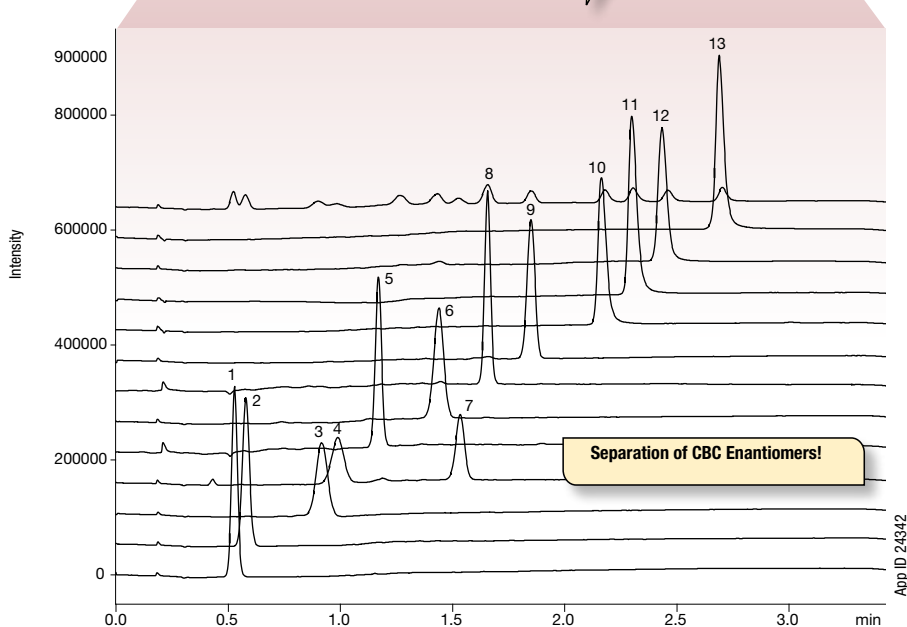
Flow Rate: 3 mL/min

Detection: UV @ 220 nm

Temperature: 40 °C

Sample: Cannabinoid mix of 8

Expanded and optimized method separates achiral and chiral species!



Separation of CBC Enantiomers!

Column: Lux 3 μ m Cellulose-2

Dimensions: 150 x 3.0 mm

Part No.: [00F-4456-YO](#)

Mobile Phase: A: Carbon Dioxide
 B: Methanol

Gradient:	Time (min)	% B
	0	4
	3	25
	3.5	25

Flow Rate: 5 mL/min

Detection: UV @ 220 nm

Temperature: 40 °C

Sample: Cannabinoid mix of 12

- | | |
|-----------------------|-----------|
| 1. CBDV | 8. THCV |
| 2. CBN | 9. CBG |
| 3. Delta-8-THC | 10. CBDVA |
| 4. CBC (Enantiomer 1) | 11. CBDVA |
| 5. CBD | 12. THCA |
| 6. Delta-9-THC | 13. CBGA |
| 7. CBC (Enantiomer 2) | |

Chiral SFC Media (cont'd)

Chiral Material Characteristics

Packing Material Porous	Particle Size (µm)	Pressure Stability (bar)	pH Stability
Lux Cellulose	3, 5, 10, 20	300	2.0 - 9.0
Lux Amylose	3, 5, 20*	300	2.0 - 9.0

* Please inquire

3.0mm ID Lux Screening Columns

Ordering Information

3 µm MidBore™ Columns (mm)†		SecurityGuard™ Cartridges (mm)
Phases	150 x 3.0	4 x 2.0*
		/10pk
i-Cellulose-5	00F-4755-Y0	AJ0-8631
Cellulose-1	00F-4458-Y0	AJ0-8402
Cellulose-2	00F-4456-Y0	AJ0-8398
Cellulose-3	00F-4492-Y0	AJ0-8621
Cellulose-4	00F-4490-Y0	AJ0-8626
Amylose-1	00F-4729-Y0	AJ0-9337
Amylose-2	00F-4471-Y0	AJ0-8471
	for ID:	2.0–3.0mm

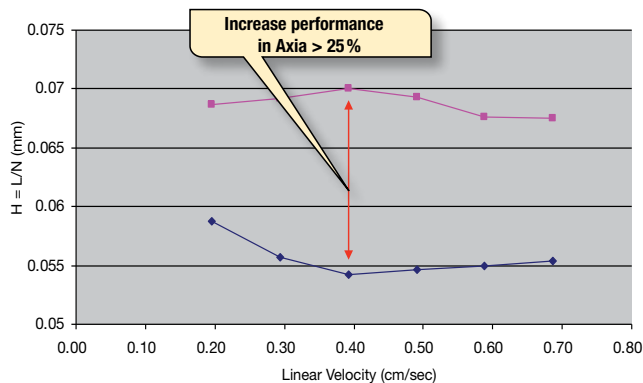
† Additional dimensions available upon request.

* SecurityGuard Analytical Cartridges require holder, Part No.: [KJO-4282](#)



SFC Preparative Advantage Using Axia™ Packed Technology

Expect up to 25% higher resolution when using the same material packing in Axia versus standard hardware.



◆ Axia Technology ■ Standard Hardware



Ordering Information

Supercritical Fluid Chromatography (SFC) Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phase	150 x 4.6**	250 x 4.6**	250 x 10	4 x 3.0*	10 x 10.0 ‡
Chiral Columns†				/10pk	/3pk
Lux 5 µm i-Amylose-1	00F-4762-E0	00G-4762-E0	00G-4762-N0	AJ0-8641	AJ0-8642
Lux 5 µm i-Amylose-3	00F-4779-E0	00G-4779-E0	00G-4779-N0	AJ0-8650	AJ0-8652
Lux 5 µm i-Cellulose-5	00F-4756-E0	00G-4756-E0	00G-4756-N0	AJ0-8632	AJ0-8633
Lux 5 µm Cellulose-1	00F-4459-E0	00G-4459-E0	00G-4459-N0	AJ0-8403	AJ0-8404
Lux 5 µm Cellulose-2	00F-4457-E0	00G-4457-E0	00G-4457-N0	AJ0-8366	AJ0-8399
Lux 5 µm Cellulose-3	00F-4493-E0	00G-4493-E0	00G-4493-N0	AJ0-8622	AJ0-8623
Lux 5 µm Cellulose-4	00F-4491-E0	00G-4491-E0	00G-4491-N0	AJ0-8627	AJ0-8628
Lux 5 µm Amylose-1	00F-4732-E0	00G-4732-E0	00G-4732-N0	AJ0-9336	AJ0-9344
Lux 5 µm Amylose-2	00F-4472-E0	00G-4472-E0	00G-4472-N0	AJ0-8470	AJ0-8472
			for ID:	3.2–8.0mm	9–16mm

**Available in 3 µm. †Additional dimensions available upon request.

for ID: 3.2–8.0mm

9–16mm



*SecurityGuard Analytical Cartridges require holder, Part No.: [KJO-4282](#).



‡SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#).

Supercritical Fluid Chromatography (SFC) Columns (mm) (cont'd)				SecurityGuard™ Cartridges (mm)	
Phase	250 x 21.2	250 x 30	250 x 50	15 x 21.2	15 x 30.0*
Chiral Columns†				/ea	/ea
Lux 5 µm i-Amylose-1	00G-4762-P0-AX	00G-4762-U0-AX	00G-4762-V0-AX	AJ0-8643	AJ0-8644
Lux 5 µm i-Amylose-3	00G-4779-P0-AX	00G-4779-U0-AX	00G-4779-V0-AX	AJ0-8653	AJ0-8654
Lux 5 µm i-Cellulose-5	00G-4756-P0-AX	00G-4756-U0-AX	00G-4756-V0-AX	AJ0-8634	AJ0-8635
Lux 5 µm Cellulose-1	00G-4459-P0-AX	00G-4459-U0-AX	00G-4459-V0-AX	AJ0-8405	AJ0-8406
Lux 5 µm Cellulose-2	00G-4457-P0-AX	00G-4457-U0-AX	00G-4457-V0-AX	AJ0-8400	AJ0-8401
Lux 5 µm Cellulose-3	00G-4493-P0-AX	00G-4493-U0-AX	00G-4493-V0-AX	AJ0-8624	AJ0-8625
Lux 5 µm Cellulose-4	00G-4491-P0-AX	00G-4491-U0-AX	00G-4491-V0-AX	AJ0-8629	AJ0-8630
Lux 5 µm Amylose-1	00G-4732-P0-AX	00G-4732-U0-AX	00G-4732-V0-AX	AJ0-9338	AJ0-9339
			for ID:	18–29mm	30–49mm

†Additional dimensions available upon request.

for ID: 18–29mm

30–49mm



**SFC PREP 21.2mm ID SecurityGuard Cartridges require holder, Part No.: [AJ0-8617](#).

*SFC PREP 30.0mm ID SecurityGuard Cartridges require holder, Part No.: [AJ0-8618](#).

Bulk SFC media is available. Please contact your Phenomenex representative for more information.

For all other SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315

Achiral SFC Media

- Core-shell and fully porous media
- High surface area for increased loading
- Easy scale-up from lab to pilot plant
- Polar and non-polar selectivities for screening
- Columns interchangeable between SFC and HPLC modes

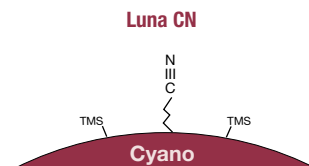
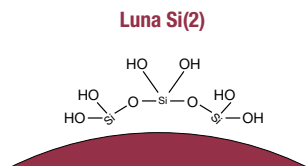
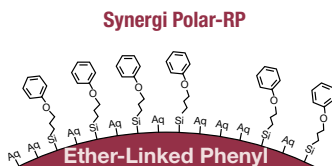
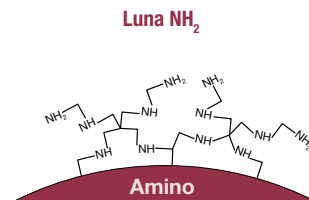
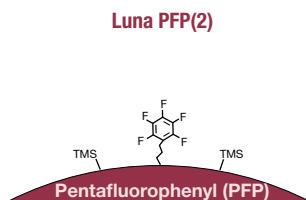
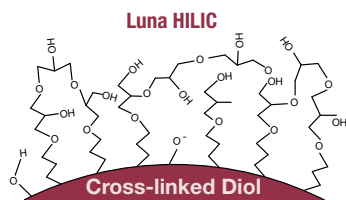
Media Selectivity is Critical for Success

Utilizing differences in surface chemistries will ensure that you achieve a successful separation for any given project, as in the example below. Once the ideal column phase is identified, you have the ability to optimize for additional improvements in performance:

- Changing retention
- Increasing efficiency
- Altering selectivity
- Reversing elution orders

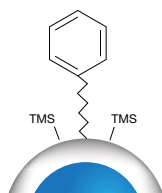
These optimization steps can easily be achieved by adjusting a few simple parameters. For instance, you can try different modifiers and/or additives, change the percent concentration of your modifier, or you can simply change your pressure, temperature, and/or flow rate.

Fully Porous Particles

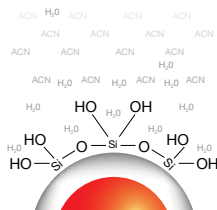


Core-Shell Particles

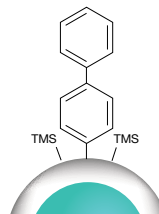
Kinetex Phenyl-Hexyl



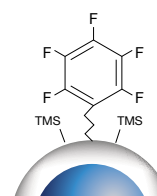
Kinetex HILIC



Kinetex Biphenyl

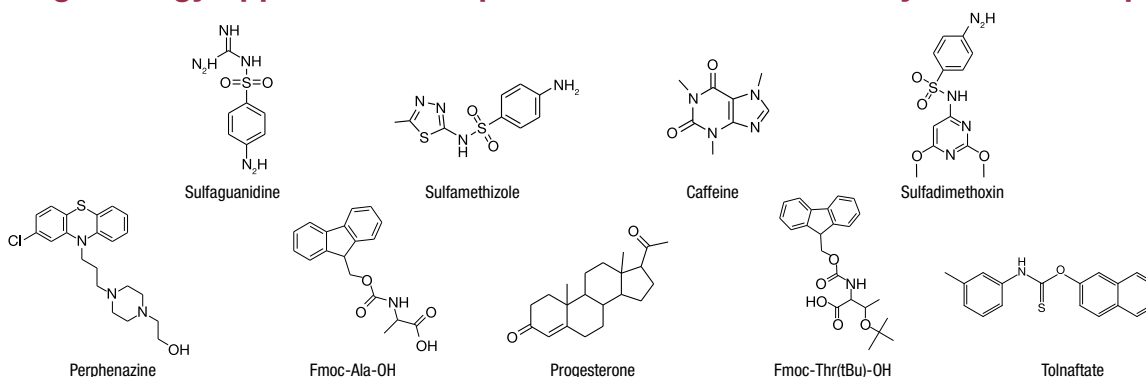


Kinetex F5



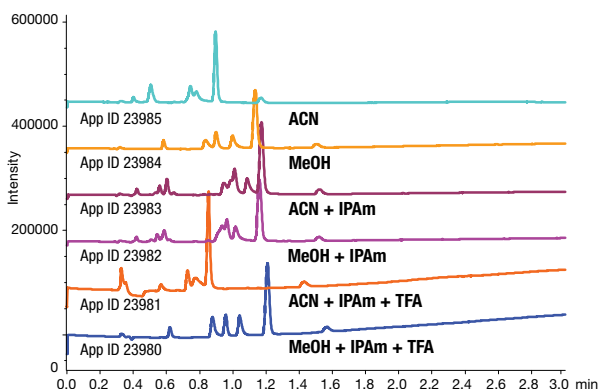
Achiral SFC Media (cont'd)

Screening Strategy Applied to the Separation of Pharmaceutically Related Compounds



Step 1. Screen Co-Solvents

- Use an appropriate sample that has a representative chromatographic profile
- Use a single column; this work used a Kinetex core-shell Biphenyl LC column
- Evaluate additives, this work used methanol to evaluate acidic, basic, acid/base mixed, and without any additives
- Use a fast gradient, an example would be 5% to 25% over 2 min with a 30 second hold
- Interpret results by comparing peak shape, retention and how many peaks were observed
- Evaluate other solvents such as acetonitrile, isopropanol, or mixtures if necessary
- Select the most promising conditions and move on to Step 2



Column: Kinetex 2.6 μ m Biphenyl
Dimensions: 150 x 3.0 mm
Part No.: [00F-4622-Y0](#)
Mobile Phase: A: Carbon Dioxide
 B: As described

Gradient:

Time (min)	% B
0	5
2.5	25
3	25

Flow Rate: 3 mL/min
Temperature: 40 °C
Detection: UV @ 220 nm

Step 3. Method Optimization

Expand the gradient around the observed peaks

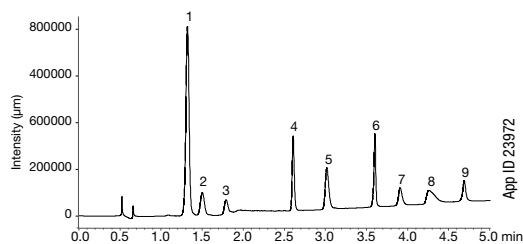
- If all of the peaks are early, lower the final gradient % co-solvent
- If all of the peaks are late, raise the initial gradient % co-solvent
- If the peaks are very close, extend the gradient over a longer period of time

Determine if a gradient is needed

- Evaluate if the chromatographic selectivity is dependent on the eluent density by screening with backpressure set higher and lower than typical; 20 – 30 bar difference is suitable

Finalize the gradient slope (if necessary)

- If the peaks are well resolved, shorten the time for the gradient
- If the peaks need more resolution, lengthen the time for the gradient



Column: Luna 3 μ m HILIC
Dimensions: 150 x 3.0 mm
Part No.: [00F-4449-Y0](#)
Mobile Phase: A: Carbon Dioxide
 B: Methanol

Temperature: 40 °C
Detection: UV @ 220 nm
Sample:

1. Tolnaftate
2. Progesterone
3. Caffeine
4. Fmoc thr(tbu)
5. Sulfamethizol
6. Fmoc-ala
7. Sulfadimethoxine
8. Perphenazine
9. Sulfaguandine

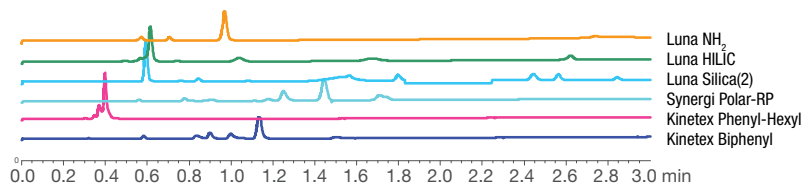
Gradient:

Time (min)	% B
0	1
1	1
5	40

Flow Rate: 3 mL/min

Step 2. Column Screening

- Use the best co-solvent additive combination found in Step 1
- Evaluate columns that have been previously successful with achiral SFC
- Use a gradient similar to the one used in Step 1
- Interpret results by comparing peak shape, retention and how many peaks were observed
- If nothing is promising, select other column chemistries and repeat
- If promising conditions are found, move on to Step 3



Column: As described
Dimensions: 150 x 3.0 mm
Mobile Phase: A: Carbon Dioxide
 B: Methanol

Gradient:

Time (min)	% B
0	5
2.5	25
3	25

Flow Rate: 3 mL/min
Temperature: 40 °C
Detection: UV @ 220 nm

Achiral SFC Media (cont'd)

Achiral Material Characteristics

Packing Material Porous	Particle Size (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load %	End Capping	pH Stability
Luna Silica(2)	3, 5, 10, 15	100	400	0	No	2.0 - 7.5
Luna HILIC	3, 5	200	400	5.7	No	1.5 - 8.0
Luna PFP(2)	3, 5	100	400	11.5	Yes	1.5 - 9.0
Luna CN	3, 5, 10	100	400	7.0	Yes	1.5 - 7.0
Luna NH ₂	3, 5, 10	100	400	9.5	No	1.5 - 11.0
Synergi Polar-RP	2.5, 4, 10	80/100*	475/400*	11	proprietary	1.5 - 7.0
Packing Material Core-Shell						
Kinetex HILIC	1.7, 2.6, 5	100	200	0	No	2.0 - 7.5
Kinetex Biphenyl	1.7, 2.6, 5	100	200	11	Yes	1.5 - 8.5**
Kinetex Phenyl-Hexyl	1.7, 2.6, 5	100	200	11	Yes	1.5 - 8.5**
Kinetex F5	1.7, 2.6, 5	100	200	9	Yes	1.5 - 8.5

**Columns are pH stable from 1.5 - 10 under isocratic conditions. Columns are pH stable under 1.5 - 8.5 under gradient conditions.

*Specs. for 2.5µm Synergi Polar-RP

Ordering Information

Phase	Supercritical Fluid Chromatography (SFC) Columns (mm)			Axia™ Packed Preparative Columns		SecurityGuard™ Cartridges (mm)			
	150 x 4.6	250 x 4.6	250 x 10	250 x 21.2	250 x 30	4 x 3.0*	10 x 10‡	15 x 21.2**	15 x 30°
Achiral Columns†						/10pk	/3pk	/ea	/ea
Luna 5 µm Silica(2)	00F-4274-E0	00G-4274-E0	00G-4274-N0	00G-4274-P0-AX	00G-4274-U0-AX	AJ0-4348	AJ0-7223	AJ0-7229	AJ0-8312
Luna 5 µm HILIC	00F-4450-E0	00G-4450-E0	00G-4450-N0	00G-4450-P0-AX	00G-4450-U0-AX	AJ0-8329	AJ0-8902	—	—
Luna 5 µm PFP(2)	00F-4448-E0	00G-4448-E0	00G-4448-N0	00G-4448-P0-AX	—	AJ0-8327	AJ0-8376	AJ0-8377	AJ0-8378
Luna 5 µm CN	00F-4255-E0	00G-4255-E0	00G-4255-N0	00G-4255-P0-AX	00G-4255-U0-AX	AJ0-4305	AJ0-7313	AJ0-8220	AJ0-8311
Luna 5 µm NH ₂	00F-4378-E0	00G-4378-E0	00G-4378-N0	00G-4378-P0-AX	—	AJ0-4302	AJ0-7364	AJ0-8162	AJ0-8309
Synergi 4 µm Polar-RP	00F-4336-E0	00G-4336-E0	00G-4336-N0	00G-4336-P0-AX	00G-4336-U0-AX	AJ0-6076	AJ0-7276	AJ0-7845	AJ0-8307
Phase	150 x 4.6	250 x 4.6	250 x 10	250 x 21.2	250 x 30	4.6*	10 x 10	15 x 21.2	15 x 30
Core-Shell Kinetex Technology						/3pk	/3pk	/ea	/ea
Kinetex 2.6 µm HILIC	00F-4461-E0	00G-4461-E0	—	—	—	AJ0-8772	—	—	—
Kinetex 5 µm Biphenyl	00F-4627-E0	00G-4627-E0	00G-4627-N0	00G-4627-P0-AX	—	AJ0-9207	AJ0-9280	AJ0-9272	AJ0-9273
Kinetex 5 µm F5	00F-4724-E0	00G-4724-E0	00G-4724-N0	00G-4724-P0-AX	00G-4724-U0-AX	AJ0-9320	AJ0-9323	AJ0-9324	AJ0-9325
Kinetex 5 µm Phenyl-Hexyl	00F-4603-E0	00G-4603-E0	—	00G-4603-P0-AX	00G-4603-U0-AX	AJ0-8774	—	AJ0-9147	AJ0-9216

†Additional phases and dimensions available upon request.

for ID: 3.2-8.0 mm 9-16 mm 18-29 mm 30-49 mm

* SecurityGuard ULTRA Cartridges require holder Part No.: [AJ0-9000](#)

* SecurityGuard Analytical Cartridges require holder Part No.: [KJ0-4282](#)

‡ SemiPrep SecurityGuard Cartridges require holder Part No.: [AJ0-9281](#)

** SFC PREP SecurityGuard Cartridges require holder Part No.: [AJ0-8617](#)

° SFC PREP SecurityGuard Cartridges require holder Part No.: [AJ0-8618](#)

Additional Non-Polar Phases Available

- C18/C8/C4
- Phenyl-Hexyl
- TWIN™ Technology C18
- TWIN Technology C6-Phenyl
- Fusion-RP
- Hydro-RP and more...



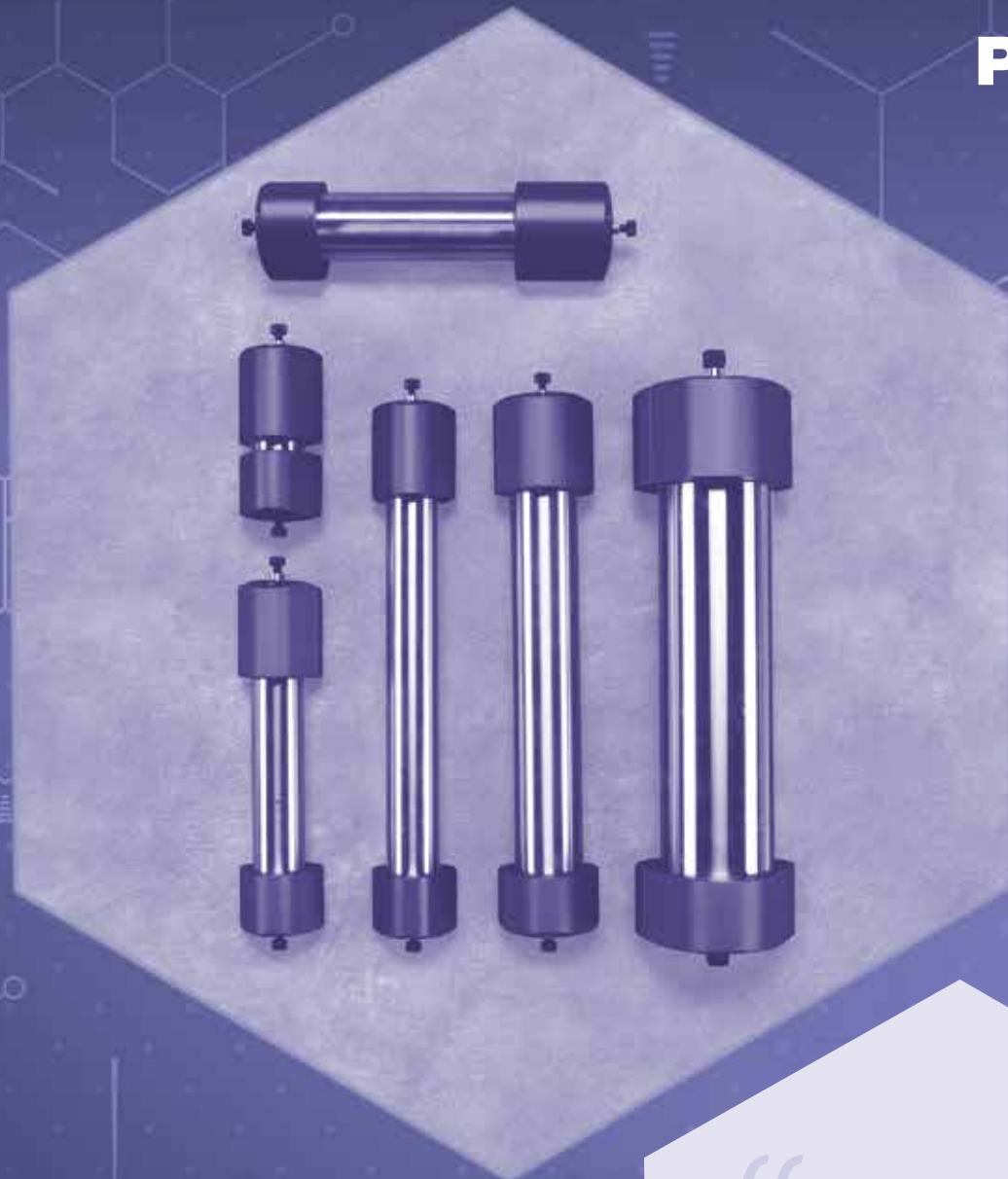
For more information on core-shell Kinetex media, please see p. 227



Bulk SFC media is available. Please contact your Phenomenex representative for more information.



Prep Columns and Bulk Media



“ We routinely use Axia packed columns from Phenomenex for peptide purifications. Among various preparative HPLC columns we have used, the Axia packed Luna columns (5 μ m) stand out. We have been very satisfied with the increased loading capacity and excellent performance. ”

Guangcheng Jiang
Ferring Research Institute, Inc., USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

351 - 370

Axia Packed Preparative LC and SFC Columns	352-362
Process Chromatography	363-369
Bulk Media	363-369
Columns, Scout and Preparative	366-367
Sepra Bulk Sorbents	369

U.S. Patent No. 7, 674, 383

AXIA Preparative Chromatography Redefined

AXIA patented technology is an advanced column packing and hardware design that eliminates media bed collapse as a source of premature failure in chiral and achiral preparative columns.

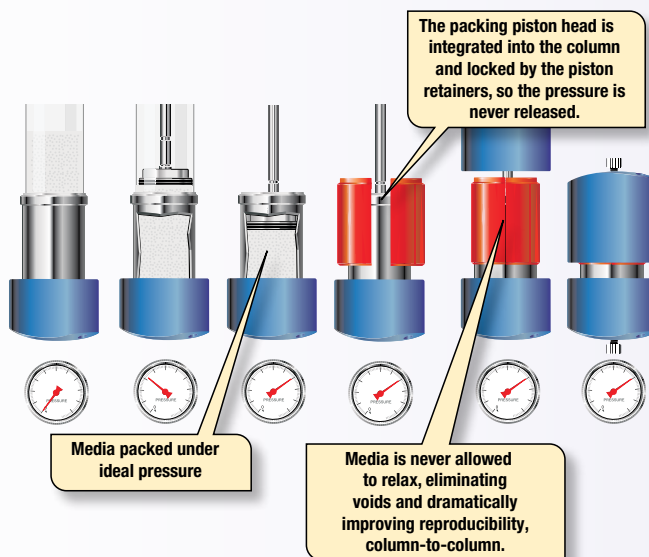
AXIA Packing Technology

AXIA packed preparative columns involve a single axial compression step, unlike conventional packed preparative columns. The ideal column bed density is custom calculated and automated for each specific media and column size. Computer control of the entire process ensures both proper bed density and column uniformity every time.

During the AXIA packing process, the packing piston is locked in place, eliminating any decompression and then recompression of the media sorbent, thus maintaining media and column bed integrity. This solves common lifetime and performance problems associated with conventional packing processes for preparative columns.



AXIA Packing Process Involves: Compression → Final Column



Traditional Slurry Packing

Traditional slurry packing processes, like the Waters® OBD™ (Optimum Bed Density) column packing approach, involves the column being removed from the column packing station once it is packed.

Several potential problems with this packing method are:

- Variability in column performance due to increased number of manual operations required for assembly
- Potential silica media damage during recompression
- Level of process control is based on traditional slurry packing technology



Conventional Packing Process Involves: Compression → Decompression → Recompression → Final Column

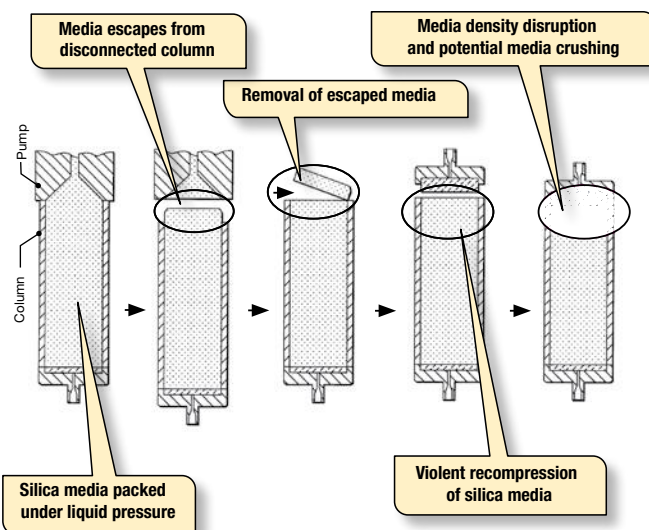


Diagram from Waters Corporation U.S. Patent No. 7,399,410



View loading comparison, see p. 355

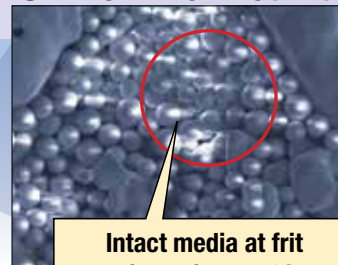
Axia packed columns produce uniform media bed with intact particles

The highly tuned patented process and hardware eliminates potential decompression ensuring bed stability and optimal packing density.

The media found on the inlet frit of the Axia packed column shows no signs of damage unlike the media found on inlet frit of traditionally packed prep columns.



*SEM of Axia inlet frit



Intact media at frit surface after packing

Traditional packed preparative columns produce non-uniform media beds with sheared and crushed particles

Decompression and then recompression during packing can damage the media and lead to increased column-to-column variability, flow disturbances, and decreased column lifetimes.



*SEM of Waters® OBD™



Crushed media or silica fines at frit surface after packing

*The images are believed to be representative, but individual columns may vary.

“ I find Axia Columns to be very robust and durable. I often use the prep column for much longer than predicted with reproducible peaks. This saves us a significant amount of money. ”

David Wisnoski
GlaxoSmithKline, USA

“ Axia columns provide me with first rate quality and engineering. Reliability, reproducibility, and durability are provided with all Axia columns that I use. I can literally purify 2500 samples per column. The time and cost savings are tremendous. ”

Derrick Miyao
Large Biotech Manufacturer, USA

“ We have used Phenomenex Axia prep-HPLC columns for several years and they consistently provide excellent separation and reproducibility for a variety of different compounds. ”

Jeremy R. Wolf
ABC Laboratories, USA

View an animated packing process comparison at:
www.AxiaPrep.com



The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Axia™ Packed Preparative Columns

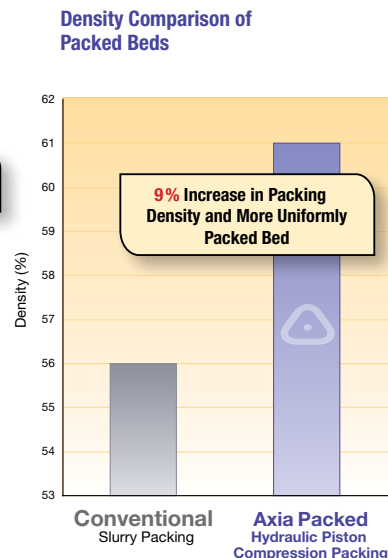
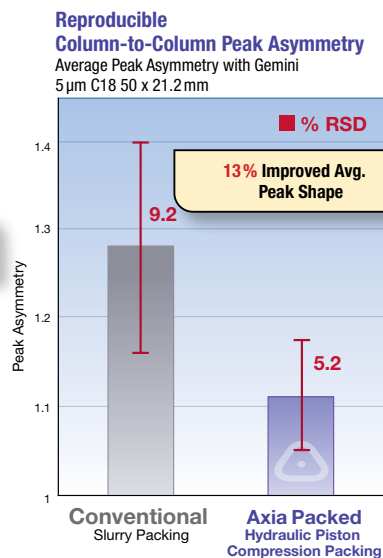
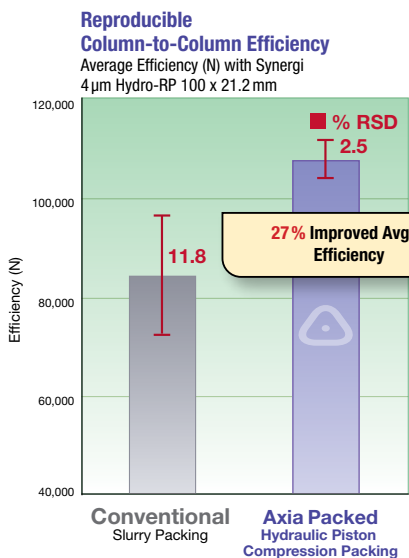
U.S. Patent No. 7, 674, 383

Expect Better Performance. Expect an Excellent Axia Column. Every Time.

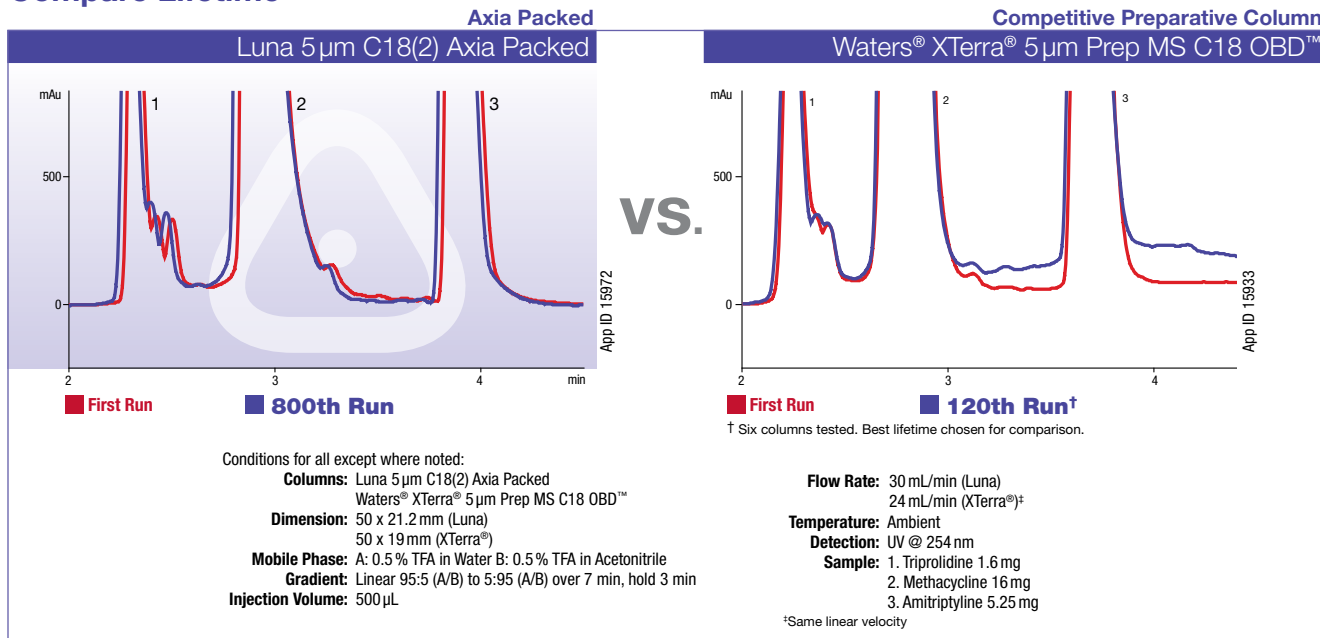
The completely automated packing system offers feedback control and infinite tuning of packing density to specific media characteristics such as mechanical strength and porosity. An optimum higher bed density can be consistently reproduced column-to-column.

This directly translates into consistent efficiency and peak asymmetry measurements and decreases the column variability seen in traditionally packed preparative columns.

Consistent Quality. Column-to-Column. Batch-to-Batch



Compare Lifetime



U.S. Patent No. 7, 674, 383

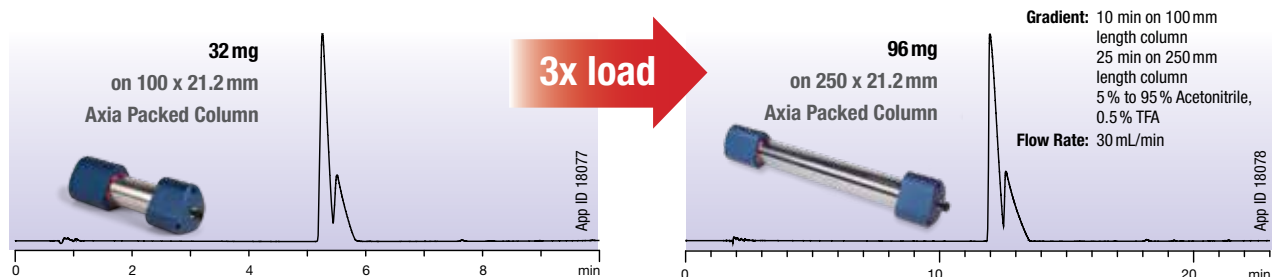
Seamless Scalability: 2 Options to Increase Sample Load

Option 1: Increase Column Length

Increase sample load without increasing your flow rate by using a longer column. With Axia technology, each preparative column is optimized for:

- Analytical-like efficiency
- Long column lifetime
- High sample load with high-surface area media such as Kinetex, Aeris, Gemini, Luna, Luna Omega, or Synergi

As a result, load generally increases as a direct proportion to column length. In this example, the sample load tripled by increasing column length.



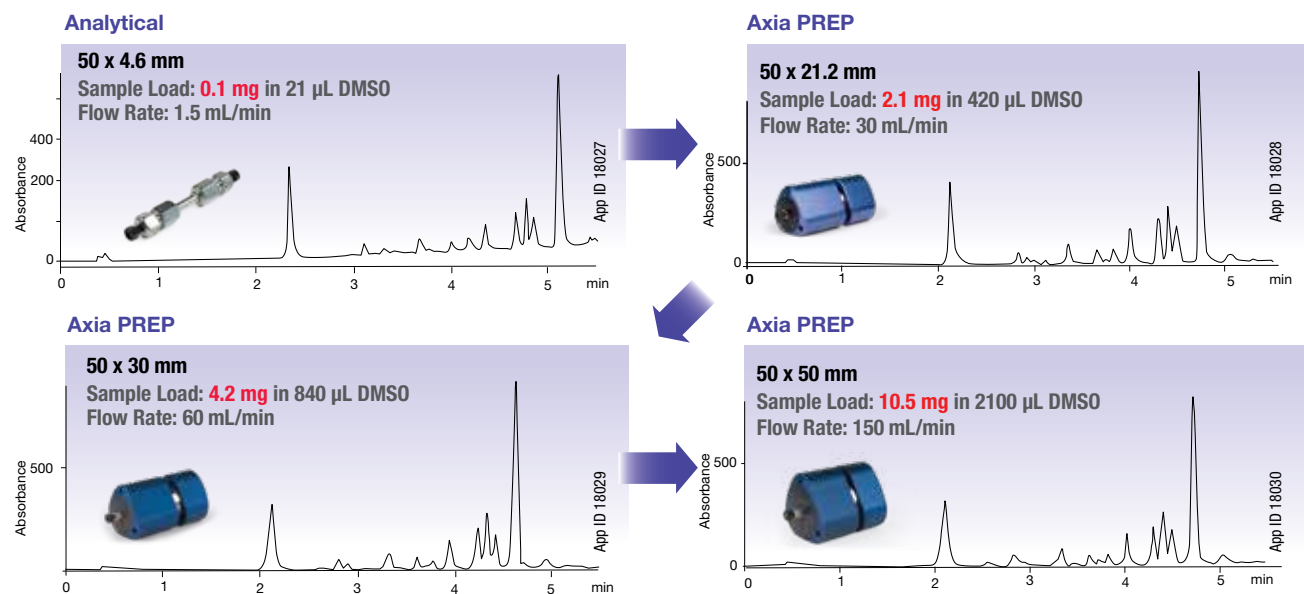
Option 2: Increase Column ID

For maximizing load without increasing the run time, consider scaling up to a larger column ID. Axia packed columns provide the three important benefits you need.

- Reproducible performance across all column diameters
- Increased throughput without sacrificing purity
- High efficiency from analytical to preparative

Conditions for all except where noted:

- **Columns:** Luna 5 μ m C18(2)
- **Dimensions:** As Noted
- **Mobile Phase:** A. 0.5% TFA in Water
B. 0.5% TFA in Acetonitrile
- **Gradient:** A/B (95:5) to A/B (5:95) in 5 minutes
- **Flow Rate:** As Noted
- **Temperature:** Ambient
- **Injection:** As Noted
- **Detection:** UV @ 254 nm
- **Sample:** Suzuki reaction mixture



SF=Scaling Factor

U.S. Patent No. 7, 674, 383

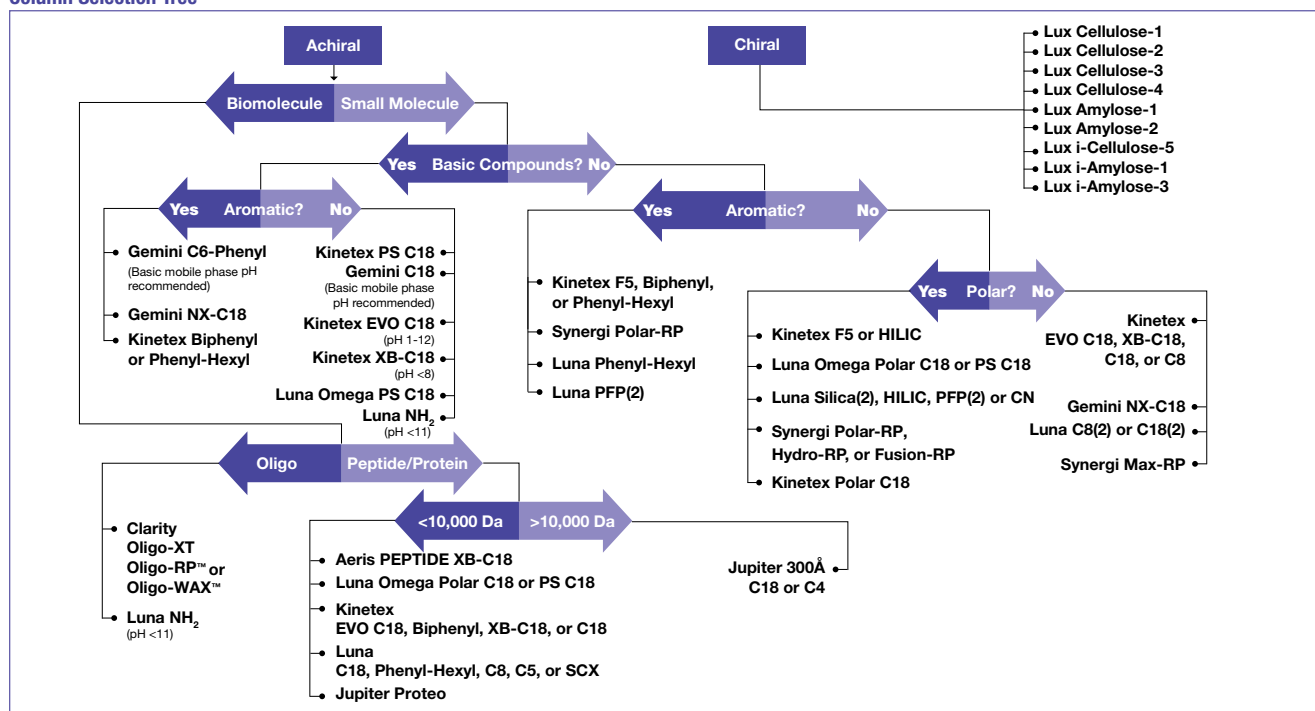
Selectivity Options

Stationary Phase Selectivity

With high surface areas, Phenomenex media—Gemini NX-C18 and Gemini (375 m²/g), Luna (400 m²/g) and Synergi (475 m²/g)—maximize loading capabilities. Use the selection tree below to select the best media for your targeted purification.

ize loading capabilities. Use the selection tree below to select the best media for your targeted purification.

Column Selection Tree

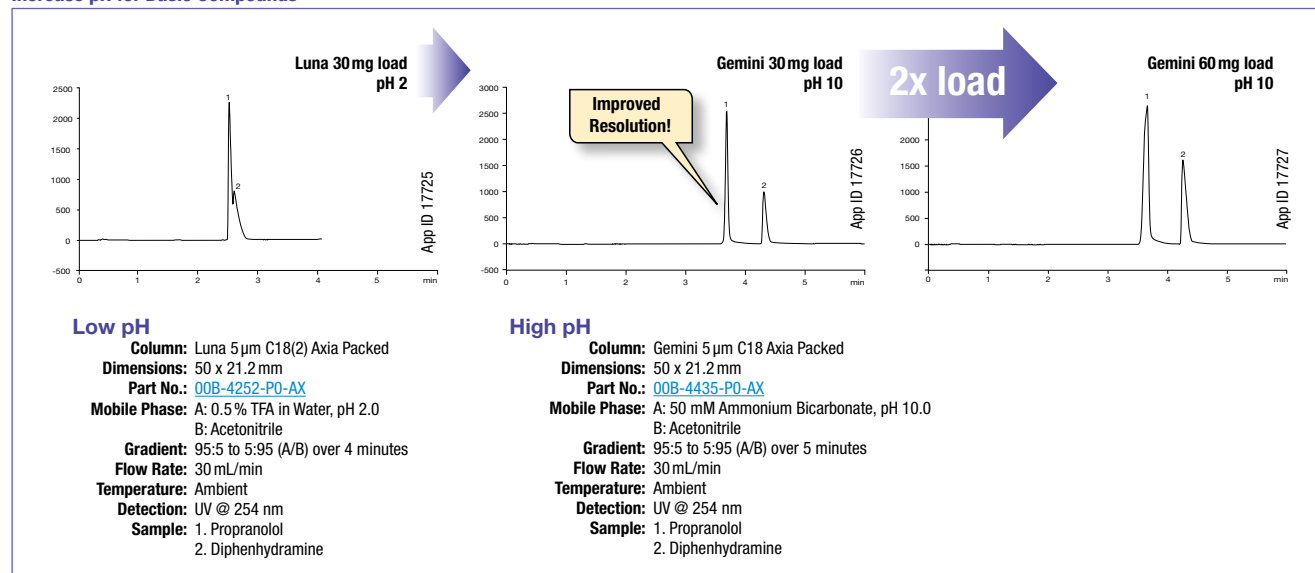


pH Selectivity

In reversed phase chromatography, compounds retain better when neutral. With the advent of pH stable (1-12) media such as Gemini NX-C18, C18, and C6-Phenyl, and Kinetex EVO C18 improving retention and resolution of basic compounds at high pH

is now possible without compromising column lifetime. Under these conditions, you can easily double or triple the loading compared to your current low pH purifications.

Increase pH for Basic Compounds



U.S. Patent No. 7, 674, 383

Chiral Media Packed in Axia Technology



Resolve 92 % of Your Enantiomers with Lux Chiral Preparative Columns*

Resolve Your Enantiomers with Nine Distinct Phases:

Lux i-Cellulose-5: Immobilized 3,5-Dichloro Phenylcarbamate Selector Cellulose tris (3, 5-dichlorophenylcarbamate)

Lux i-Amylose-1: Immobilized 3,5-Dimethyl Phenylcarbamate Selector Amylose tris (3, 5-dimethylphenylcarbamate)

Lux i-Amylose-3: Immobilized 3-Chloro, 5-Methyl Phenylcarbamate Selector Amylose tris (3-chloro-5-methylphenylcarbamate)

Lux Cellulose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector Cellulose tris (3, 5-dimethylphenylcarbamate)

Lux Cellulose-2: Coated 3-Chloro, 4-Methyl Phenylcarbamate Selector Cellulose tris (3-chloro-4-methylphenylcarbamate)

Lux Cellulose-3: Coated 4-Methyl Phenylacetate Selector Cellulose tris (4-methylbenzoate)

Lux Cellulose-4: Coated 4-Chloro, 3-Methyl Phenylcarbamate Selector Cellulose tris (4-chloro-3-methylphenylcarbamate)

Lux Amylose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector Amylose tris (3, 5-dimethylphenylcarbamate)

Lux Amylose-2: Coated 5-Chloro, 2-Methyl Phenylcarbamate Selector Amylose tris (5-chloro-2-methylphenylcarbamate)

* based on screening 233 compounds on five Lux phases

Availability in 3 µm and 5 µm packed columns as well as 20 µm bulk media for process scale purification
All Lux columns are pressure stable up to 300 bar and pH stable 2-9

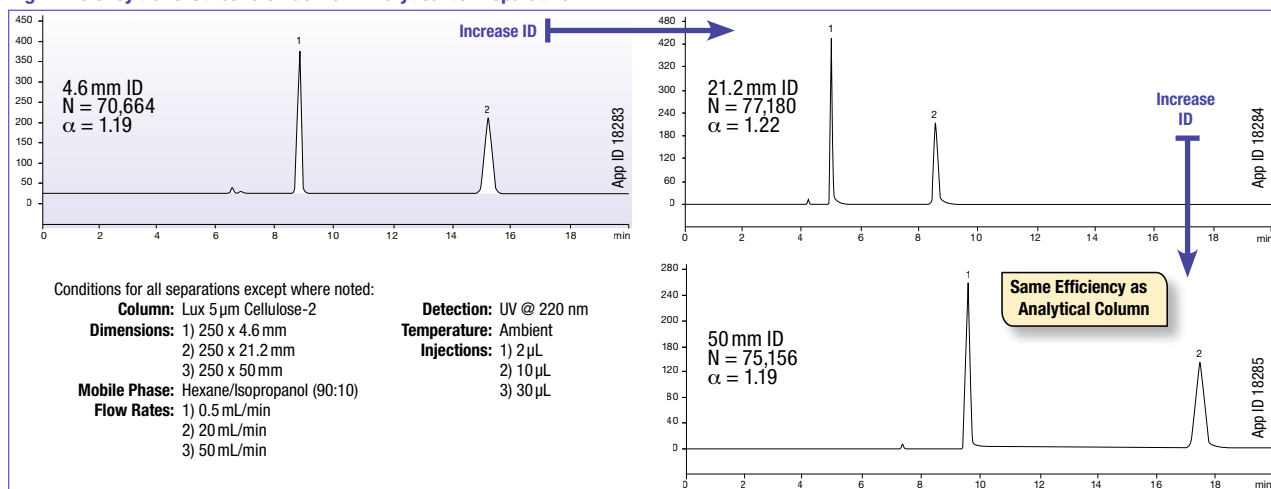


For more chiral column information, see p.282

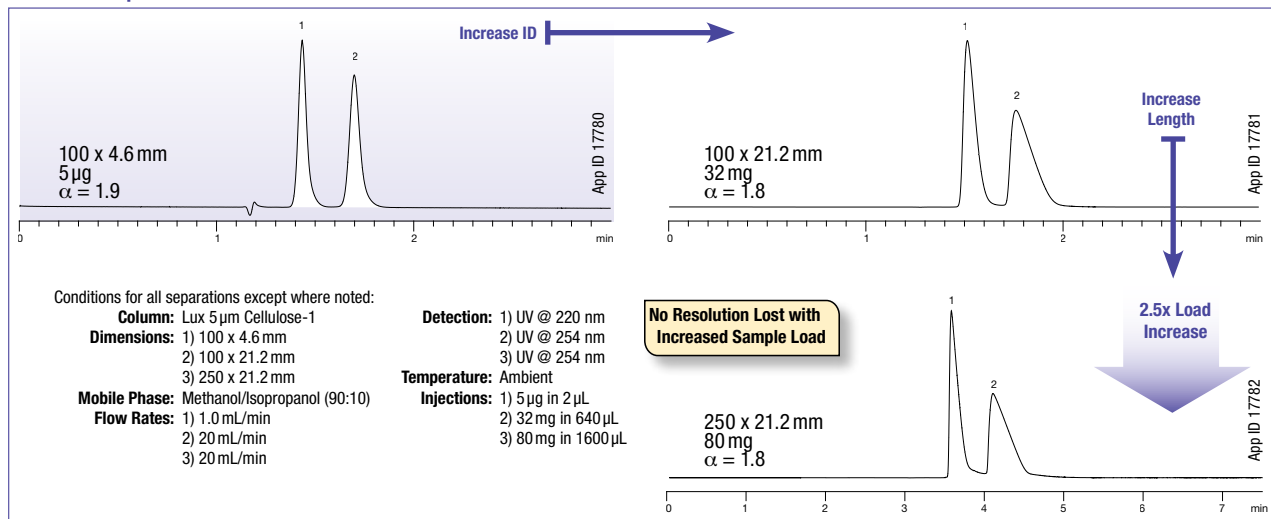
Higher Purity Preparative Separations

With award-winning Axia technology, analytical-like efficiency is achieved in a preparative column format.

High Efficiency trans-Stilbene Oxide from Analytical to Preparative



Direct Scale Up of Methocarbamol on Lux Cellulose-1



Axia™ Packed Preparative Columns

U.S. Patent No. 7, 674, 383

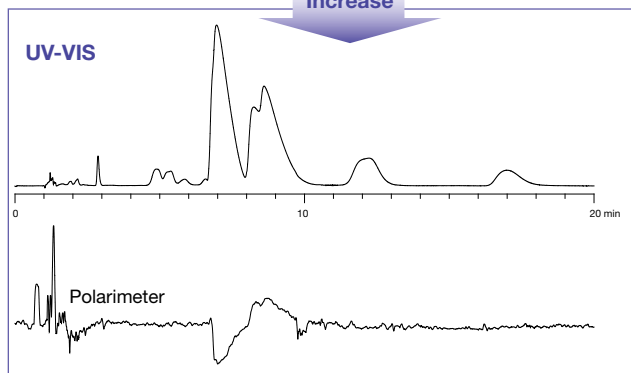
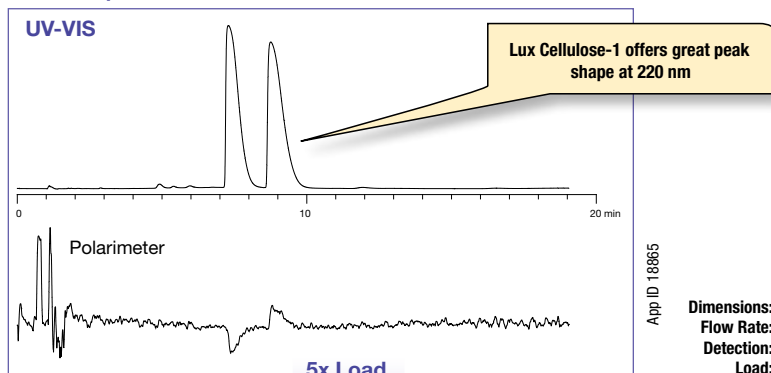
Axia: SFC Approved Complete SFC Screening

From analytical to Axia packed preparative achiral columns, Luna, Gemini, Synergi, Kinetex, and Lux chiral columns offer complementary selectivities, high efficiency, and pressure stability up to 300 bar (4300 psi) for SFC separations.

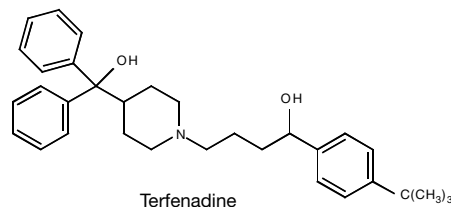
Seamless Scale Up from Laboratory, to Pilot Plant and Production.

Increase column ID for higher loading and greater purification. Axia packed 21.2 and 30 mm diameter columns provide same purification capability and performance as the 4.6 mm analytical screening columns.

Baseline Separation of Enantiomers



Overloading study with increased analytical load showing impurities eluting after major enantiomers only detected at 254 nm



Conditions for all columns:

Columns: Lux 5 µm Cellulose-1
Mobile Phase: Methanol with 0.1 % DEA/
Carbon Dioxide (25:75)

Column Temperature: 35 °C

Polarimeter: ALP-PDR-Chiral

Sample: Terfenadine with ethanol
dissolution solvent

Dimensions: 250 x 4.6 mm
Flow Rate: 2.5 mL/min
Detection: UV @ 220 nm
Load: 300 µg in 10 µL

Dimensions: 250 x 4.6 mm
Flow Rate: 2.5 mL/min
Detection: UV @ 254 nm
Load: 1.5 mg in 50 µL

High loading capacity media along with stacking injections allow for increased yields

Closer stacked injections can not be used due to the impurities eluting after the major enantiomers

7.5 cycles
per hr/
787 mg per hr

Dimensions: 250 x 21.2 mm
Flow Rate: 50 mL/min
Detection: UV @ 220 nm
Load: 105 mg in 3.5 mL



For additional SFC information and applications, see p.342

Axia™ Packed Preparative Columns

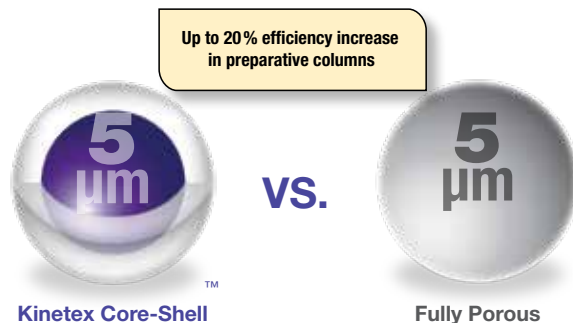
U.S. Patent No. 7, 674, 383

First and Only Core-Shell Material for Preparative Purifications

Kinetex Axia Packed Preparative HPLC Columns

- Core-shell performance in a preparative format
- Easy method scale-up from Kinetex analytical HPLC and UHPLC columns
- Reduce solvent consumption with faster purifications

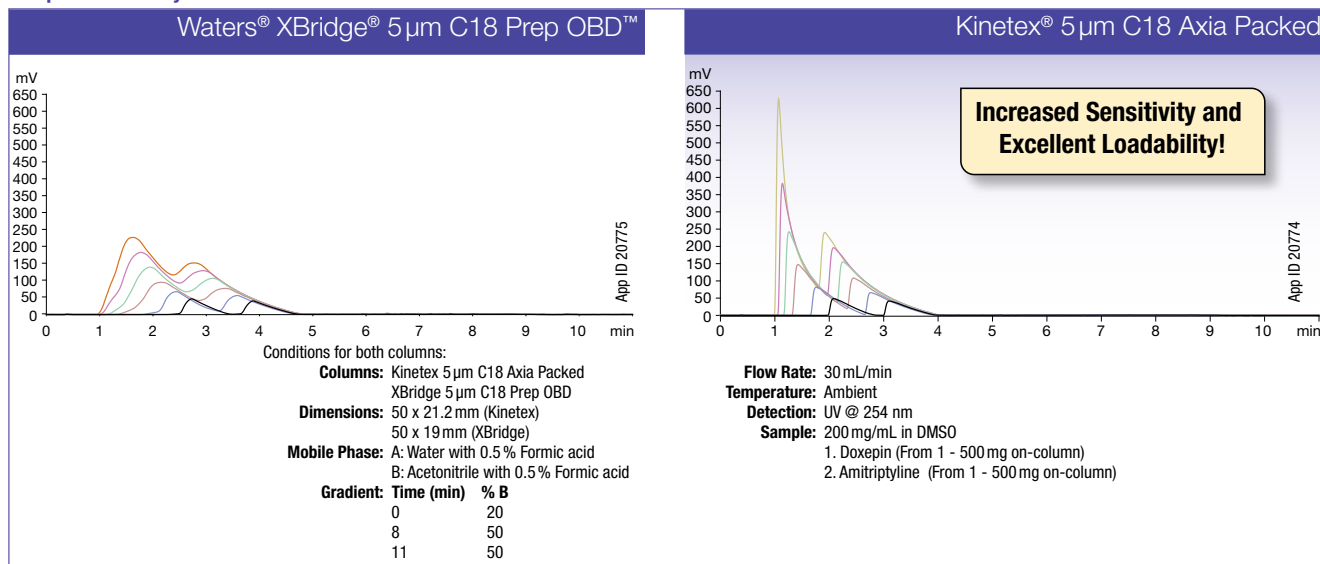
Axia columns packed with Kinetex 5 µm core-shell media provide higher efficiencies and loadability that is as good or better than columns packed with fully porous 5 µm media. Even under very challenging conditions, such as the purification of strong bases using a mobile phase containing formic acid (0.1%) as the modifier, the Axia packed Kinetex 5 µm media outperforms a fully porous Waters



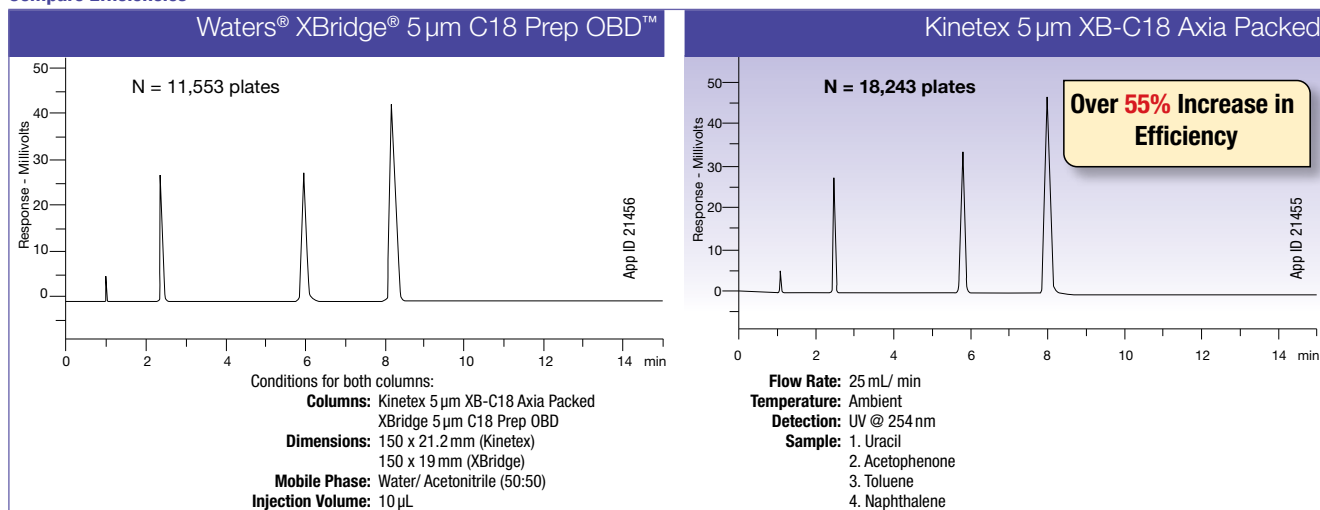
XBridge Prep column.

Combine this with the added flexibility that the entire Kinetex core-shell line (1.3µm, 1.7µm, 2.6µm, and 5µm) is fully scalable in retention and selectivity, makes transferring high performance HPLC/UHPLC methods to preparative and SFC applications, simple.

Compare Loadability



Compare Efficiencies



Comparative separations may not be representative of all applications.

Axia™ Packed Preparative Columns

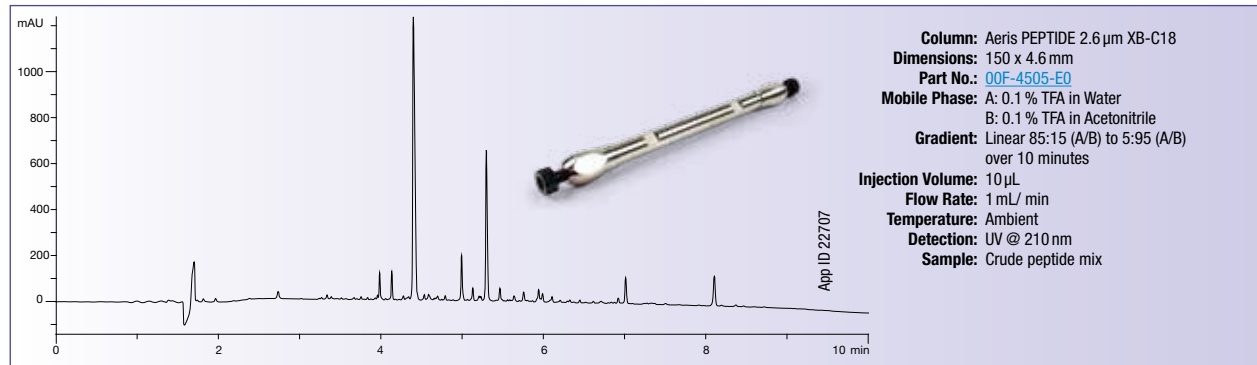
U.S. Patent No. 7, 674, 383

Develop, Purify, and Analyze Peptide Fractions with One Media

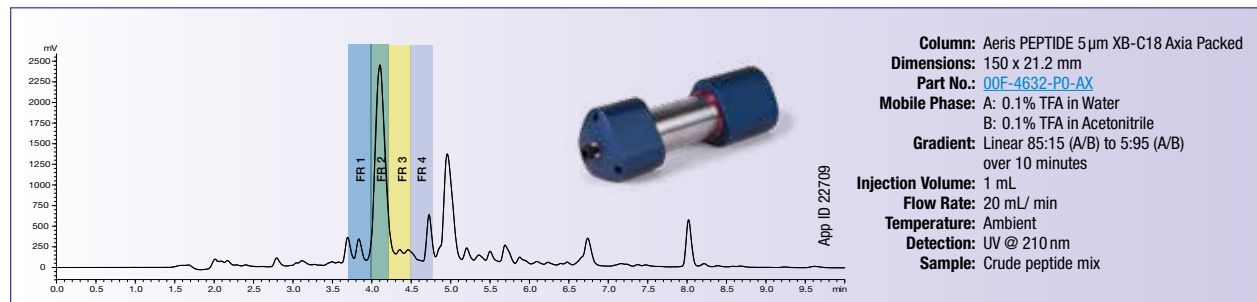
Aeris PEPTIDE is fully scalable in retention and selectivity with its 4 unique particle sizes (1.7 µm, 2.6 µm, 3.6 µm, and 5 µm) for easy transfer from HPLC and UHPLC methods to preparative applications.

Seamless Scalability from HPLC/UHPLC to PREP

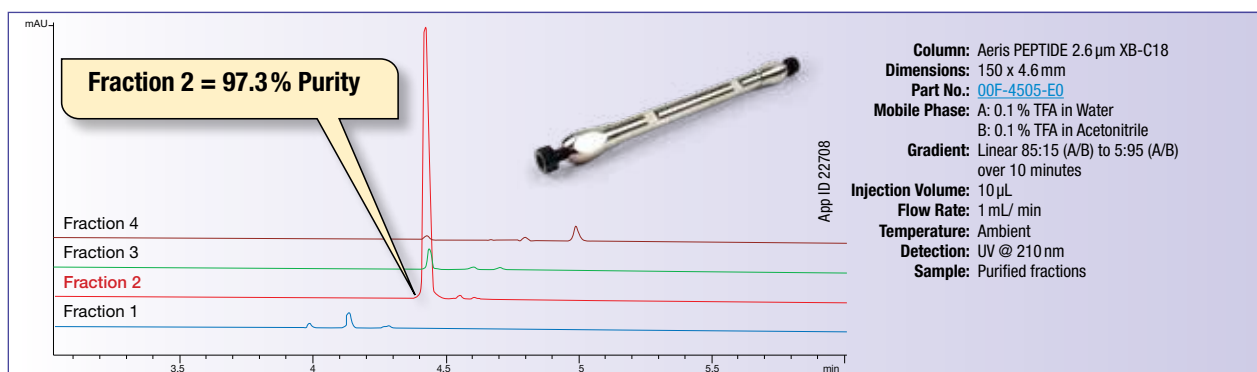
Analytical method — Aeris PEPTIDE 2.6 µm XB-C18



Preparative scale-up and fraction collection — Aeris PEPTIDE 5 µm XB-C18



Analytical fraction analysis — Aeris PEPTIDE 2.6 µm XB-C18



PREP COLUMNS & BULK MEDIA | AXIA

SecurityGuard™ PREP System

(Highly recommended for extending column lifetime)

Protect your Axia Packed column and prolong its lifetime with SecurityGuard, the advanced HPLC guard cartridge system.

- Get full protection with minimal impact on your chromatographic results.
- Contaminants are retained by an inexpensive, 15 x 21.2 or 15 x 30 mm ID disposable cartridge. See pp. 314-315. For Aeris and Kinetex Core-Shell SecurityGuard PREP cartridges, see p. 315.



For Aeris PEPTIDE 5 µm PREP, see p. 194

Ordering Information

SecurityGuard PREP System

Part No.	Description	Unit
AJ0-8223	SecurityGuard PREP HPLC Guard Cartridge Holder Kit, 21.2 mm ID, includes column coupler	ea
AJ0-8277	SecurityGuard PREP HPLC Guard Cartridge Holder Kit, 30.0 mm ID, includes column coupler	ea



Axia™ Packed Preparative Columns

U.S. Patent No. 7, 674, 383

Axia Packed Columns

Achiral Phases

Ordering Information

Aeris™			
Phase	Length	ID	Part No.
5 µm			
PEPTIDE XB-C18	150	21.2	00F-4632-PO-AX
	250	21.2	00G-4632-PO-AX
Kinetex®			
Phase	Length	ID	Part No.
5 µm			
XB-C18	50	21.2	00B-4605-PO-AX
	50	30	00B-4605-UO-AX
	100	21.2	00D-4605-PO-AX
	100	30	00D-4605-UO-AX
	150	21.2	00F-4605-PO-AX
	150	30	00F-4605-UO-AX
	250	21.2	00G-4605-PO-AX
	250	30	00G-4605-UO-AX
EVO C18	50	21.2	00B-4633-PO-AX
	50	30	00B-4633-UO-AX
	100	21.2	00D-4633-PO-AX
	100	30	00D-4633-UO-AX
	150	21.2	00F-4633-PO-AX
	150	30	00F-4633-UO-AX
	250	21.2	00G-4633-PO-AX
	250	30	00G-4633-UO-AX
Biphenyl	100	21.2	00D-4627-PO-AX
	100	30	00D-4627-UO-AX
	150	21.2	00F-4627-PO-AX
	150	30	00F-4627-UO-AX
	250	21.2	00G-4627-PO-AX
HILIC	100	21.2	00D-4606-PO-AX
	150	21.2	00F-4606-PO-AX
	250	21.2	00G-4606-PO-AX
C18	50	21.2	00B-4601-PO-AX
	50	30	00B-4601-UO-AX
	100	21.2	00D-4601-PO-AX
	100	30	00D-4601-UO-AX
	150	21.2	00F-4601-PO-AX
	150	30	00F-4601-UO-AX
	250	21.2	00G-4601-PO-AX
	250	30	00G-4601-UO-AX
C8	50	21.2	00B-4608-PO-AX
	100	21.2	00D-4608-PO-AX
	150	21.2	00F-4608-PO-AX
	150	30	00F-4608-UO-AX
	250	21.2	00G-4608-PO-AX
	250	30	00G-4608-UO-AX
Phenyl-Hexyl	50	21.2	00B-4603-PO-AX
	100	21.2	00D-4603-PO-AX
	100	30	00D-4603-UO-AX
	150	21.2	00F-4603-PO-AX
	150	30	00F-4603-UO-AX
	250	21.2	00G-4603-PO-AX
	250	30	00G-4603-UO-AX
F5	50	30	00B-4724-UO-AX
	100	30	00D-4724-UO-AX
	150	21.2	00F-4724-PO-AX
	150	30	00F-4724-UO-AX
	250	21.2	00G-4724-PO-AX
150	30	00F-4603-UO-AX	

Jupiter®			
Phase	Length	ID	Part No.
4 µm			
Proteo	250	30	00G-4396-UO-AX
10 µm			
Proteo	100	21.2	00D-4397-PO-AX
	250	21.2	00G-4397-PO-AX
	250	30	00G-4397-UO-AX
C18 300 Å	250	30	00G-4055-UO-AX
C4 300 Å	250	21.2	00G-4168-PO-AX

Gemini®			
Phase	Length	ID	Part No.
5 µm			
NX-C18	50	21.2	00B-4454-PO-AX
	50	30	00B-4454-UO-AX
	75	30	00C-4454-UO-AX
	100	21.2	00D-4454-PO-AX
	100	30	00D-4454-UO-AX
	150	21.2	00F-4454-PO-AX
	150	30	00F-4454-UO-AX
	250	21.2	00G-4454-PO-AX
	250	30	00G-4454-UO-AX
	C18	50	21.2
50		30	00B-4435-UO-AX
100		21.2	00D-4435-PO-AX
100		30	00D-4435-UO-AX
150		21.2	00F-4435-PO-AX
C6-Phenyl	100	21.2	00D-4444-PO-AX
	150	21.2	00F-4444-PO-AX
	250	21.2	00G-4444-PO-AX
	100	21.2	00D-4444-PO-AX
	150	21.2	00F-4444-PO-AX

10 µm			
NX-C18	50	21.2	00B-4455-PO-AX
	100	21.2	00D-4455-PO-AX
	100	30	00D-4455-UO-AX
	100	50	00D-4455-V0-AX
	150	21.2	00F-4455-PO-AX
	150	30	00F-4455-UO-AX
	150	50	00F-4455-V0-AX
	250	21.2	00G-4455-PO-AX
	250	30	00G-4455-UO-AX
	250	50	00G-4455-V0-AX
C18	100	21.2	00D-4436-PO-AX
	100	30	00D-4436-UO-AX
	150	21.2	00F-4436-PO-AX
	150	30	00F-4436-UO-AX
	150	50	00F-4436-V0-AX
	250	21.2	00G-4436-PO-AX
	250	30	00G-4436-UO-AX
	250	50	00G-4436-V0-AX
	250	50	00G-4455-V0-AX
	250	50	00G-4436-V0-AX
C8(3)	250	21.2	00G-4763-PO-AX
	250	30	00G-4763-UO-AX
	250	50	00G-4763-V0-AX

Clarity®			
Phase	Length	ID	Part No.
5 µm			
Oligo-RP™	100	21.2	00D-4442-PO-AX
	100	30	00D-4442-UO-AX
	250	21.2	00G-4442-PO-AX
Oligo-XT	100	21.2	00D-4745-PO-AX
	150	21.2	00F-4745-PO-AX
	150	30	00F-4745-UO-AX
	250	21.2	00G-4745-PO-AX
10 µm			
Oligo-RP	150	21.2	00F-4445-PO-AX
	150	30	00F-4445-UO-AX
	250	21.2	00G-4445-PO-AX
Oligo-WAX™	250	21.2	00G-4451-PO-AX

continued

Axia™ Packed Preparative Columns

U.S. Patent No. 7, 674, 383

Axia Packed Columns (cont'd)

Achiral Phases (cont'd)

Ordering Information (cont'd)

Luna®					
Phase	Length	ID	Part No.		
5 µm					
C18(2)	50	21.2	00B-4252-P0-AX		
	50	30	00B-4252-U0-AX		
	75	30	00C-4252-U0-AX		
	100	21.2	00D-4252-P0-AX		
	100	30	00D-4252-U0-AX		
	150	21.2	00F-4252-P0-AX		
	150	30	00F-4252-U0-AX		
	250	21.2	00G-4252-P0-AX		
	250	30	00G-4252-U0-AX		
	C8(2)	75	30	00C-4249-U0-AX	
100		30	00D-4249-U0-AX		
150		21.2	00F-4249-P0-AX		
250		21.2	00G-4249-P0-AX		
CN	250	21.2	00G-4255-P0-AX		
Phenyl-Hexyl	150	21.2	00F-4257-P0-AX		
NH₂	150	21.2	00F-4378-P0-AX		
	250	21.2	00G-4378-P0-AX		
HILIC	100	21.2	00D-4450-P0-AX		
	150	21.2	00F-4450-P0-AX		
	250	21.2	00G-4450-P0-AX		
	250	30	00G-4450-U0-AX		
PFP(2)	100	21.2	00D-4448-P0-AX		
	100	30	00D-4448-U0-AX		
	150	21.2	00F-4448-P0-AX		
	250	21.2	00G-4448-P0-AX		
Silica (2)	100	21.2	00D-4274-P0-AX		
	150	21.2	00F-4274-P0-AX		
	250	21.2	00G-4274-P0-AX		
10 µm	C18(2)	50	21.2	00B-4253-P0-AX	
		100	21.2	00D-4253-P0-AX	
		150	21.2	00F-4253-P0-AX	
		150	30	00F-4253-U0-AX	
		250	21.2	00G-4253-P0-AX	
		250	30	00G-4253-U0-AX	
		250	50	00G-4253-V0-AX	
		C8(2)	250	21.2	00G-4250-P0-AX
			250	50	00G-4250-V0-AX
		Silica (2)	250	21.2	00G-4091-P0-AX
15 µm					
C18(2)	250	50	00G-4273-V0-AX		
	C8(2)	250	50	00G-4272-V0-AX	
Luna Omega					
Phase	Length	ID	Part No.		
5 µm					
Polar C18	100	21.2	00D-4754-P0-AX		
	100	30	00D-4754-U0-AX		
	150	21.2	00F-4754-P0-AX		
	150	30	00F-4754-U0-AX		
	250	21.2	00G-4754-P0-AX		
	250	30	00G-4754-U0-AX		
	250	50	00G-4754-V0-AX		
PS C18	50	21.2	00B-4753-P0-AX		
	50	30	00B-4753-U0-AX		
	100	21.2	00D-4753-P0-AX		
	100	30	00D-4753-U0-AX		
	150	21.2	00F-4753-P0-AX		
	150	30	00F-4753-U0-AX		
	250	21.2	00G-4753-P0-AX		
	250	30	00G-4753-U0-AX		
	250	50	00G-4753-V0-AX		

Synergi™			
Phase	Length	ID	Part No.
4 µm			
Fusion-RP	100	21.2	00D-4424-P0-AX
	150	21.2	00F-4424-P0-AX
	250	21.2	00G-4424-P0-AX
Hydro-RP	50	21.2	00B-4375-P0-AX
	150	21.2	00F-4375-P0-AX
	250	21.2	00G-4375-P0-AX
Max-RP	150	21.2	00F-4337-P0-AX
	250	21.2	00G-4337-P0-AX
Polar-RP	50	21.2	00B-4336-P0-AX
	100	21.2	00D-4336-P0-AX
	100	30	00D-4336-U0-AX
	150	21.2	00F-4336-P0-AX
	150	30	00F-4336-U0-AX
250	21.2	00G-4336-P0-AX	
10 µm			
Fusion-RP	150	21.2	00F-4425-P0-AX
	250	21.2	00G-4425-P0-AX
Hydro-RP	250	21.2	00G-4376-P0-AX
Polar-RP	250	21.2	00G-4351-P0-AX

Chiral Phases

Lux®			
Phase	Length	ID	Part No.
5 µm			
Amylose-1	150	21.2	00F-4732-P0-AX
	250	21.2	00G-4732-P0-AX
	250	30	00G-4732-U0-AX
	250	50	00G-4732-V0-AX
Amylose-2	150	21.2	00F-4472-P0-AX
	250	21.2	00G-4472-P0-AX
	250	30	00G-4472-U0-AX
Cellulose-1	150	21.2	00F-4459-P0-AX
	250	21.2	00G-4459-P0-AX
	250	30	00G-4459-U0-AX
	250	50	00G-4459-V0-AX
Cellulose-2	150	21.2	00F-4457-P0-AX
	250	21.2	00G-4457-P0-AX
	250	30	00G-4457-U0-AX
	250	50	00G-4457-V0-AX
Cellulose-3	150	21.2	00F-4493-P0-AX
	250	21.2	00G-4493-P0-AX
	250	30	00G-4493-U0-AX
	250	50	00G-4493-V0-AX
	250	50	00G-4493-V0-AX
Cellulose-4	150	21.2	00F-4491-P0-AX
	250	21.2	00G-4491-P0-AX
	250	30	00G-4491-U0-AX
	250	50	00G-4491-V0-AX
	250	50	00G-4491-V0-AX
i-Cellulose-5	150	21.2	00F-4756-P0-AX
	250	21.2	00G-4756-P0-AX
	250	30	00G-4756-U0-AX
	250	50	00G-4756-V0-AX
	250	50	00G-4756-V0-AX
i-Amylose-1	150	21.2	00F-4762-P0-AX
	250	21.2	00G-4762-P0-AX
	250	30	00G-4762-U0-AX
	250	50	00G-4762-V0-AX
	250	50	00G-4762-V0-AX
i-Amylose-3	150	21.2	00F-4779-P0-AX
	250	21.2	00G-4779-P0-AX
	250	30	00G-4779-U0-AX
	250	50	00G-4779-V0-AX
	250	50	00G-4779-V0-AX



Process Chromatography

Bulk HPLC Media

- Grams to Multi-Kilogram, Phenomenex can deliver
- Over 20 different media available
- Long lifetime and excellent reproducibility

Quick, Direct Scale-up from Analytical Methods

Scaling up is easier when using an HPLC media that provides near identical performance across all particle sizes and with increases in column diameter. Any mobile phase conditions developed on a Luna or Jupiter analytical column can be easily transferred to a 10 μm or 15 μm preparative column with equivalent resolution, selectivity, and proportional mass loading. Lux analytical columns also easily scale to 20 μm preparative columns.

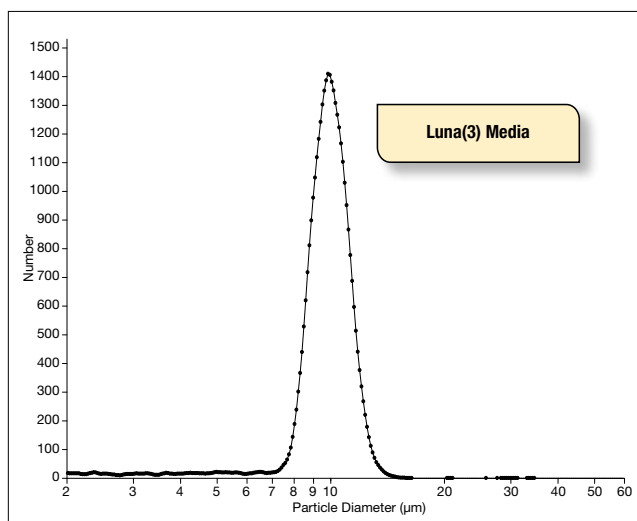
Mechanically Strong Media

- Media free of crushed or cracked silica and silica fines
- Backpressures that remain stable
- Consistent particle size distribution so performance is maintained
- Longer column lifetimes (frits stay unclogged)

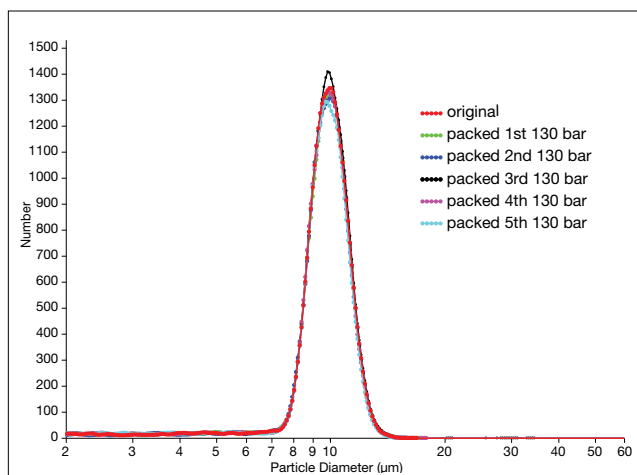
Withstand Multiple Repacking in Dynamic Axial Compression (DAC) Systems

Dynamic Axial Compression (DAC) systems apply high mechanical stress on the packing media. This, along with high flow rates and backpressures can crack or shear low mechanical strength silica particles, creating silica fines, which will rapidly degrade column efficiency and clog frits. Luna, Jupiter, and Lux media provide exceptional strength over multiple DAC packings without sacrificing performance as well as easily withstanding high mechanical stress.

Lower Backpressure with Narrower Particle Size Distribution



Mechanical Stability Demonstrated by Repeated Packing



Overlay of particle size distributions of Luna C18(3) repeatedly packed at 130 bars in a 5 cm ID DAC system



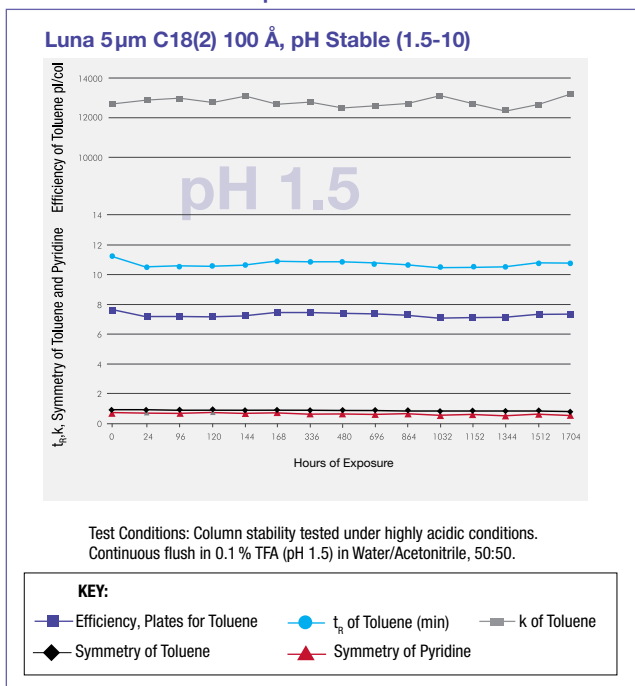
Process Chromatography

Chemically Stable Media

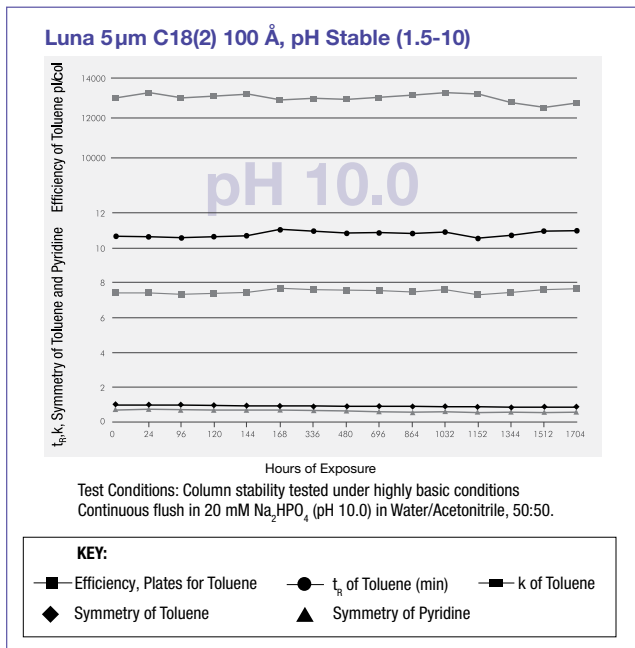
Chemical stability at pH levels outside the normal constraints of 2-7 is a critical factor in today's process environments for several reasons:

- Allows greater loading capacity
- Allows optimization of sample solubility
- pH adjustment to optimize recovery of API
- Clean-in-Place (CIP) processes by means of a caustic wash

Excellent Performance at Low pH



Extended Media Lifetime even Under Caustic Washes



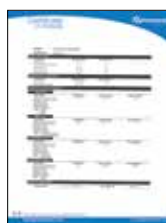
Controlled Manufacturing Process

We engineer and manufacture all of our media with your needs as a guideline. Our state-of-the-art facility gives us the capability to provide some of the most consistent media available on the market. With very high loadability, excellent mechanical strength, extended chemical stability, and batch-to-batch reproducibility, it is no wonder why more and more people turn to Phenomenex media every day.

Certificates

The development, production, and marketing of Phenomenex Bulk Media follow ISO 9001 guidelines.

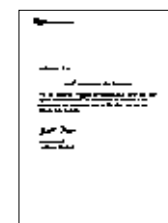
Product Quality



ISO 9001

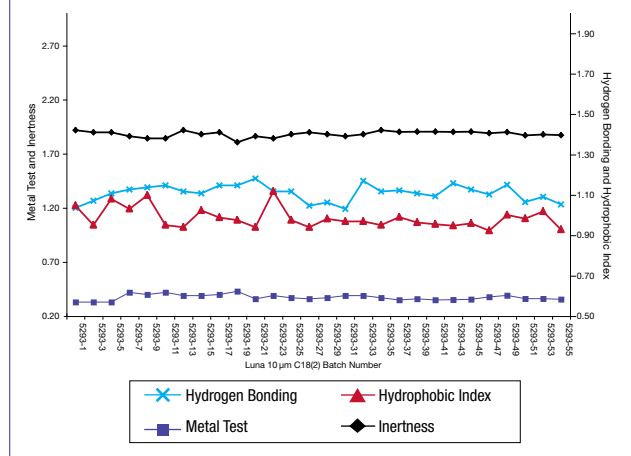


BSE/TSE Certificate



Batch-to-Batch Reproducibility

With over 20 years of proven reproducibility, you can be confident in your choice to develop methods on Luna. The following graph shows consistency in both inertness and hydrophobicity across 40 batches of Luna 10 µm C18(2).



Exceptional Chemical Stability for Low Leachates

The dense bonded phase density of Luna and Synergi provide revolutionary pH 1.5-10 stability[†], with Gemini offering an extended pH range of 1.0-12.0. The wide pH range of these media provides flexibility in method development allowing for improvements in resolution and greater mass loading of basic compounds ($pK_a > 9$) at high pH.

[†]Please see Sorbent Characteristics chart pp. 417-418 for exact pH limits of each phase.

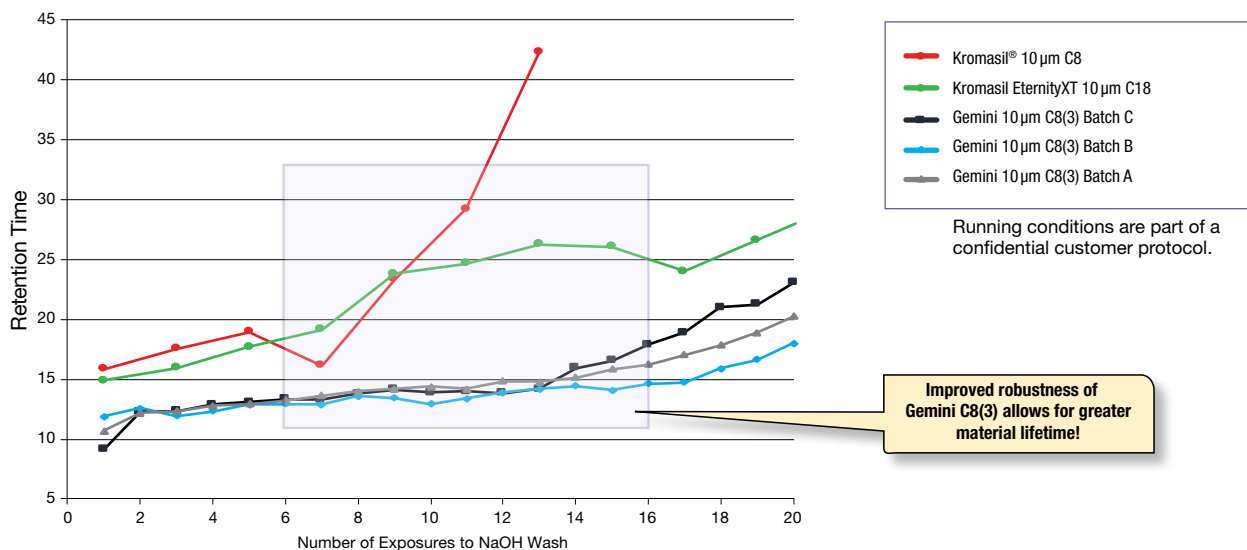
Process Chromatography

Gemini C8(3)

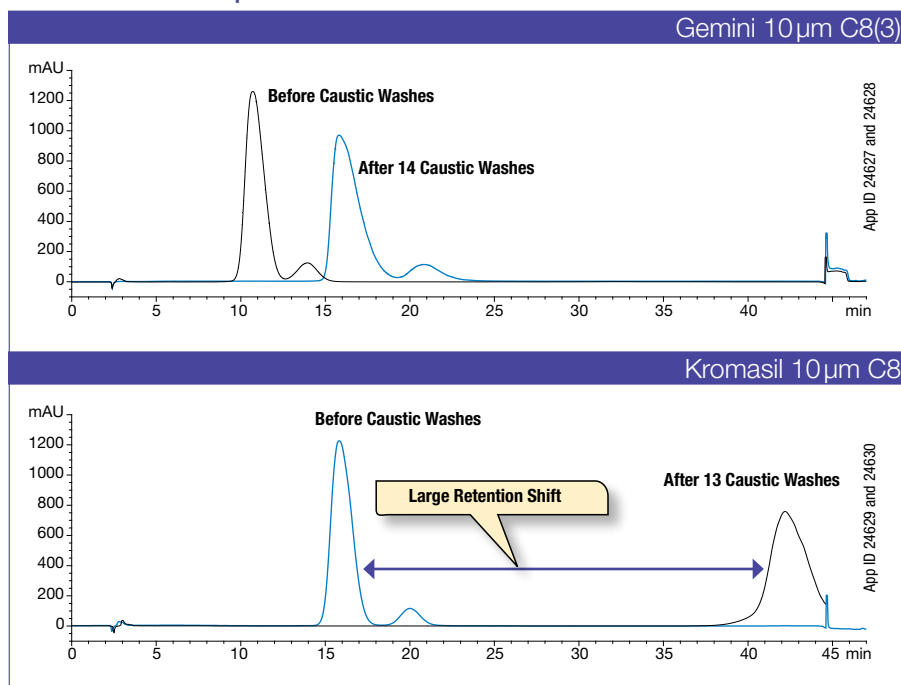
The Material Developed for High pH Insulin Purification

Many products can separate human insulin and its degradant, while few can withstand high pH caustic washes for aggregate removal. Now, there is a clear media choice. Gemini® C8(3) provides the needed separation, the needed low/high pH robustness, and the overall consistency in terms of efficiency and retention cycle to cycle to cycle. You don't have to choose between consistent performance or robustness; Gemini C8(3) was developed to give you the best of both worlds.

Insulin Retention vs. Exposures to NaOH Wash



Insulin Retention Comparison



Comparative separations may not be representative of all applications.

Process Chromatography

PREP LC Columns and Bulk HPLC Media

- Maintain or increase yield with less media
- Dramatically reduce cost of PREP/Process-LC purifications
- Withstand multiple axial compression packings with high mechanical strength media

Maintain or Increase Yield with Less Media

Higher silica surface area equals greater mass loading. With 400 m²/g surface area, Luna has one of the highest surface areas among popular PREP LC media. Even greater mass loading is possible with the 475 m²/g surface area of Synergi 80 Å media. Both Synergi and Luna are unique in that they offer high mass loading with low-density, rugged silica; requiring less media to pack a given volume. Thus while less media is needed to pack a given dimension compared to other common prep sorbents, mass loading remains high with peak resolution and purity maintained. Especially for early eluting target compounds, Luna has been shown to provide greater mass loading compared to some common prep media. This allows for increased loading on less media, and more yield per run.

Choose the Correct Media for your Application

Bonded Phase	Sorbent	Pore Size (Å)	Surface Area (m ² /g)	pH Stability	Particle Size (µm) ("bulk" indicates bulk media available)	Density	Applications
Achiral Media							
Si (Silica)	Luna Silica(3)	100	400	2.0 – 7.5	10- <i>PREP</i> (bulk)	0.47	Small Organic Molecules, Steroids, Nutraceuticals, Fat Soluble Vitamins, Tocopherols
	Luna Silica(2)	100	400	2.0 – 7.5	10 µm (bulk) 10- <i>PREP</i> (bulk) 15 µm (bulk) 20 µm (bulk)	0.45	Small Organic Molecules, Steroids, Nutraceuticals, Fat Soluble Vitamins, Tocopherols
C18	Luna C18(3)	100	400	1.5 – 10	10- <i>PREP</i> (bulk)	0.60	Pharmaceuticals, Peptides, Nutraceuticals, Agrochemical, Vitamins, Basic Compounds, General Reversed Phase Applications
	Luna C18(2)	100	400	1.5 – 10	10 µm (bulk) 10- <i>PREP</i> (bulk) 15 µm (bulk)	0.58	Pharmaceuticals, Peptides, Nutraceuticals, Agrochemical, Vitamins, Basic Compounds, General Reversed Phase Applications
	Synergi Hydro-RP C18 with Polar Endcapping	80	475	1.5 – 7.5	10 µm (bulk)	0.55	Very Polar Compounds, Pharmaceuticals, Vitamins, Antibiotics
	Jupiter 300 C18	300	170	1.5 – 10	10 µm (bulk), 15 µm (bulk)	0.44	Hydrophilic Proteins, Oligonucleotides (>30 mer)
C12	Synergi Max-RP	80	475	1.5 – 10	10 µm (bulk)	0.55	Pharmaceuticals, Nutraceuticals, Agrochemical, Vitamins, Amino Acids, Basic Compounds, General Reversed Phase Applications
C8	Luna C8(3)	100	400	1.5 – 10	10- <i>PREP</i> (bulk)	0.58	Pharmaceuticals, Peptides, Estrogens, Basic Compounds, General Reversed Phase Applications
	Luna C8(2)	100	400	1.5 – 10	10 µm (bulk) 10- <i>PREP</i> (bulk) 15 µm (bulk)	0.56	Pharmaceuticals, Peptides, Estrogens, Basic Compounds, General Reversed Phase Applications
	Gemini C8(3)	100	400	1.0 – 12.0	10 µm (bulk)	0.60	Small Molecules, Peptides, Proteins, Oligonucleotides
C4	Luna C4(2)	100	400	1.5 – 10	10- <i>PREP</i> (bulk)	0.54	Hydrophobic Compounds, Peptides, Small Proteins
	Jupiter 300 C4	300	170	1.5 – 10	10 µm (bulk), 15 µm (bulk)	0.38	Hydrophobic Proteins
Phenyl	Luna Phenyl-Hexyl	100	440	1.5 – 10	10 µm (bulk) 10- <i>PREP</i> (bulk) 15 µm (bulk)	0.58	Polar and Aromatic Compounds, Peptides, Antibiotics, Lipids, Phenols, Sweeteners
	Luna Polar-RP	100	400	1.5 – 7.0	10- <i>PREP</i> (bulk)	0.55	Polar and Aromatic Compounds, Hydrophilic Peptides, Antibiotics, Phenols, Sweeteners
	Synergi Polar-RP (Ether-Linked Phenyl)	80	475	1.5 – 7.0	10 µm (bulk)	0.55	Polar and Aromatic Compounds, Hydrophilic Peptides, Antibiotics, Phenols, Sweeteners
CN (Cyano)	Luna CN	100	400	1.5 – 7.0	10 µm (bulk)	0.55	Polar Compounds, Pharmaceuticals, Hydrophilic Peptides, Esters, Steroids, Phthalates, Compounds with COOH, CO, NH ₂ , NHR, or NR ₂ groups
NH ₂ (Amino)	Luna NH ₂	100	400	1.5 – 11	10 µm (bulk)	0.57	Sugars, Sugar Alcohols, Anionic Compounds, Steroids, Vitamins, Nucleosides, Oligonucleotides
Chiral Media							
cellulose tris(3,5-dimethylphenyl carbamate)	Lux Cellulose-1	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(3-chloro-4-methyl phenylcarbamate)	Lux Cellulose-2	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(4-methylbenzoate)	Lux Cellulose-3	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(4-chloro-3-methyl phenylcarbamate)	Lux Cellulose-4	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds



Process Chromatography

Scout Columns

Achiral Columns

Ordering Information

Luna (100 Å)		
Phases	250 x 4.6 mm	250 x 10 mm
10 µm-<i>PREP</i>		
C18(3)	00G-4616-E0	00G-4616-N0
C18(2)	00G-4324-E0	—
C8(3)	00G-4623-E0	00G-4623-N0
C8(2)	00G-4323-E0	00G-4323-N0
C4(2)	00G-4460-E0	00G-4460-N0
Phenyl-Hexyl	00G-4325-E0	00G-4325-N0
Polar-RP	00G-4757-E0	00G-4757-N0
Silica(3)	00G-4617-E0	00G-4617-N0
Silica(2)	00G-4322-E0	00G-4322-N0
10 µm		
CN	00G-4300-E0	—
NH ₂	00G-4379-E0	00G-4379-N0
15 µm		
C18(2)	00G-4273-E0	00G-4273-N0
C8(2)	00G-4272-E0	00G-4272-N0
Phenyl-Hexyl	00G-4286-E0	00G-4286-N0
Silica(2)	00G-4271-E0	—
20 µm		
Silica(2)	00G-4437-E0	—

Jupiter (300 Å)		
Phases	250 x 4.6 mm	250 x 10 mm
15 µm		
300 Å C18	00G-4057-E0	00G-4057-N0
300 Å C4	00G-4169-E0	00G-4169-N0

Gemini (110 Å)		
Phases	250 x 4.6 mm	250 x 10 mm
10 µm		
C8(3)	00G-4763-E0	00G-4763-N0

Chiral Columns

Ordering Information

Lux (1000 Å)		
Phases	250 x 4.6 mm	250 x 10 mm
10 µm		
Cellulose-1	00G-4501-E0	00G-4501-N0
Cellulose-2	00G-4502-E0	00G-4502-N0
Cellulose-3	00G-4624-E0	—
Cellulose-4	00G-4625-E0	—
20 µm		
Cellulose-1	00G-4473-E0	00G-4473-N0
Cellulose-2	00G-4464-E0	00G-4464-N0
Cellulose-3	00G-4504-E0	00G-4504-N0
Cellulose-4	00G-4503-E0	00G-4503-N0



Additional scout columns available. Contact us for 3µm, 4µm, 5µm, and 10µm media scout columns.



Process Chromatography

Bulk HPLC Media


Achiral Media

Ordering Information

Luna (100 Å)				
Phases	100 g	1 kg	5 kg	10 kg
10 µm-<i>PREP</i>				
C18(3)	04G-4616	04K-4616	04L-4616	04M-4616
C18(2)	04G-4324	04K-4324	04L-4324	04M-4324
C8(3)	04G-4623	04K-4623	04L-4623	04M-4623
C8(2)	04G-4323	04K-4323	04L-4323	04M-4323
C4(2)	04G-4460	04K-4460	04L-4460	04M-4460
Phenyl-Hexyl	04G-4325	04K-4325	04L-4325	04M-4325
Polar-RP	04G-4757	04K-4757	04L-4757	04M-4757
Silica(3)	04G-4617	04K-4617	04L-4617	04M-4617
Silica(2)	04G-4322	04K-4322	04L-4322	04M-4322
10 µm				
CN	04G-4300	04K-4300	04L-4300	—
NH ₂	04G-4379	04K-4379	—	—
15 µm				
C18(2)	04G-4273	04K-4273	04L-4273	04M-4273
C8(2)	04G-4272	04K-4272	04L-4272	04M-4272
Phenyl-Hexyl	04G-4286	04K-4286	04L-4286	04M-4286
Silica(2)	04G-4271	04K-4271	04L-4271	04M-4271
20 µm				
Silica(2)	04G-4437	04K-4437	—	—

Jupiter (300 Å)				
Phases	100 g	1 kg	5 kg	10 kg
15 µm				
300 Å C18	04G-4057	04K-4057	04L-4057	04M-4057
300 Å C4	04G-4169	04K-4169	04L-4169	04M-4169

Gemini (110 Å)				
Phases	100 g	1 kg	5 kg	10 kg
10 µm				
C8(3)	04G-4763	04K-4763	04L-4763	04M-4763


 For Sepra bulk sorbents, see p.369



Chiral Media

Ordering Information

Lux (1000 Å)			
Phases	10 g	100 g	1 kg
10 µm			
Cellulose-1	04D-4501	04G-4501	04K-4501
Cellulose-2	04D-4502	04G-4502	04K-4502
Cellulose-3	04D-4624	04G-4624	04K-4624
Cellulose-4	04D-4625	04G-4625	04K-4625

 Contact your Phenomenex technical consultant or local distributor for additional bulk packings and quantities not listed.

Process Chromatography

Sepra™ Bulk Sorbents

- Provides reproducible recoveries from capture to purification
- Removes contaminants and eliminates matrix effects
- Offers controlled selectivity for target analytes
- Results in high-throughput sample purification

Phenomenex offers a wide mix of bulk media including an array of large particle media for today's chemists who need effective capture and concentrating resins.

Sepra media offers purification of proteins, peptides, nucleic acids, antibodies, tryptic digests, nucleotides, viruses, and small molecular weight pharmaceuticals in a low pressure environment. It is an excellent economical alternative to high pressure RPC while still offering high resolution and loading capacity.



Capture and Concentrate Resins

Media Base Material	Brand	Phase	Particle Size (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load (%)	pH Stability	Ordering Information		
								Sepra Bulk Sorbents		
								Phase	100 g	1 kg
Silica	Sepra	C18-E	50	65	500	17	2-9	C18-E	04G-4348	04K-4348
		C18-T	50	135	300	15	2-9	C18-T	04G-4405	04K-4405
		C8	50	65	500	10	2-9	C8	04G-4406	—
		Phenyl	50	65	500	10	2-9	Phenyl	04G-4407	—
		CN	50	65	500	10	2-9	CN	04G-4409	—
		NH ₂	50	65	500	5	2-9	NH ₂	04G-4408	04K-4408
		Florisil®	170 (60/100 mesh)	80	300	0	2-9	Florisil®	04G-4411	04K-4411
		SCX	50	65	500	9	2-9	SCX	04G-4413	04K-4413
		SAX	50	65	500	6	2-9	SAX	04G-4414	04K-4414
		WCX	55	70	500	8	2-9	WCX	04G-S027	—
		Silica	50	65	500	0	2-9	Silica	04G-4410	04K-4410
		EPH	200	70	Proprietary	0	2-7.5	EPH	04G-4508	—
Small Pore Polymer	Sepra ZT	ZT	30	85	800	—	1-14	ZT	04G-4426	—
		ZT-SCX	30	85	800	—	1-14	ZT-SCX	04G-4466	—
		ZT-WCX	30	85	800	—	1-14	ZT-WCX	04G-4478	—
		ZT-SAX	30	85	800	—	1-14	ZT-SAX	04G-4485	—
		ZT-WAX	30	85	800	—	1-14	ZT-WAX	04G-4463	—
Large Pore Polymer	Sepra ZTL	ZTL	115	330	500	—	1-14	ZTL	04G-4470	—
		ZTL-SCX	115	330	500	—	1-14	ZTL-SCX	04G-4467	04K-4467
		ZTL-WCX	115	330	500	—	1-14	ZTL-WCX	Inquire	Inquire
		ZTL-SAX	115	330	500	—	1-14	ZTL-SAX	Inquire	Inquire
		ZTL-WAX	115	330	500	—	1-14	ZTL-WAX	04G-4494	—
Styrenedivinylbenzene Polymer	Sepra SDB-L	SDB-L	95	255	500	—	1-14	SDB-L	04G-4412	04K-4412



Interested in MSPD for your analysis? Please contact us for technique and accessory information.

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FREE Webinar Library

Amino Acid Analysis



“ We have been using EZ:faast to quantify several amino acids in plasma, urine, and cephalorochidian fluid ... and we are very pleased with its performance. It is really simple and produces reliable results in a few minutes. ”

Sr. Valdemir Melechco Carvalho
Fleury S.A., Brazil

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The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

EZ:faast™ Amino Acid Analysis.....371-374

FOR RESEARCH USE ONLY. Not for use in clinical diagnostic procedures.

EZ:faast™ Amino Acid Analysis

U.S. Patent No. 6, 770, 246

Amino Acid Analysis in 15 Minutes

- Easy-to-use kit contains everything needed for sample clean up, derivatization, and analysis of 384 samples
- Kits compatible with GC-FID, GC-MS, & LC-MS chromatographic systems
- Simple & fast sample prep, derivatization, analysis for both physiological (free) amino acids and protein hydrolysates
- Analyze amino acids from the most complex matrixes such as blood, plasma, foodstuffs, and fermentation broth
- No plasma protein or urea removal required for physiological samples
- Great sample purity and improved reproducibility
- Method can be optimized for sulfur-containing and aromatic amino acids, along with numerous other amino acid derivatives

Performance Characteristics

Precision

EZ:faast allows for the quantitation of amino acids in various sample matrixes with good precision. RSD values are listed for most applications shown in this section of the catalog. These values are better than 5% for most amino acids and sample types, except for ASN, GLN, HIS, ILE, MET, TRP and TYR with % RSD < 12. RSD % values include variation due to both sample preparation and analysis, other methods usually only consider analysis.

Accuracy

Recovery of EZ:faast varies between 89-107%. An example of % recovery for spiked amino acids in specific matrixes is shown below. Clover honey was used to demonstrate accuracy. Five samples were taken from a well-homogenized honey and tested for % recovery (accuracy), each sample was spiked with 200 nmol/mL of five different amino acids. All data reported in nmol/mL.

	Standard Added	Honey + Standard	Standard Recovered	% Recovery (Accuracy)
ALA	199	280.11	201.74	101.4
ASN	209	360.48	187.42	89.7
PHE	197	248.46	185.76	94.3
LYS	188	239.50	180.05	95.8
TYR	200	208.11	182.33	91.2

Five spiked samples showed good recovery (89.7 - 101.4%) for all amino acids analyzed. For another detailed accuracy example, please refer to Technical Note (TN-8001) – *Asparagine Analysis in Food Products*.

Sensitivity

Limits of detection (LOD) are shown for each analytical technique (GC-FID, GC-MS and LC-MS) in the lists of amino acids amenable for analysis by EZ:faast. LODs were determined for the amino acids included in the standard mixtures provided with the kit for calibration purposes.



Effective Sample Clean Up

EZ:faast™ eliminates nearly all potential contaminants. The SPE and liquid/liquid extraction steps remove a majority of the interfering components. Additionally with the GC Kit, discrimination for non-volatile contaminants then occurs at the GC injection port. These discriminatory steps help produce chromatograms without interfering peaks from complex matrixes such as plasma and urine.

Table 1: Common Protein Removal Protocols vs. EZ:faast

Comparative data showing amino acid concentrations in μmol/L from three common deproteinized plasma samples (SSA = sulfosalicylic acid; TCA = trichloroacetic acid; ORG = acetonitrile:ethanol 2:1) with a plasma sample analyzed by the GC-FID EZ:faast method. The comparative data (mean values and ranges for 12 measurements) show no significant differences between samples prepared by common protein removal procedures or by the EZ:faast method.

	Without De-proteinization EZ: faast method		SSA (Recommended for OPA-derivatized samples)		TCA		ORG (Recommended for PITC-derivatized samples)	
	GLY	290	(286-293)	288	(282-293)	259	(238-280)	261
ALA	421	(415-427)	422	(417-427)	380	(357-402)	393	(365-421)
ABA	23	(22-24)	23	(20-26)	22	(21-22)	22	(21-23)
LEU	165	(162-168)	164	(162-166)	162	(158-165)	163	(155-170)
ILE	74	(72-75)	70	(69-72)	71	(69-72)	73	(72-73)
MET	30	(29-30)	32	(31-33)	31	(30-31)	30	(29-30)
PRO	209	(207-211)	207	(204-210)	212	(208-215)	206	(197-214)
ASP	18	(17-19)	16	(15-17)	16	(14-17)	19	(18-20)

Derivative Stability

EZ:faast amino acid derivatives are stable at room temperature for more than 24 hours. Samples prepared during the day can be left on the autosampler tray at room temperature for analysis during the night or the next day. Prepared samples can be stored for a couple of days refrigerated or frozen for longer periods of time. The stability of amino acid derivatives prepared with standard solutions passed through the EZ:faast sample preparation procedure was tested at different moments in time over a 19 hour period starting shortly after sample preparation. The first injection was used for instrument calibration. Average % RSD for 22 amino acids was 2.9. Glycine and Isoleucine showed minimal variation in response with 0.69 and 0.7% RSD, respectively. HYP with RSD 11.07% is the least stable amino acid derivative.

Robustness

Method of analysis for amino acids based on the EZ:faast procedure is robust. Results are unaffected by most deviations from the preferred sample preparation and analysis protocol. The following parameters have been evaluated for their effect on method robustness: GC instrument settings, maximum loading capacity of sorbent tips, sample pH, sample loading speed during SPE clean up, and reaction times allowed for derivatization. The only critical parameters to monitor are speed of sample load during the SPE step and minimum reaction time allowed for derivatization (total 3 min).

U.S. Patent No. 6, 770, 246

Analyze Over 60 Amino Acids with Several Kit Options

Based on Sample Type

Free (Physiological) Amino Acids

The EZ:faast kits for free amino acids provide rapid clean up, derivatization, and analysis of amino acids from complex mixtures, while yielding a full amino acid profile in 15 minutes. The sample preparation cleans up amino acids from complex matrixes like blood, urine, cheese, cell cultures, and wine. Samples are pre-column derivatized to form stable amino acid derivatives.

Protein Hydrolysates

Within 15 minutes, hydrolyzed protein or peptide samples are prepared and derivatized for rapid sequencing. Sample preparation ensures non-hydrolyzed protein removal for more accurate analysis. Derivatized samples will not degrade rapidly.

Based on Chromatographic Instrument

Gas Chromatography (GC)

The GC kit options are compatible with a NPD, FID, or MS detectors. The analysis time on the GC column is a quick 8 minutes and provides excellent resolution of all amino acids in the profile. The derivatization procedure used makes the amino acids less polar and therefore more volatile so they can be analyzed via GC.

Liquid Chromatography (HPLC)

LC-MS kit options are available for labs without GC systems or to analyze Arginine or Citrulline. The sample preparation and derivatization is still just 7 minutes, but the analysis is slightly longer at 12 minutes.

Amino Acids Analyzed by GC

Chemical Name	Abbreviation	LOD* (nmol/mL) S/N 3:1	
		FID	MS
Alanine	ALA	1	0.1
β-Alanine	β-ALA		
Alliin			
α-Aminoadipic acid	AAA	1	0.2
4-Aminobenzoic acid	PABA		
α-Aminobutyric acid	ABA	1	0.2
β-Aminoisobutyric acid	β-AIB	4	0.2
β-Amino-n-butyric acid	βABA		
γ-Amino-n-butyric acid	GABA		
α-Aminopimelic acid	APA	0.47	0.4
Arginine-succinic acid	ARG-SUC		
Asparagine	ASN	2	2.5
Aspartame			
Aspartic acid	ASP	0.87	0.1
Bicin			

* LODs were determined for amino acids included in standard mixtures provided with the kit

Note: several amino acids coelute under the chromatographic conditions specified in the user manual

Amino Acids Analyzed by GC (cont'd)

Chemical Name	Abbreviation	LOD* (nmol/mL) S/N 3:1	
		FID	MS
Carboxymethyl-cysteine			
Chloro-phenylalanine	Cl-PHE		
Cystathionine	CTH	4	10
Cysteine	CYS		
Cystine	C-C	4	10
2,4-Diamino-n-butyric acid	DABA		
Diaminopimelic	DAPA		
3,4-Dihydroxyphenylalanine	DOPA		
Dopamine	DA		
Ethanolamine			
Ethionine	ETH		
Fluoro-alanine			
Glutamic acid	GLU	2	0.2
Glutamine	GLN	8	10
Glycine	GLY	2	0.1
Glycine-glycine (dipeptide)	GLY-GLY		
Glycine-proline (dipeptide)	GPR	1	5
Histamine	HA		
Histidine	HIS	1	0.2
Homocysteine	HCYS		
Homocystine	HC-CH		
Homophenylalanine	HPHE		
Homoserine	HSER		
Hydroxylysine (2 isomers)	HLY	2	10
3-Hydroxyproline	3HYP		
4-Hydroxyproline	4HYP	2	0.2
Isoleucine	ILE	0.65	0.2
allo-Isoleucine	alILE	0.65	0.1
Leucine	LEU	0.65	0.1
Lysine	LYS	1	0.2
Lysine-alanine (dipeptide)	LYS-ALA		
Methionine	MET	0.87	0.2
Methionine Sulfone			
Methionine Sulfoxide			
3-Methyl-cysteine			
Naphthyl-alanine			
3-Nitrotyrosine			
Norleucine	NLE		
Norvaline	NORV		
Ornithine	ORN	1	0.2
Phenylalanine	PHE	0.47	0.2
Phenyl Glycine	PHE-GLY		
Pipecolic Acid	HPRO		
Proline	PRO	1	0.1
Proline-hydroxyproline (dipeptide)	PHP	0.87	10
Sarcosine	SAR	1	0.1
Seleno Cystine	Se-C-C		
Seleno Methionine	Se-MET		
Serine	SER	2	0.2
Serotonin	SRO		
Theanine	THE		
Thioprolin	TTPR	0.43	0.1
Threonine	THR	2	0.2
Threonine-aspartic acid (dipeptide)	THR-ASP		
Tryptophan	TRP	0.43	0.1
Tyramine			
Tyrosine	TYR	0.4	0.2
Valine	VAL	0.6	0.2

Clinical Research

- Analyze complex blood, urine, and plasma samples

PKU (Phenylketonuria) Screening

Kit: EZ:faast GC-FID Free (Physiological) Amino Acid Kit

Part No.: [KGO-7165](#)

Injection: Split 1:15 @ 250 °C, 2 µL

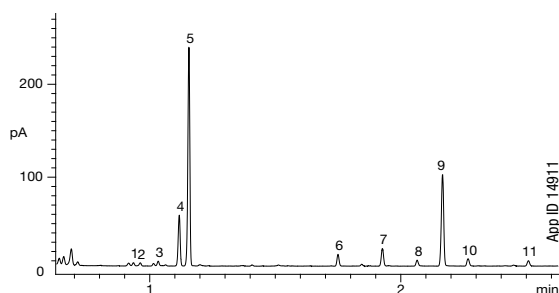
Carrier Gas: Helium 2 mL/ minute constant flow @ 110 °C

Oven Program: 30 °C/ min from 110 °C to 320 °C, hold at 320 °C for 1 minute

Detector: FID @ 320 °C

- Sample:
- | | |
|----------------------------------|-----------------------------|
| 1. Aspartic Acid (10, 4.3)* | 7. Lysine (52.5, 5.4)* |
| 2. Methionine (12.5, 9.6)* | 8. Histidine (20, 10.3)* |
| 3. 4-Hydroxyproline (22.5, 3.5)* | 9. Norvaline |
| 4. Glutamic Acid (337.5, 2.8)* | 10. Tyrosine (35, 11.1)* |
| 5. Phenylalanine (755, 2.2)* | 11. Tryptophan (7.5, 11.6)* |
| 6. Ornithine (32.5, 3.6)* | |

* Detection Limit (nmol/mL), RSD (n=30) %



Food and Beverage

- Analyze complex wine, beer, juice, foodstuffs, fermentation broths, cell culture, and protein hydrolysate matrices

Theanine Analysis in Tea

Column: EZ:faast GC-MS Free (Physiological) Amino Acid Kit

Part No.: [KGO-7166](#)

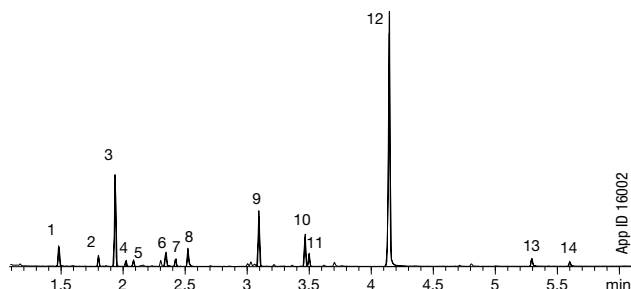
Injection: Split 1:15 @ 250 °C, 2 µL

Carrier Gas: Helium 1.1 mL/ minute constant flow @ 110 °C

Oven Program: 32 °C/ min from 110 °C to 320 °C

Detector: MS @ 45-450 m/z

- Sample:
- | | |
|-------------------|--------------------------|
| 1. Alanine | 8. Asparagine |
| 2. Valine | 9. Aspartic Acid |
| 3. Norvaline (IS) | 10. Glutamic Acid |
| 4. Leucine | 11. Phenylalanine |
| 5. Isoleucine | 12. Theanine & Glutamine |
| 6. Serine | 13. Tyrosine |
| 7. Proline | 14. Tryptophan |



Biotechnology and Pharmaceutical

- For the analysis of amino acids in fermentation broths, cell cultures, serum, and protein hydrolysates

Mammalian Cell Culture

Kit: EZ:faast GC-FID

Free (Physiological) Amino Acid Kit

Part No.: [KGO-7165](#)

Injection: Split 1:15 @ 250 °C, 2 µL

Carrier Gas: Helium 1.5 mL/ minute, constant flow @ 110 °C

Oven Program: 30 °C/ min from 110 °C to 320 °C, hold at 320 °C for 1 minute

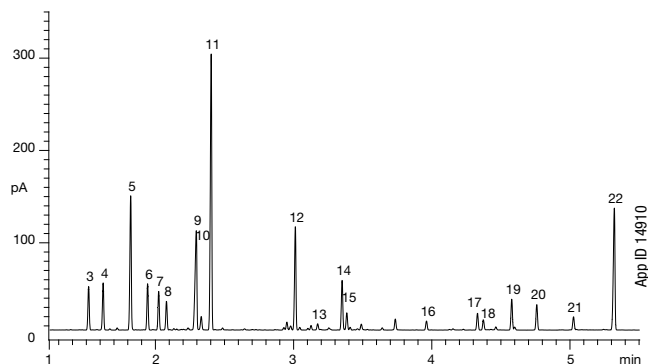
Detector: FID @ 320 °C

Sample: Derivatized amino acids in mammalian cell culture (0.1 mL). Norvaline

is the internal standard added at a concentration of 200 µmol/L.

- | | |
|----------------------------|--|
| 3. Alanine (248, 2.1)* | 13. 4-Hydroxyproline (45, 0.9)* |
| 4. Glycine (304, 2.9)* | 14. Glutamic Acid (538, 5.6)* |
| 5. Valine (685, 3.8)* | 15. Phenylalanine (50, 2.3)* |
| 6. Norvaline (IS) | 16. Glutamine (105, 10.5)* |
| 7. Leucine (149, 2.2)* | 17. Ornithine (93, 3.8)* |
| 8. Isoleucine (138, 8.6)* | 18. Glycine-proline (dipeptide) (57, 5.6)* |
| 9. Threonine (891, 3.6)* | 19. Lysine (134, 5.5)* |
| 10. Serine (124, 4.8)* | 20. Histidine (168, 10.5)* |
| 11. Proline (1220, 2.3)* | 21. Tyrosine (45, 9.2)* |
| 12. Asparagine (630, 2.6)* | 22. Tryptophan (462, 11.5)* |

* Detection Limit (nmol/mL), RSD (n=30) %



Ordering Information

Amino Acid Analysis Kits

Each kit includes: ZB-AAA GC column, or AAA LC column, sample prep and derivatization reagents, sample prep vials, AA standards, SPE pipette tips, vial rack, and microdispenser for reagents 4 and 5. MS kits also include autosampler vials with inserts. GC kits also include injector liners.

Part No.	Description	Unit
KGO-7165	GC-FID Free (Physiological) Amino Acid Analysis Kit	ea
KGO-7166	GC-MS Free (Physiological) Amino Acid Analysis Kit	ea
KGO-7167	GC-FID Protein Hydrolysate Kit	ea
KGO-7168	GC-MS Protein Hydrolysate Kit	ea
KH0-7337	LC-MS Free (Physiological) Amino Acids Kit with 250 x 2.0 mm column	ea
KH0-7338	LC-MS Free (Physiological) Amino Acids Kit with 250 x 3.0 mm column	ea
KH0-7339	LC-MS Protein Hydrolysates Kit with 250 x 2.0 mm column	ea
KH0-7340	LC-MS Protein Hydrolysates Kit with 250 x 3.0 mm column	ea
AGO-7184	GC Free (Physiological) Amino Acid Standards (SD1, 2, 3) 2 mL/vial x 2	ea
AGO-7263	GC Protein Hydrolysate Standard (SD) 2 mL/vial x 2	ea
ALO-7500	LC-MS Free (Physiological) Amino Acid Standards (SD1, 2, 3) 2 mL/vial x 2	ea
ALO-7501	LC-MS Protein Hydrolysate Standard (SD) 2 mL/vial x 2	ea

Synthetic DNA/RNA

Purification and Analysis



“Very happy with Phenomenex overall. The quality of the products and the customer service, which often goes beyond what I expect, helped me enormously with troubleshooting and method development.”

Wayne Noonan
Peter MacCallum Cancer Centre,
Australia

375 - 387

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Clarity[®] BioSolutions for Synthetic DNA/RNA

U.S. Patent No. 7, 119, 145

Optimized Oligo Purification and Analysis

- RPC, HPLC, prep LC, desalting, and extraction solutions
- DNA, RNA/RNAi, longmers, dye-labeled, and modified oligonucleotides
- High efficiency LC-MS protocols for characterization/QC
- Personalized technical support and customer service

Each product in the Clarity BioSolutions portfolio has been designed to efficiently and effectively purify or characterize synthetic oligonucleotides used in biological research, therapeutic development and biochemical manufacturing. Purification solutions include reversed phase HPLC (RP-HPLC), ion-exchange LC (IEX-LC), reversed phase cartridge (RPC), and desalting, while characterization solutions include high efficiency reversed phase (RP-LC-MS) columns.



Material Characteristics

Clarity Products	Particle Support	Bonded Phase	Particle Shape/Size (µm)	Pore Size (Å)	Surface Area (m ² /g)
Clarity QSP™ Cartridges	Polymer (PSDVB)	Hydrophilic polymer coating	35	500	300
Clarity Oligo-RP™ LC Columns	TWIN (silica, organic composite)	C18	3, 5, 10	110	375
Clarity RP-Desalting™ Tubes	Silica	C18	55	140	300
Clarity Oligo-MS™ LC Columns	Core-Shell	C18	1.7, 2.6, 5	100	200* (*effective)
Clarity OTX™ Extraction Plates	Polymer (surface modified PSDVB)	Mixed-mode anion exchanger	33	85	800
Clarity Oligo-XT LC Columns	Core-Shell	C18	1.7, 2.6, 5	100	200

Clarity BioSolutions Product Selection

Purification

	Clarity QSP™	Clarity Oligo-RP™ Clarity Oligo-XT	Clarity RP-Desalting™
Primary Use	High-throughput, trityl-on RPC purification	RP-HPLC purification of failure sequences from target sequences	Quick removal of salt & excess reagent
Purities	>90 %	>90 %	~70 %
Recoveries	~90 %	~70 %	~70 %
Synthesis Scale Load	Up to 50 µmol	Up to 50 µmol	Up to 1 µmol
Oligo Types	DNA, RNA/RNAi, Thioates, Dye-labeled, Modified		

Characterization / Analysis

	Clarity Oligo-RP™	Clarity Oligo-MS™ Clarity Oligo-XT	Clarity OTX™
Primary Use	RP-LC-MS analysis with optimized selectivity and sensitivity	Rapid, high efficiency RP-LC-MS analysis for QC and characterization	Extraction of oligo therapeutics from biological samples for LC-MS bioanalysis
Oligo Length	≤ 60 mer	≤ 60 mer	≤ 40 mer
Recommended Mobile Phase	TEA / HFIP	TEA/HFIP/MeOH	n/a

U.S. Patent No. 7, 119, 145

Clarity OTX[™] Extraction Kits

Rapid Isolation of Oligo Therapeutics from Biological Samples

- > 80% typical extraction recoveries
- No liquid-liquid extraction (LLE) required
- Suitable for a majority of therapeutic oligos, tissues, and fluids
- Optimized for LC-MS bioanalysis
- Can be automated for high-throughput

Effective Recovery

The Clarity OTX extraction solution was designed to effectively isolate a wide range of therapeutic oligonucleotides from fluids and tissues. It utilizes a mixed-mode solid phase extraction sorbent in conjunction with carefully formulated buffers to consistently deliver greater than 80% recoveries.

Sample Preparation:

- Add an equal volume of Lysis-Loading buffer to biological fluid matrix
- Vortex briefly

Extraction Protocol

Condition: 1 mL Methanol (Vacuum ~2" Hg)

Equilibrate: 1 mL Equilibration buffer (Vacuum ~3" Hg)

Load sample: 0.4 mL - 3 mL volume (Vacuum ~3" Hg)

Vacuum: ~10" Hg for ~10 seconds to completely evacuate solution through cartridge

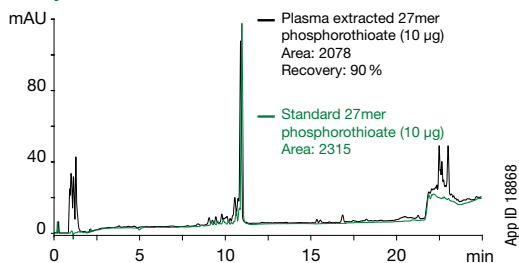
Wash: 6 mL Wash buffer (2 mL x 3) (Vacuum 3-4" Hg)

Vacuum: 10-15" Hg for ~1 minute

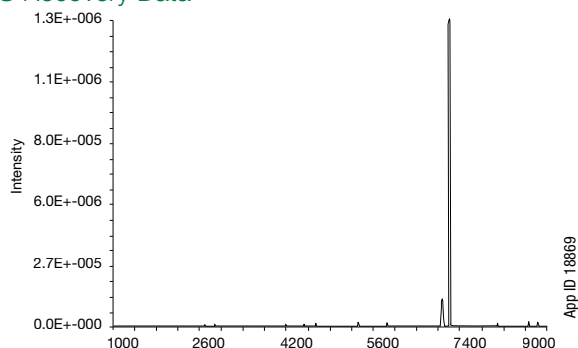
Elute: 1 mL Elution buffer (Vacuum ~3" Hg)

LC-MS Prep: Dry down or lyophilize and reconstitute in 100 µL water or aqueous buffer

UV Recovery Data



MS Recovery Data



The above illustrates the recovery of a 27mer thioate from 200 µL of human plasma. The UV data shows that 90% recovery is achieved with the Clarity OTX extraction protocol. The MS data further demonstrates that plasma contaminants are effectively removed and complete isolation and recovery of the target is achieved.

Phenomenex

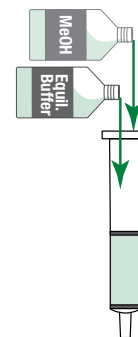
Designed for Throughput

In just 4 steps and 15 minutes, scientists can extract therapeutic oligos and their metabolites from biological samples. This is accomplished by eliminating the need for liquid-liquid extraction and providing a 96-well plate format which is amenable to parallel processing.



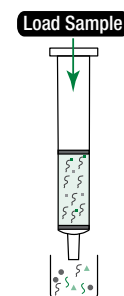
STEP 1

Preparation of SPE sorbent to selectively retain the oligo of interest and its metabolites.



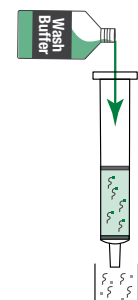
STEP 2

Salts, sugars, large proteins and genomic DNA flow through the cartridge. The oligo of interest, proteins, and lipids bind to the sorbent via a mixed-mode, weak anionic interaction.



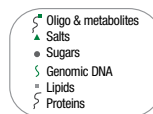
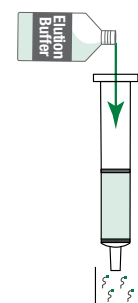
STEP 3

The Wash Buffer is formulated to strip off lipids and remaining proteins from the sorbent, while not disturbing the oligo therapeutics and its metabolites.



STEP 4

The addition of the Elution Buffer releases the target oligo therapeutic and its metabolites. The elution volume can be dried down or lyophilized and reconstituted prior to LC-MS analysis.



Request a FREE copy of the Clarity OTX User's Guide for more detailed information on the extraction protocol.

Clarity[®] BioSolutions for Synthetic DN/RNA

U.S. Patent No. 7, 119, 145

Clarity OTX[™] (cont'd)

Flexible Formats

To test proof of concept or for low sample volumes, Clarity OTX is available as a starter kit, which includes either a 96-well plate or 50 solid phase extraction cartridges and all the buffers (lysis-loading, equilibration, wash, and elution) required for the extraction protocol.



For labs that must process large volumes of biological samples, 96-well plates, 1L quantities of lysis-loading buffer, and the formulations for the other three buffers are available.



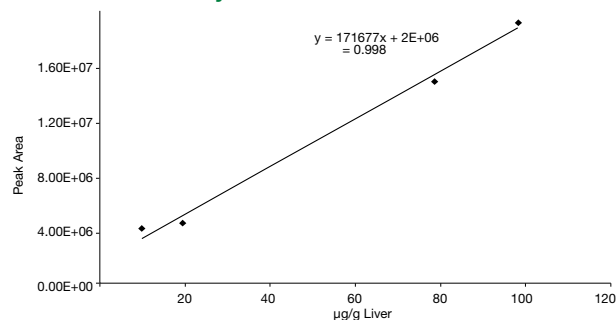
Eliminate MS Interfering Contaminants

The Clarity OTX extraction protocol effectively removes cell debris such as proteins, genomic DNA, and lipids which significantly mask the oligo therapeutics of interest. By removing these contaminants, MS noise is considerably reduced.

Excellent Linearity

Significant effort was made to develop an extraction solution that would provide good linearity and reliable quantitative results.

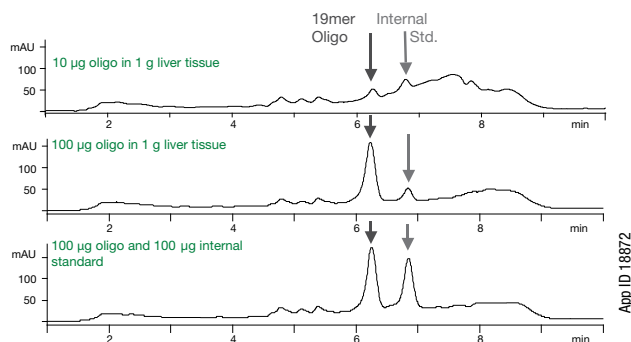
Liver Tissue Linearity Curve



From low to high concentrations of ng/mL, excellent linearity is achieved on the MS by extracting oligo therapeutics and their metabolites using the Clarity OTX methodology. Linearity for a 19mer P-S oligonucleotide in 1 g of liver tissue, based on MS peak area, was evaluated at four different oligo concentrations in liver tissue from 100 µg to 10 µg. High recovery and good linearity is seen across physiological relevant concentrations for this initial study.

Detect Low Dosage Levels

Due to the typical 85% and greater recoveries of the parent oligonucleotide therapeutic and its metabolites and the elimination of interfering compounds, detection in low sensitivity ranges is possible when using a sensitive MS.



UV chromatograms of oligonucleotide extracted from liver tissue using Clarity OTX. The 19mer extracted phosphorothioate oligonucleotide was spiked with 10 µg of an oligonucleotide internal standard before analysis. The top two chromatograms represent different levels of the incubated P-S oligo. The bottom chromatogram is an external standard of equal amounts of the 19mer oligo and internal standard. Note the high recovery of the oligonucleotide and low level of plasma contaminants from the incubated samples.

Ordering Information

Clarity OTX			
Part No.	Description		Unit
KS0-8494	Clarity OTX Starter Kit-Tubes	Includes: 100 mg/3 mL cartridges (x50) Lysis-loading buffer (100 mL) Equilibration buffer (250 mL) Wash buffer (350 mL) Elution buffer (100 mL)	ea
KS0-9253	Clarity OTX Starter Kit-96-Well Plate	100 mg/ 96-well plate (x1) Lysis-loading buffer (100 mL) Equilibration buffer (250 mL) Wash buffer (350 mL) Elution buffer (100 mL)	ea
8M-S103-4GA	Clarity OTX Microelution Well Plate	2 mg/ well	1/box
8E-S103-CGA	Clarity OTX Well Plate	25 mg/ well	1/box
8E-S103-EGA	Clarity OTX Well Plate	100 mg/ well	1/box
8B-S103-EBJ	Clarity OTX Cartridge	100 mg/3 mL	50/box
8B-S103-HCH	Clarity OTX Cartridge	500 mg/6 mL	30/box
ALO-8579	Clarity OTX Lysis-Loading Buffer V2.0	1 L	ea

Clarity[®] BioSolutions for Synthetic DNA/RNA

U.S. Patent No. 7, 119, 145

Clarity QSP[™] Cartridges and 96-Well Plates

High-throughput, RPC Purification

- > 90% typical purities & recoveries for RNA & DNA
- For oligos 10 – 100 mer
- Simple 3-step process for trityl-on oligos
- Cost-effective solution for high purity
- Purification without using ion-pairing agents

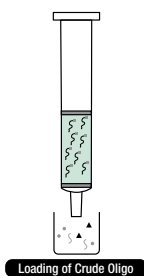
The Quick, Simple, Pure (QSP) Protocol

Following the easy, step-by-step QSP protocol anyone can deliver high purity RNA and DNA. The process includes brief sample preparation followed by 3 simple steps to isolate the oligo of interest from impurities and failure sequences. The QSP sorbent and loading buffers have been engineered to work synergistically with crude synthetic mixtures to produce greater than 90% recoveries and purities in less than 20 minutes.

Pre-treatment: Trityl-on oligo sample preparation. Mix equal volume of loading buffer with cleavage/deprotection solution

STEP 1

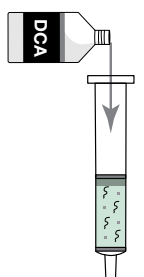
Load crude oligo cocktail
All trityl-off impurities flow directly through; no wash required.



Loading of Crude Oligo

STEP 2

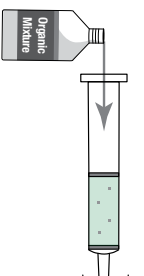
Detritylate
Less than 2% depurination observed. A faint orange band will appear at top half of cartridge indicating DMT retention.



Detritylate

STEP 3

Elute target oligo
pH buffered solutions used to maintain safe pH for oligo; select elution buffer based on downstream requirements.



Elution of Target Oligo

- Full Length Trityl-On Oligo
- Impurity
- N-1 Sequence
- Detritylated Failure Sequences
- Trityl Group
- Full Length Target Oligo

Dual-Component System

Two components, loading buffer and SPE cartridge or 96-well plate, are required for Clarity QSP purification. Various loading buffers have been formulated specifically for DNA and RNA chemistries so that one-step loading in synthetic cocktails is permissible and no ion-pairing reagents are required. Multiple SPE formats are available to suit a wide range of synthesis scales and automation requirements. 96-well plates are of a standard footprint and should fit most commercial vacuum manifolds and liquid handling robots.

Loading Buffers

- DNA: for all DNA and RNA-TOM chemistries
- RNA-TBDMS: for RNA-TBDMS and 2' modified RNA chemistries



SPE Formats

- 60 mg/ 3 mL cartridges: < 200 nmol scale
- 150 mg/ 3 mL cartridges: < 1 µmol scale
- 5 g/ 60 mL cartridges: 5 – 25 µmol scale



- 50 mg/ 96-well plate: 200 nmol scale per well



96-well plate

Negligible Depurination

Significant effort was made during the development of Clarity QSP to minimize the causes of depurination. The lower acid concentrations and limited exposure times within the protocol generate less than 2% depurination.



Request a FREE copy of Technical Note [TN-0008](#), Avoiding Depurination During Trityl-on Purification for more information.



2008 R&D 100 Award Recipient

Clarity QSP™ (cont'd)

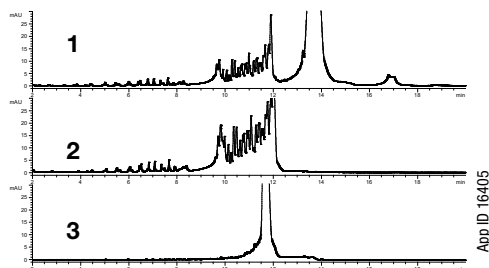
High Purity, High Yield DNA and RNA

Clarity QSP is a next generation trityl-on purification solution that was specifically designed to complement contemporary synthetic processes and consistently deliver high purities and recoveries for all types of synthetic DNA and RNA sequences. Complete discrimi-

nation between full-length trityl-on sequences from impurities is guaranteed. The final elution step delivers concentrated, full-length sequences in a stable media suitable for in vivo applications and downstream analysis conducive for MS, NMR, CE, and HPLC.

53nt DNA Purification

Sequence: ACAGTCGTACAGTCATATATTACTATTAGTGTCTACTGCAGCTGTTATCTAT
Synthesis Scale: 200 nmol
Format: 50 mg / 1 mL

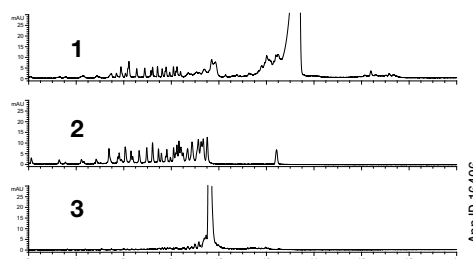


1. Crude Trityl-on
2. Load fraction
3. Detritylated final elution

Crude Trityl-on	Load Fraction	Detritylated Final Elution	Recovery	Purity (Peak area)
39.7	6.51	29.6	89 %	93 %

High-Throughput DNA Purification

Sequence: GTGGATCTGCGCACTTCAGGCTCCTGGGCT
Synthesis Scale: 200 nmol
Format: 96-Well Plate (50 mg / well)

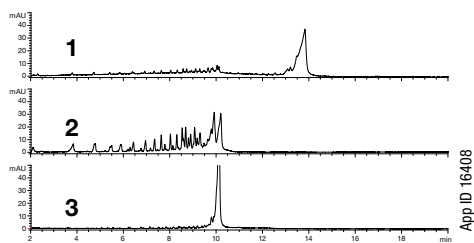


1. Crude Trityl-on
2. Load fraction
3. Detritylated final elution

Crude Trityl-on	Load Fraction	Detritylated Final Elution	Recovery	Purity (Peak area)
28.3	5.3	20.8	90.3 %	92 %

Crude 27nt RNA Purification (TBDMS Chemistry)

Sequence: Proprietary
Synthesis Scale: 1 µmol
Format: 150 mg / 3 mL



1. Crude Trityl-on
2. Load fraction
3. Detritylated final elution

Crude Trityl-on	Load Fraction	Detritylated Final Elution	Recovery	Purity (Peak area)
33.4	9.22	22.9	94 %	84 %

Ordering Information

Clarity QSP™ Well Plates & Cartridges

Part No.	Description		Unit
Formats			
8E-S102-DGB	Clarity QSP Well Plate	50 mg/well	1/box
8B-S102-UBJ	Clarity QSP Cartridge	60 mg/3 mL	50/box
8B-S102-SBJ	Clarity QSP Cartridge	150 mg/3 mL	50/box
8B-S042-LFF	Clarity QSP Cartridge	5 g/60 mL	16/box

Buffers*

AL0-8280	Clarity QSP DNA Loading Buffer	1 L	ea
AL0-8282	Clarity QSP RNA-TBDMS Loading Buffer	1 L	ea

* RNA-TOM loading buffer available upon request



For more information on the Clarity QSP protocol, depurination, or applications, please request a copy of the Clarity QSP User's Manual.



Request Technical Note [TN-0015](#) Comparing Performance of High-Throughput, Trityl-on RNA/DNA Purification Products to see the benefits of using Clarity QSP over other trityl-on solutions.



Clarity RP-Desalting[™] Tubes and Well Plates

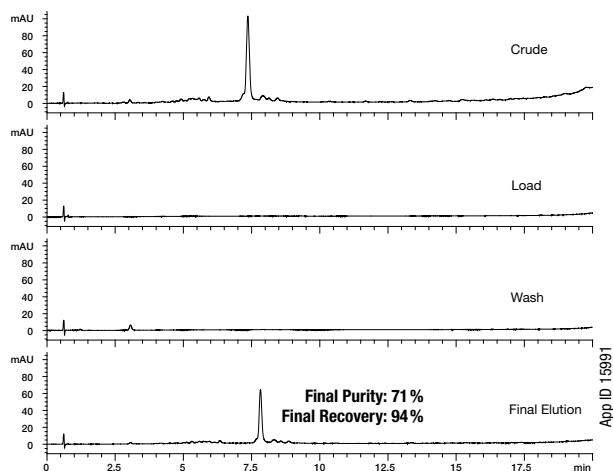
Quick, Simple Removal of Salt and Reagent

- 70% typical purity by removing salt and excess reagent
- 80% typical recovery of target oligo
- For cleanup of trityl-off DNA and RNA sequences
- Removes salt prior to MS analysis
- Also in a high-throughput 96-well plate format

Clarity QSP[™], Oligo-WAX[™], and Oligo-RP[™] can be used to yield highly purified target oligonucleotides (> 85% purity) from a synthesis mixture. For simple desalting and reagent removal of a trityl-off synthetic oligonucleotide, Clarity RP-Desalting tubes are a poly-functional silica-based C18 sorbent that provides a high capacity, fast and effective desalting process.

Desalting of Dye-Labeled DNA

Column: Clarity 3 μm Oligo-RP C18
Dimensions: 50 x 4.6 mm
Part No.: 00B-4441-E0
Mobile Phase: A: 50 mM TEAA, pH 7.5 / 5% Acetonitrile
 B: Methanol
Gradient: A/B (90:10) to A/B (40:60) in 20 min
Flow Rate: 1 mL/min
Detection: UV @ 260 nm
Sample: 25nt DNA oligonucleotide

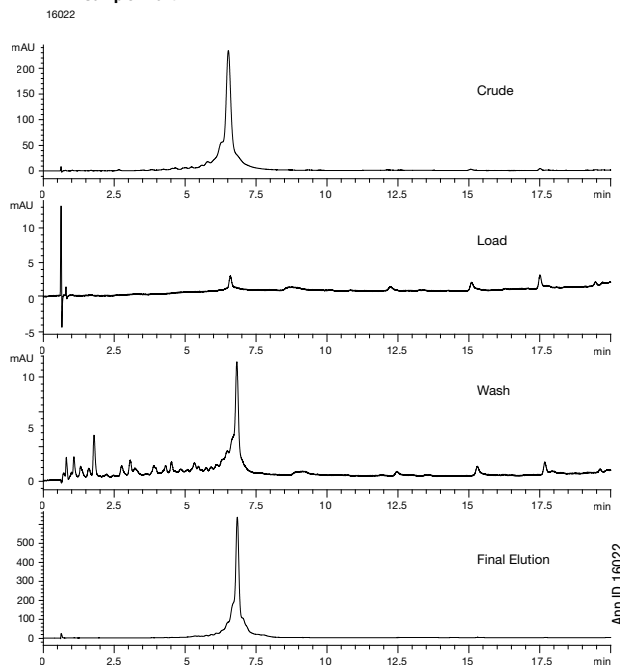


A quencher-labeled sample of DNA (25nt) with the sequence FAMTTGACTTAGACTTAGA-CTTAGTTT was desalted using Clarity RP-Desalting tubes in the 200 mg/3 mL format. Collection fractions were then analyzed for purity and recovery using the above protocol.



Crude DNA Desalting

Column: Clarity 3 μm Oligo-RP C18
Dimensions: 50 x 4.6 mm
Part No.: 00B-4441-E0
Mobile Phase: A: 50 mM TEAA / 5% Acetonitrile
 B: Methanol
Gradient: A/B (90:10) to A/B (40:60) in 20 min
Flow Rate: 1 mL/min
Detection: UV @ 260 nm
Sample: 40nt DNA



Ordering Information

Clarity RP-Desalting Tubes		
	200 mg/3 mL*	500 mg/3 mL**
Phase	50/box	50/box
C18	8B-S041-FBJ	8B-S041-HBJ

Clarity RP-Desalting Well Plates*

Part No.	Description	Unit
8E-S041-SGA	Clarity RP Desalting 150 mg/well	ea



For more information on the Clarity products please contact your Phenomenex technical consultant.

* For 200 μmol synthesis
 ** For 1 μmol synthesis

Clarity[®] BioSolutions for Synthetic DNA/RNA

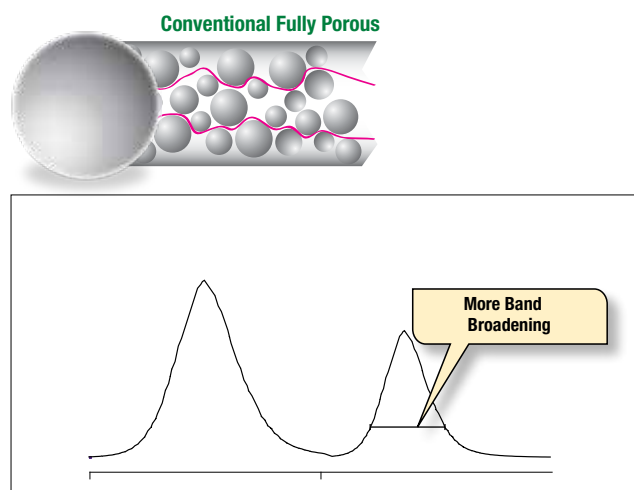
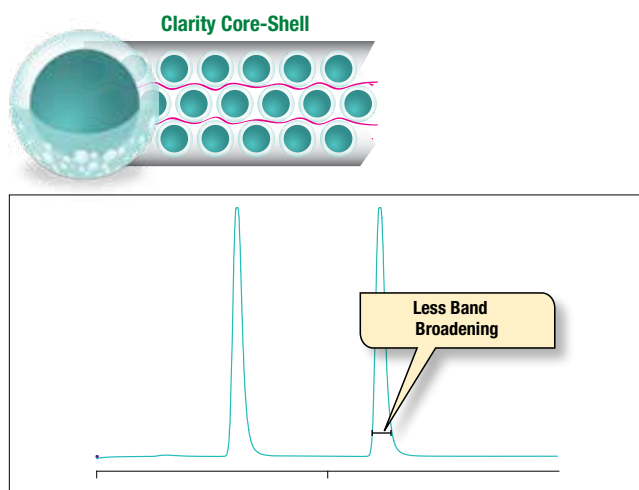
U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Clarity Oligo-XT Core-Shell LC Columns

A Sensitive Solution for Oligo Characterization and Bioanalysis

Unlike traditional fully porous oligo columns, Clarity Oligo-XT relies on the power of core-shell technology to provide extremely high efficiencies for both low and high oligo concentrations. Because the Clarity Oligo-XT particle is not fully porous, analytes spend less time diffusing into and out of the pores as they travel through

the column, resulting in less band broadening for higher peak efficiencies, making Clarity Oligo-XT a great choice for analyses that require sensitivity such as oligo characterization and oligo analysis from bioanalytical samples.

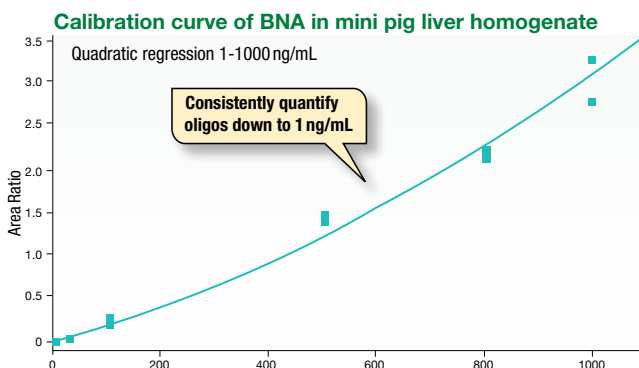


Fully Porous	VS	Clarity Core-Shell	Average Efficiency Gain with Clarity*
5 μm		5 μm	90% Higher
3 μm		2.6 μm	85% Higher

Fully Porous	VS	Clarity Core-Shell	Average Efficiency Gain with Clarity*
1.7 μm		1.7 μm	20% Higher

* May not be representative of all applications

Sensitive, Reliable Analysis



LC-MS/MS Conditions:

Column: Clarity 5 μm Oligo-XT
Dimensions: 50 x 2.1 mm
Part No.: [00B-4745-AN](#)
HPLC system: Shimadzu[®] Nexera[®] X2 UHPLC
Mobile Phase: A: 1.0% HFIP & 0.1% DIEA with 10 μM EDTA in Methanol
 B: 1.0% HFIP & 0.1% DIEA with 10 μM EDTA in Methanol Water (50:50 v/v)

Gradient:	Time (min)	% B
	0.5	30
	2.5	60
	3	100
	3.5	100
	4	30
	5	30

Flow Rate: 500 $\mu\text{L}/\text{min}$
Inj. Volume: 10 μL
Temperature: 40 $^{\circ}\text{C}$

Detection: Thermo Q Exactive[™] Hybrid Quadrupole-Orbitrap[™] Mass Spectrometer, HESI, negative polarity

Clarity Oligo-MS[™] LC Columns

Rapid and Efficient LC-MS Separation for QC and Characterization

- Core-shell particle technology provides improved speed, resolution, and sensitivity
- 2.6 µm particles deliver increased efficiency at reduced backpressures
- Easily transfer quantitative LC-MS methods to any system with 2.6 µm particles
- 1.7 µm particles boost performance of existing sub-2 µm methods

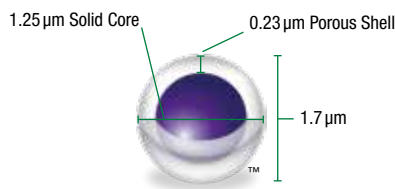
Clarity Oligo-MS, C18 columns have been engineered for the MS characterization of synthetic DNA and RNA samples. This media is based on core-shell technology which generates extremely high efficiencies due to the innovative particle design. This increase in efficiency improves the resolution between critical oligo sequences, gives higher sensitivity for easier MS quantitation, and allows for a decrease in column length for higher throughput.

Core-Shell Technology for Synthetic DNA/RNA Analysis

Clarity Oligo-MS media is not fully porous like traditional particles used for the analysis of oligonucleotides. It is a core-shell particle technology which uses a sol-gel processing technique to grow a homogeneous porous shell onto a solid core. This highly optimized process combined with uniform particle size distribution produces a column that generates extremely high plate counts.

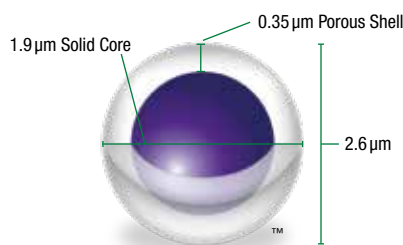
1.7 µm Core-Shell Particle

- Reduced diffusion path maximizes efficiency
- Increased efficiencies compared to traditional fully porous sub-2 µm columns. Typical operating backpressures > 400 bar



2.6 µm Core-Shell Particle

- Reduced diffusion path maximizes efficiency
- Ultra-high performance on any system with Clarity Oligo-MS 2.6 µm columns

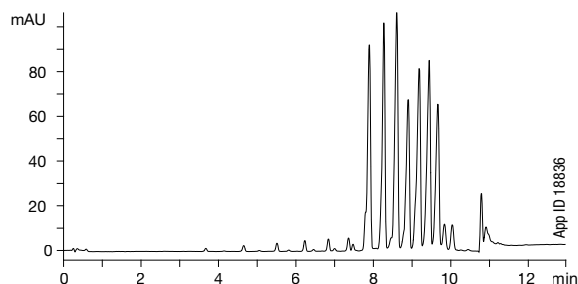


Achieve Baseline Resolution of N-1 and N+1 Oligo from Target

The high plate counts generated by the Clarity Oligo-MS material produce extremely high efficiencies and thus excellent resolution between oligonucleotides of similar length and structure. Scientists can achieve baseline resolution between synthetic oligonucleotides with just one base difference allowing easier quantitation.

Poly dT Standard (12-18mer)

Column: Clarity 2.6 µm Oligo-MS C18
Dimensions: 50 x 2.1 mm
Part No.: [00B-4479-AN](#)
Mobile Phase: A: 100 mM HFIP / 4 mM TEA / 2% Methanol
 B: 100 mM HFIP / 4 mM TEA / 98% Methanol
Gradient: A/B (95:5) to A/B (80:20) in 10 min
Flow Rate: 0.5 mL/min
Temperature: 50 °C
Detection: UV @ 260 nm (22 °C)
Injection Volume: 20 µL
Sample: Poly dT (12-18)

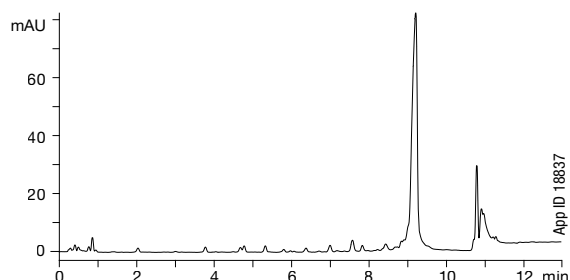


Rapid Separation of Complex Oligo Samples

Due to the high resolving power of Clarity Oligo-MS columns, high-throughput methods for the separation of complex synthetic mixtures can be developed. Using short (50 mm length) columns, impurities are separated from the peak of interest in less than 12 minutes.

Crude DNA 30mer

Column: Clarity 2.6 µm Oligo-MS C18
Dimensions: 50 x 2.1 mm
Part No.: [00B-4479-AN](#)
Mobile Phase: A: 100 mM HFIP / 4 mM TEA / 2% Methanol
 B: 100 mM HFIP / 4 mM TEA / 98% Methanol
Gradient: A/B (95:5) to A/B (80:20) in 10 min
Flow Rate: 0.5 mL/min
Temperature: 50 °C
Detection: UV @ 260 nm (22 °C)
Injection Volume: 20 µL
Sample: Crude DNA 30mer



Clarity Oligo-RP™ LC Columns

Reversed Phase LC for Purification and Characterization

- Easily separate N-1 failure sequences from target oligo with > 90 % purities
- Trityl-off purification of DNA, RNA, Thioates, and modified/labeled oligonucleotides
- Preparative dimensions and particle sizes for loads > 5 μmol
- Purify oligos up to 60 mer in length
- Excellent column for reversed phase HPLC quality control (QC) testing

Clarity Oligo-RP has been specifically designed for the reversed phase purification of oligonucleotides with balanced hydrophobicity and polar selectivity. The media is based on composite particle TWIN™ technology. This technology gives improved selectivity and efficiency for oligonucleotides when compared to other hybrid, polymer, and silica particles found in the marketplace. It is available in 3, 5, and 10 μm particle sized beads and in a variety of dimensions.

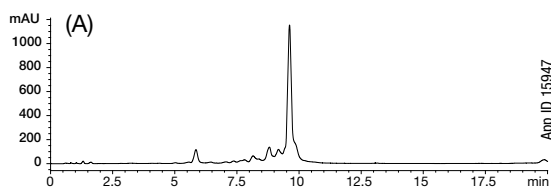
Preparative Purification on Oligo-RP

Reversed phase separation of oligonucleotides has advantages over other modes of separations such as ion-exchange. The Oligo-RP phase allows high loadability and delivers high recovery and purity, eliminating the need for extra purification steps. This is achieved through an ion-pair separation of the trityl-off oligonucleotide from failure products and other impurities.

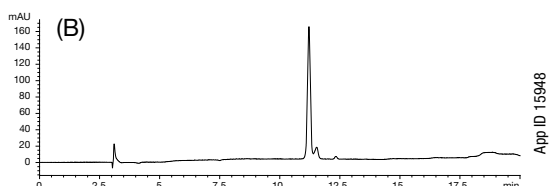
DNA Purification

(A) Preparative (B) Analytical QC

- Column:** Clarity 3 μm Oligo-RP C18
Dimensions: (A) 50 x 10.0 mm
 (B) 50 x 4.6 mm
Part No.: (A) [00B-4441-NO](#)
 (B) [00B-4441-EO](#)
Mobile Phase: A: 50 mM TEAA pH 7.5 / 5 % Acetonitrile
 B: Methanol
Gradient: 10 % to 60 % B in 20 minutes
Flow Rate: (A) 4.7 mL/min
 (B) 1.0 mL/min
Detection: UV @ 260 nm
Sample: 20nt DNA



A 200 μg (1 μmol) 20mer DNA sample was loaded onto a 10 mm ID Clarity Oligo-RP column. Impurities were separated from the target sequence.



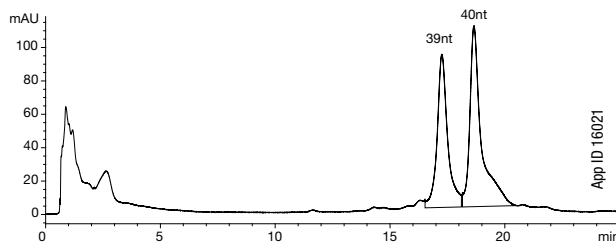
A Clarity Oligo-RP analytical column was used to verify the purity of the preparative purification. A purity of 92 % with a yield of 85 % was determined.

Separate N-1 Failure Sequences from Target N Sequence

The Oligo-RP sorbent is specifically designed to accommodate all possible interactive features of nucleosides with matching modes of reactivity to its own. The sorbent possesses hydrophobic, dipolar, π-π, and hydrogen bond donor/acceptor sites; this combination of interaction along with an ion-pairing reagent elicits a high degree of differential selectivity between nucleic acids. Thus it can recognize even the slightest changes in nucleotide sequence, such as a difference of one base (N and N-1) or substitution of one base for another.

DNA Purification of Failure N-1 from Target N Sequence

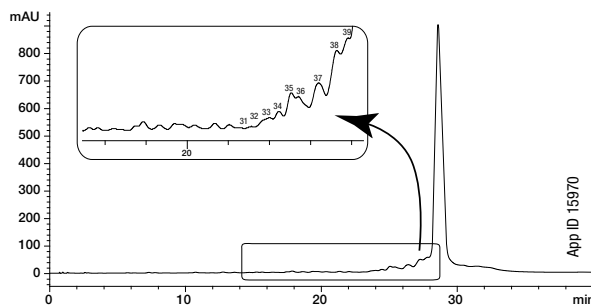
- Column:** Clarity 3 μm Oligo-RP C18
Dimensions: 50 x 4.6 mm
Part No.: [00B-4441-EO](#)
Mobile Phase: A: 50 mM TEAA pH 7.5
 B: Methanol
Gradient: 10 % to 45 % B in 30 minutes
Flow Rate: 1 mL/min
Detection: UV @ 260 nm
Sample: 1. 40nt DNA with sequence
 CTCTGAACAGTTGATCTATGCACTTCAGACTTATGATCA (2.5 μg)
 2. 39nt DNA with sequence
 TTCTGAACAGTTGATCTATGCACTTCAGACTTATGATCA (2.5 μg)



Clarity Oligo-RP successfully separates a 40mer from a 39mer DNA oligonucleotide due to its excellent efficiency and resolving power.

Fingerprint of 40mer DNA

- Column:** Clarity 3 μm Oligo-RP C18
Dimensions: 50 x 4.6 mm
Part No.: [00B-4441-EO](#)
Mobile Phase: A: 50 mM TEAA pH 7.5 / 5 % Acetonitrile
 B: Methanol
Gradient: 20 % to 25 % B in 20 minutes; hold at 5 minutes @ 25 % B
Flow Rate: 1 mL/min
Detection: UV @ 260 nm
Sample: 40nt DNA with sequence
 5'-CTC CTG GGC AGT GGA TCT GCG CACTTC AGG CTC CTG GGC A-3'



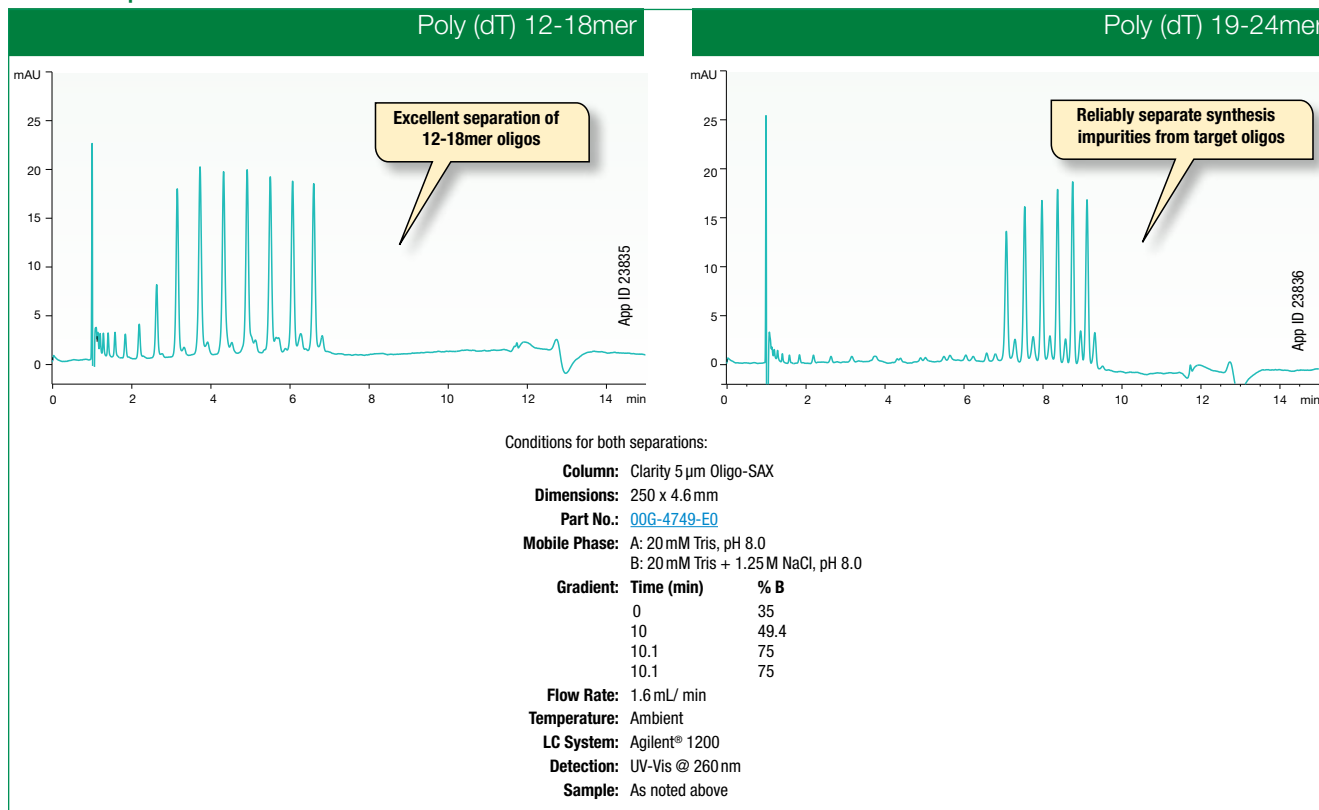
Due to the high efficiency of the sorbent and ion-pairing interactions, a fingerprint of a crude 40mer DNA on Clarity Oligo-RP is produced illustrating baseline resolution of impurities from the final product.

Clarity Oligo-SAX LC Columns

High Resolution Oligo Characterization

The characterization of synthetic oligos is important in the drug development process, and one common technique used is strong anion-exchange liquid chromatography. This high resolution technique is preferred when extensive characterization (i.e. LC-MS) is not necessary. Another valuable benefit is that n-1 failure sequences can still be separated without the use of an ion-pair reagent. Clarity Oligo-SAX strong anion-exchange columns allow analysts to reliably characterize a variety of different sized synthetic oligos while providing excellent separation of oligos and synthesis impurities.

A Sensitive Separation



Clarity Oligo-WAX[™] LC Columns

High Purity, High Loadability Preparative Ion-Exchange Purification

- Excellent efficiency column results in > 90% purities due to good fractionation of closely eluting compounds
- High loading capacity due to very high density ligand
- Increase productivity by running at higher flow rates and pressures
- Columns amenable to HPLC and FPLC systems

Clarity Oligo-WAX LC columns were designed with the synthetic DNA/RNA preparative chromatographer in mind. Oligo-WAX is an advantageous combination of purity, capacity, mechanical strength, cost, and efficiency.

Tailored for Preparative Purification

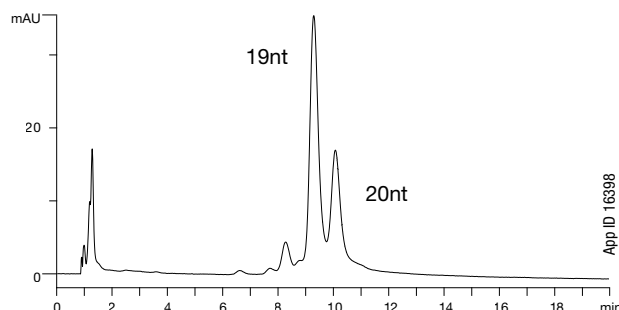
The majority of synthetic oligo preparative purifications are performed using a strong anion exchanger bonded to a 10 or 15µm polymer backbone. Polymer backbones are amenable to clean in place protocols and strong anion exchangers have a wide effective pH range. To date, these technologies have been satisfactory for prep purifications and will continue to be. However, due to the fact that Clarity Oligo-WAX is a cross-linked weak anion exchanger bonded to a 10µm high purity silica, this technology offers advantages such as high loading capacity, excellent peak efficiency, and a robust backbone that aren't available with typically used purification products.

Purify Failure Sequences and Contaminants from Target Sequence

Ion-exchange is an excellent separation mode for purifying contaminants and failure sequences from target sequences. Clarity Oligo-WAX, due to its increased efficiency compared to other ion-exchange columns, has the ability to recognize minute charge differences in nucleotide sequences such as failure sequences or base substitutions.

DNA Purification of N-1 Sequence from Target N Sequence

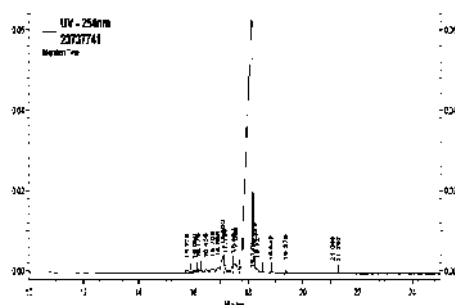
Column: Clarity 10µm Oligo-WAX
Dimensions: 150 x 4.6 mm
Part No.: [00F-4451-E0](#)
Mobile Phase: A: Water
 B: Acetonitrile
 C: 100 mM Tris, pH 8
 D: 2 M Sodium chloride
Gradient: A/B/C/D (70:10:20:0) to (10:10:20:60) in 20 min
Flow Rate: 2.2 mL/min
Detection: UV-Vis Abs.-Diode Array (ambient)
Sample: Depurinated A & G and 20mer DNA



App ID 16398

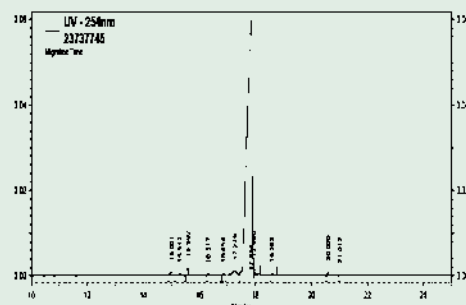
CE Purity Analysis of Ion-Exchange Purification

GE Healthcare SOURCE[™] 15Q
150 x 10 mm (self-packed)



- Final Purity = 88.8%, N-1 = 2.0% • Final amount = 205.9 OD's
- Recovery of full-length product = 28.9% • Conductivity = 200 µS/cm

Clarity Oligo-WAX 10µm
150 x 10 mm (pre-packed)



- Final Purity = 95.1%, N-1 = 1.3% • Final amount = 188.9 OD's
- Recovery of full-length product = 28.4% • Conductivity = 151 µS/cm

Two purification runs were performed on each column with fractional QC being taken after each run. Passing fractions from the two purification runs were combined into one pooled lot for each column. That pooled lot was then divided equally and run through a Clarity desalting tube. Final OD's and QC were taken after desalting, including ESI, CE, and conductivity. The purity and resolution of Clarity Oligo-WAX was considerably better than SOURCE 15Q. Though SOURCE had a slightly higher recovery of full length oligo, it was not a wide enough margin to offset the purity advantage.

Data courtesy of a large, Iowa-based oligo manufacturer.
 Comparative separations may not be representative of all applications.

Clarity Oligo-XT, Oligo-MS[™], and Oligo-RP[™] LC Columns

Ordering Information

Minibore Columns (mm)				SecurityGuard [™] Cartridges (mm)	SecurityGuard [™] ULTRA Cartridges [†]
Phase	50 x 2.0	100 x 2.0	150 x 2.0	4 x 2.0*	—
3 μm Oligo-RP C18	00B-4441-B0	00D-4441-B0	00F-4441-B0	/10pk AJ0-8134	—
5 μm Oligo-RP C18	—	—	00F-4442-B0	/10pk AJ0-8134	—
Phase	50 x 2.1	100 x 2.1	150 x 2.1	—	2.1
1.7 μm Oligo-MS C18	00B-4480-AN	00D-4480-AN	—	—	/3pk AJ0-9068
2.6 μm Oligo-MS C18	00B-4479-AN	00D-4479-AN	00F-4479-AN	—	/3pk AJ0-9068
1.7 μm Oligo-XT	00B-4747-AN	00D-4747-AN	—	—	/3pk AJ0-9515
2.6 μm Oligo-XT	00B-4746-AN	00D-4746-AN	—	—	/3pk AJ0-9515
5 μm Oligo-XT	00B-4745-AN	—	—	—	AJ0-9515

for ID: 2.0-3.0 mm for 2.1 mm ID



Analytical Columns (mm)					SecurityGuard [™] Cartridges (mm)	SecurityGuard [™] ULTRA Cartridges [†]
Phase	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*	4.6
2.6 μm Oligo-MS C18	00B-4479-E0	00D-4479-E0	—	—	—	/3pk AJ0-9066
2.6 μm Oligo-XT	00B-4746-E0	00D-4746-E0	—	—	—	/3pk AJ0-9514
3 μm Oligo-RP C18	00B-4441-E0	00D-4441-E0	00F-4441-E0	—	/10pk AJ0-8135	—
5 μm Oligo-RP C18	00B-4442-E0	—	00F-4442-E0	00G-4442-E0	/10pk AJ0-8135	—
5 μm Oligo-XT	—	—	00F-4745-E0	—	—	/3pk AJ0-9514
10 μm Oligo-RP C18	—	—	00F-4445-E0	00G-4445-E0	/10pk AJ0-8135	—

for ID: 3.2-8.0 mm for 4.6 mm ID

Semi-Prep Columns (mm)					SecurityGuard [™] Cartridges (mm)
Phase	50 x 10.0	100 x 10.0	150 x 10.0	250 x 10.0	10 x 10 [†]
3 μm Oligo-RP C18	00B-4441-N0	—	—	—	/3pk AJ0-8136
5 μm Oligo-RP C18	00B-4442-N0	00D-4442-N0	00F-4442-N0	00G-4442-N0	/3pk AJ0-8136
5 μm Oligo-XT	00B-4745-N0	00D-4745-N0	00F-4745-N0	—	/3pk AJ0-9516
10 μm Oligo-RP C18	—	—	00F-4445-N0	00G-4445-N0	/3pk AJ0-8136

for ID: 9-16 mm



For more about SecurityGuard ULTRA and cartridge holder ordering information, see p. 316.

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP[™] products on pp. 391-392



For Column Heater, see p. 390

Axia [™] Packed Preparative Columns (mm)					SecurityGuard [™] Cartridges (mm)	
Phase	100 x 21.2	150 x 21.2	250 x 21.2	150 x 30	15 x 21.2**	15 x 30.0*
5 μm Oligo-RP C18	00D-4442-P0-AX	—	00G-4442-P0-AX	—	/ea AJ0-8210	/ea AJ0-8310
5 μm Oligo-XT	00D-4745-P0-AX	00F-4745-P0-AX	00G-4745-P0-AX	00F-4745-U0-AX	/ea AJ0-9517	/ea AJ0-9518
10 μm Oligo-RP C18	—	00F-4445-P0-AX	00G-4445-P0-AX	00F-4445-U0-AX	/ea AJ0-8210	/ea AJ0-8310

for ID: 18-29 mm 30-49 mm

*SecurityGuard[™] Analytical Cartridges require universal holder Part No.: [KJ0-4282](#)

†SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

**PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)

•PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8277](#)

†SecurityGuard ULTRA cartridges require holder, Part No.: [AJ0-9000](#)

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Accessories and Lab Safety



“Always pleasant dealing
with Phenomenex. I am a happy
customer.”





**Avrom Litin
Enthone**

The opinions stated herein are solely those of the speaker
and not necessarily those of any company or organization.

HPLC Column Protection / Equipment

The Most Important Thing You Can Do... Use Guard Columns

Phenomenex recommends the use of SecurityGuard™ to protect all your valuable HPLC/UHPLC/SFC/PREP columns from chemical contaminants and damaging microparticulates. See page 311.

Analytical	SemiPrep
<p>For analytical separations the SecurityGuard innovative design provides a universal fit to virtually any HPLC column endfitting. Learn more about this unique cartridge system and the many benefits SecurityGuard gives you.</p> <p>SecurityGuard ULTRA</p>  <p>All core-shell and / or < 3 µm particle columns (< 20000 psi / 1378 bar) Holder P/N AJ0-9000 See page 316.</p> <p>SecurityGuard Standard</p>  <p>All non core-shell and / or ≥ 3 µm particle columns (5000 psi / 345 bar) Holder P/N KJ0-4282 See page 311.</p>	 <p>10 mm ID Guard Holder P/N AJ0-9281</p>  <p>Use with 9 to 16 mm ID Columns Cartridge size: 10 x 10 mm ID</p>

Single-Column Heater 25 °C to 90 °C

ThermaSphere™ TS-130

Maintains the temperature of your HPLC column (and guard, if any) at a precise degree set by user, thus improving reproducibility and chromatographic results.

Essential for improving virtually all types (modes) of HPLC separations.

- Improves reproducibility and chromatographic results
- Improves baseline and overall detector performance
- Reduces analyte identification errors
- Improves peak efficiency and analyte quantitation (especially at low levels)
- Improves the ruggedness of separations (within-lab and lab-to-lab)



Column heater showing front control/display panel

Specifications

Column Size Accommodated:	Fits up to one 30 cm length column, or 25 cm column with guard column. Multiple inlet and outlet slots allow the shortest length of tubing to be used with any length column.
Temperature Range:	From 25 to 90 °C in 0.1 °C increments.
Temperature Stability:	±0.1 °C Calibration two-point, electronic, factory set.
Accuracy:	0.5 °C over the entire range.
Power:	12 volt DC universal power supply takes voltage inputs from 95 to 265 VAC, 50/60 Hz. CE approved.
Over-temperature Alarm:	Audible with automatic heater shutoff if column temperature exceeds 10 °C of target temperature.
Auto-Off Timer:	Count down timer with audible alarm turns off heater, settable to 30 days in days, hours, minutes and seconds.
Injection Counter:	Trigger on external switch closure.

Ordering Information

ThermaSphere TS-130 Column Heater

Part No.	Description
EH0-7057	ThermaSphere TS-130 HPLC Column Heater 25-90 °C, 95 to 265 VAC, 50/60 Hz



1. The ThermaSphere TS-130 is warranted for one year parts and labor. Each unit is individually calibrated and comes with a Certificate of Performance. No adjustment or re-calibration is ever necessary. CE approved system, UL and CSA approved power supplies.
2. Please specify Line Cord if other than North America (Australia, Germany, Italy and U.K. are available)

PREPARATIVE		
HPLC	SFC	
 <p>21.2 mm ID HPLC Holder P/N AJ0-8223</p>	 <p>21.2 mm ID SFC Holder P/N AJ0-8617</p>	 <p>Use with 18 to 29 mm ID Columns Cartridge size: 15 x 21.2 mm ID</p>
 <p>30 mm ID HPLC Holder P/N AJ0-8277</p>	 <p>30 mm ID SFC Holder P/N AJ0-8618</p>	 <p>Use with 30 to 49 mm ID Columns Cartridge size: 15 x 30.0 mm ID</p>

Increase Lab Safety with HPLC/UHPLC Solvent Protection SecurityCAPs

The SecurityCAP mobile phase and solvent waste safety caps inhibit dangerous vapors and gases from leaving HPLC/UHPLC solvent reservoirs. Over time, these chemicals can have a negative impact on the health of all employees and visitors in the lab. When lab safety and dependable results are a priority, you need SecurityCAPs!

Mobile Phase Safety Filter and Cap

- Increases Health and Worker Safety**
Solvent vapors and gasses are restricted to their containers
- Protects HPLC/UHPLC Results**
Eliminates dust and other air contaminants from testing results
- Confidence During Quality and Safety Audits**
Eliminate aluminum foil or Parafilm® covering solvent bottles



The SecurityCAP mobile phase safety filters have an integrated one-way valve and filter membrane that captures dust, particulates, and other airborne contaminants. This prevents unwanted items from entering the solvent container which can cause irreproducible HPLC/UHPLC results, solvent contamination, bacterial growth and ghost peaks, all of which could negatively impact both your chromatography and HPLC/UHPLC system.

HPLC/UHPLC Solvent Top/Cap Comparison

SecurityCAP offers several advantages over insufficient non-sealed tops/caps which can lead to both hazardous lab conditions and poor chromatography results. When it comes to lab safety, saving money on expensive solvents and ensuring solvent protection, there is no comparison to SecurityCAP.

	Open Top	Aluminum foil wrapped bottle top	Cap with two 10 mm holes in the plastic	SecurityCAP™
Protects staff and visitors from volatile organic compounds released into lab	No	No	No	Yes
Ensures confidence during quality and safety audits	No	No	No	Yes
Protects solvents from both atmospheric particulates and contaminants	No	No	No	Yes
Saves money by preventing solvent evaporation	No	No	No	Yes
Prevents chemical spills/ splashes	No	No	No	Yes
Time monitor device for protection	No	No	No	Yes
100% Sealable	No	No	No	Yes
Easy to use	Yes	No	Yes	Yes
Improves lab safety	No	No	No	Yes

Waste Exhaust Filter and Cap

- Safer Laboratory Work Environment**
Harmful chemical vapors are safely collected and air quality is protected
- Large Capacity Waste Safety Filter**
High surface area (560m²/g) multi-compound adsorbent
- Easy to Use**
No more twisting tubes during bottle exchange



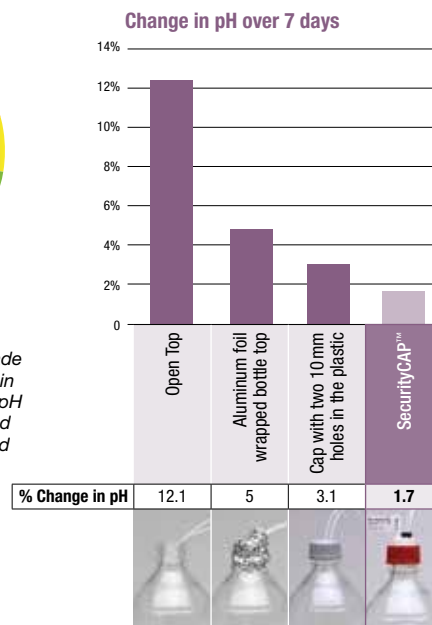
SecurityCAP solvent waste caps and exhaust filters ensure lab air quality. Feel confident that volatile vapors from solvent waste containers are being captured safely, beyond fume cupboards or hoods.

Prevent Unwanted Changes in Mobile Phase pH

As every chromatographer knows, the pH of the mobile phase can have dramatic effects on selectivity, capacity factor (retention factor), peak shape, resolution, and reproducibility of your HPLC/UHPLC analysis. Because slight variations in pH can have a dramatic impact on the separation, careful mobile phase preparation and protection are essential. When compared to other mobile phase solvent tops, SecurityCAP offers the solution to ensure the mobile phase pH will stay constant during use. This ensures reliable solvent conditions for results you can trust!



A 1L solution of 4 mM ammonium bicarbonate buffer at pH 11 was made for each bottle and left in a hood for 7 days. The pH was checked before and after the experiment and the percent difference was calculated.



Continued on next page

Lab Safety (cont'd)



Mobile Phase (Eluent) Safety Starter Kits

Ordering Information

SecurityCAP™ Mobile Phase Starter Kits

Part No.	Description	Unit
AC2-1245	2-port GL45 Cap and 6-month Safety Filter	ea
AC2-4245	2-port GL45 Caps (x4) and 6-month Safety Filter (x4)	ea
AC2-4240	2-port Merck S40 Caps (x4) and 6-month Safety Filter (x4)	ea
AC2-1345	3-port GL45 Cap and 6-month Safety Filter	ea
AC2-4345	3-port GL45 Caps (x4) and 6-month Safety Filter (x4)	ea
AC2-1445	4-port GL45 Cap and 6-month Safety Filter	ea
AC2-4445	4-port GL45 Cap (x1) and 2-port Cap (3x) and 6-month Safety Filter (x4)	ea
AC2-1545	5-port GL45 Cap and 6-month Safety Filter	ea
AC2-1561	5-port S60/S61 Cap and 6-month Safety Filter	ea

Waste Safety Starter Kits

Ordering Information

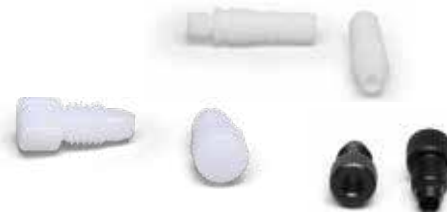
SecurityCAP Waste Starter Kits

Part No.	Description	Unit
AC1-1245	2-port GL/DIN45 Cap and 6-month Exhaust Filter and Barbed connector	ea
AC1-1545	5-port GL/DIN45 Cap and 6-month Exhaust Filter	ea
AC1-1551	5-port DIN51 Cap and 6-month Exhaust Filter	ea
AC1-1553	5-port B53 Cap and 6-month Exhaust Filter	ea
AC1-1561	5-port S61 Cap and 6-month Exhaust Filter	ea

Mobile Phase Safety Filter



Waste Safety Filters



Replacement Filters

Ordering Information

SecurityCAP Mobile Phase Safety Filter

Part No.	Description	Unit
AC2-0161	6-month Capacity, 1/4 in.-28 Threads	ea
AC2-0961	6-month Capacity, 1/4 in.-28 Threads	10/pk

SecurityCAP Waste Safety Filters

Part No.	Description	Unit
AC1-0161	6-month Exhaust Filter for SecurityCAP, 1/4 in.-28 Threads	ea
AC1-0361	6-month Exhaust Filter for SecurityCAP, 1/4 in.-28 Threads	3/pk
AC1-0162	6-month Exhaust Filter for Wide-port Caps, GL14 Threads	ea
AC1-0362	6-month Exhaust Filter for Wide-port Caps, GL14 Threads	3/pk

Fittings and Accessories

Ordering Information

SecurityCAP Fittings

Part No.	Description	Unit
AC3-1101	for 1/16 in. or 2.0 mm ID Tubing, 1/4 in.-28 Threads (POM), blue	ea
AC3-1201	for 2.3-2.6 mm ID Tubing, 1/4 in.-28 Threads (POM), white	ea
AC3-2101	for 1/8 in. ID Tubing, 1/4 in.-28 Threads (POM), black	ea

SecurityCAP Connectors

Part No.	Description	Unit
AC3-1001	Barbed connector, for 5-8 mm ID Tubing (PTFE), white	ea
AC3-1301	Y-connector for 6-8 mm ID Tubing (POM), white	ea

SecurityCAP Adapter

Part No.	Description	Unit
AC2-1138	Cap Thread Adapter, PTFE, GPI/GL 38 Female to GL45 Male	ea
AC3-1111	Waste Adapter for Male 1/4 in. NPT-port (PTFE)	ea

SecurityCAP Sealing Plug

Part No.	Description	Unit
AC3-2001	1/4 in.-28 Threads (POM), white	ea

i POM = polyoxymethylene
PTFE = polytetrafluoroethylene (Teflon®)

Disclaimer

The 6 month SecurityCAP filter lifetime is a general guideline based on running a single instrument for 8 hours a day at 1mL/min. SecurityCAP filters may need to be changed more or less frequently based on the system usage.

SecurityCAP Waste Safety Filter Compatibility Table

Supplier	Phenomenex SecurityCAP Filters	
	ea	3/pk
S.C.A.T.® SafetyWasteCaps	AC1-0162	AC1-0362
AIT® Smart Healthy Caps	AC1-0162	AC1-0362
Agilent® InfinityLab Stay Safe Caps	AC1-0162	AC1-0362
VICI Jour® Waste Caps	AC1-0161	AC1-0361
Canary-Safe™ Safety Caps	AC1-0162	AC1-0362
DURAN® DG Safety Caps	AC1-0162	AC1-0362
VapLock™ Safety Caps (with AC3-1111)	AC1-0161	AC1-0361

Fittings

1/4 in.-28 to 10-32 Standard Adapter

- Make connections between different pieces of liquid handling equipment
- Simple to use fingertight design
- Made of sturdy and inert PEEK
- Pressure rated to 1500 psi (103 bar)



Ordering Information

Standard Adapter

Part No.	Description	Unit
AQO-3351	1/4 in.-28 to 10-32 Standard Adapter, PEEK	ea

Ultra-High Performance LC/HPLC Stainless Steel Zero Dead-Volume Union

- Pressure rated to 28000 psi (1930 bar)
- For 1/16 in. OD tubing, with 10-32 threading
- 0.010 in. thru hole, 20 nL swept volume
- Includes 2 fittings (nuts and ferrules)



Ordering Information

Zero Dead-Volume Union (Stainless Steel)

Part No.	Description	Unit
AQO-8507	Zero Dead-Volume Union, SS, with Fittings, 10-32, for 1/16 in. Tubing, 28000 psi (1930 bar)	ea

Reducing Adapters

Two reducing adapters for 50mm ID Prep columns allow smaller 1/16 in. ID system tubing to be used with the larger 1/8 in. ID column inlet end fittings, forming a positive leak-free seal with zero dead volume. The smaller line from your system goes directly into the adapter and the sample goes directly into the column, without the short pieces of connecting tubing required if a reducing union was used instead. Once the fitting is installed, only one wrench is required to remove and reinstall it. Each end of the column requires a fitting.

[AQO-9222](#)

Reducing Adapter for 50 mm ID Axia Preparative HPLC/SFC Hardware



[AQO-7555](#)

Reducing Adapter for 50 mm ID Traditional (Non-Axia) HPLC/SFC Hardware



Ordering Information

Reducing Adapters

Part No.	Description	Unit
Complete Assembly		

AQO-9222	Reducing Adapter, 1/8 in. to 1/16 in. for 50 mm ID Axia Preparative HPLC/SFC Hardware, 1.0 mm (0.040 in.) ID thru-hole	2/pk
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AQO-7555	Reducing Adapter, 1/8 in. to 1/16 in. for 50 mm ID Traditional (Non-Axia) HPLC/SFC Hardware	2/pk
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Replacement Parts

AQO-7554	1/8 in. Fittings for 50 mm ID Rounded Hardware, 2 Nuts and 2 Ferrules (Non-Axia Columns)	2/pk
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AQO-3018	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea
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PEEK Zero Dead-Volume Union

- Chemically inert and fully biocompatible
- Zero dead-volume connection, 0.010 in. thru-hole
- Wrench/fingertight fittings
- Pressure rated to 5000 psi (345 bar)



Ordering Information

PEEK Zero Dead-Volume Union

Part No.	Description	Unit
AQO-1674	PEEK Zero Dead-Volume Union, 0.010 in. thru-hole, with 2 fingertight fittings	ea



Maximum Temperature Ratings (°C)

Material	Tubing	Fitting
PEEK	100	150
Delrin®	N/A	60
Teflon® (PTFE)	80	80
Polyethylene (UHMW)	N/A	50
Polypropylene	N/A	40
KEL-F®	N/A	80
Tefzel®	80	80

Ultra-High Performance LC Fittings

UHPLC / HPLC Sure-Lok™ High Pressure PEEK Male Nut Fittings

- Pressure rated to 12000 psi (827 bar)
- Stable up to temperatures of 200 °C

Made of a proprietary PEEK blend, these ultra-high performance polymeric fittings are compatible for most UHPLC/HPLC applications, and best for ion- and bio-chromatography. High pressure nuts have a knurled surface designed to provide sufficient sealing force on the ferrule without wrenches. For 1/16 in. diameter tubing, there are two design types. The convenient one-piece design is pressure rated on S.S. tubing to 12000 psi (827 bar) and stable up to temperatures of 200 °C. The second type is engineered as a 3-piece unit, with a ferrule and stainless steel gripping ring, that will provide leak-free connections up to 19000 psi (1310 bar), on S.S. tubing. Upper pressure limits of these fittings when used with polymeric tubing (such as PEEK) depends on the pressure rating of the tubing. Phenomenex PEEK tubing is rated to 7000 psi (482 bar). For higher pressure-rated fittings use the stainless steel nut and ferrule set (AQO-8506).

AQO-8503
Pressure rated up to 12000psi (827 bar)



AQO-8504
shown with AQO-8505
Pressure rated to 19000psi (1310 bar)



Ordering Information

Sure-Lok High Pressure PEEK Nuts

Part No.	Description	Unit
AQO-8502	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)	2/pk
AQO-8503	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)**	10/pk
AQO-8504	Sure-Lok High Pressure PEEK Nut, 10-32, for 1/16 in. Tubing, 19000 psi (1310 bar) ***†	10/pk
AQO-8505	Sure-Lok PEEK Ferrule Assembly (2-pc), for High Pressure 2-Pc Nut (AQO-8504)	10/pk

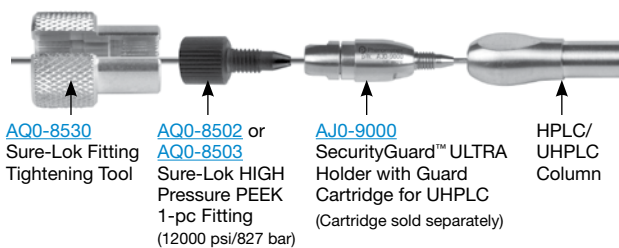
* Ferrule assembly ([AQO-8505](#)) must be ordered separately.

** Sure-Lok fitting tightening tool is required for [AQO-8503](#) and [AQO-8504](#)

† Recommended for PEEKsil™ tubing applications.

Sure-Lok™ Fitting Tightening Tool

Use this handy tool to tighten any standard, short- or long-style knurl-headed (high pressure) male nut like the ones above. The tool can also be used with many of the low-pressure nuts commonly used in the lab.



AQO-8530
Sure-Lok Fitting Tightening Tool

AQO-8502 or **AQO-8503**
Sure-Lok HIGH Pressure PEEK 1-pc Fitting (12000 psi/827 bar)

AJO-9000
SecurityGuard™ ULTRA Holder with Guard Cartridge (Cartridge sold separately)

HPLC/ UHPLC Column

Ordering Information

Sure-Lok Fitting Tightening Tool

Part No.	Description	Unit
AQO-8530	Sure-Lok Fitting Tightening Tool, Aluminum	ea

Ultra-High Performance LC/HPLC Stainless Steel Nut and Ferrule Set

For the ultra-high pressure connections use this specially-designed 10-32 stainless steel nut and ferrule set. The metal ferrule cuts a ring near the end of the tube to swage the fitting to the tube, and will provide a maximum operational limit of 28000 psi (1930 bar).



Ordering Information

Nut and Ferrule Set (Stainless Steel)

Part No.	Description	Unit
AQO-8521	Nut and Ferrule Set, SS, 10-32, for 1/16 in. Tubing, 28000 psi (1930 bar)	2/pk
AQO-8506	Nut and Ferrule Set, SS, 10-32, for 1/16 in. Tubing, 28000 psi (1930 bar)	10/pk



Important: To achieve the maximum pressure rating, 45 lbs of torque is required.



PEEKlok™ Fitting Connections

PEEKlok is designed specifically for PEEKsil™ tubing, delivering better chromatography when connecting columns, valves, and LC modules.

- Holds to 22000 psi (>1500 bar) - Ultra High Pressure Liquid Chromatography (UHPLC) fitting
- For use with 1/16 in. OD and 1/32 in. OD PEEKsil tubing
- 10-32, 6-32, and 6-40 fitting options

AQO-7600
(2 x fittings, 6 x ferrules and 1 x wrench)



AQO-7602
(2 x fittings, 6 x ferrules and 1 x tightening tool)



Ordering Information

PEEKlok Fittings

Part No.	Description	Unit
AQO-7600	PEEKlok fittings with 10-32 thread for 1/32 in. OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea
AQO-7601	PEEKlok fittings with 10-32 thread for 1/16 in. OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea
AQO-7602	PEEKlok fittings with 6-40 thread for 1/32 in. OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQO-7603	PEEKlok fittings with 6-32 thread for 1/32 in. OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea



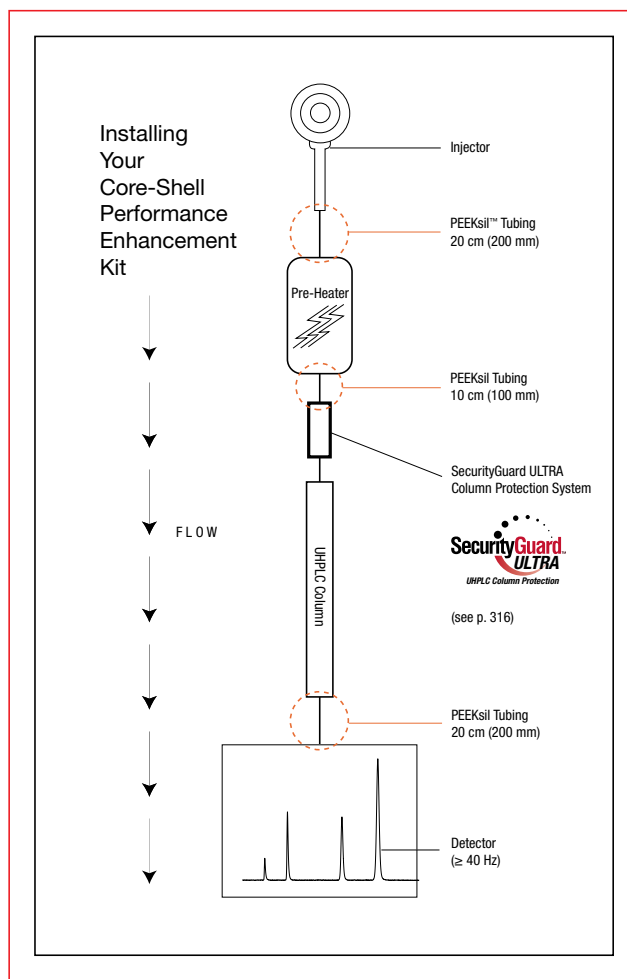
For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp.317-318

For more about SecurityGuard ULTRA Guard Cartridge System for UHPLC, see p.316

Core-Shell Performance Enhancement Kit

- Optimize UHPLC system connections – for both routine and critical applications
- Increase method efficiency, resolution, and detection
- Minimize dead volume between injector and detector
- Improve results for sensitive and demanding applications

The connections made throughout the system are critical to maximizing the benefit from your UHPLC setup. The fittings and tubing used in this kit are carefully chosen to minimize dead volume and reduce band broadening. Combined with a core-shell column and the SecurityGuard™ ULTRA column protection system, the kit will provide reliable connections and quality performance every time.



Ordering Information

Core-Shell Performance Enhancement Kit

Part No.	Description	Unit
AQO-8892	Core-Shell Performance Enhancement Kit, Includes: PEEKsil™ Tubing, Fittings and Tool*	ea

*Kit [AQO-8892](#) includes the following components:

	Kit Quantity
PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 20 cm L, Red	2/pk
PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 10 cm L, Red	ea
Sure-Lok™ High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing	10/pk
Sure-Lok Fitting Tightening Tool, Aluminum	ea

Accessories and Replacement Parts

Part No.	Description	Unit
ATO-8896	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 20 cm L, Red	5/pk
ATO-8897	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 10 cm L, Red	5/pk
AQO-8503	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing	10/pk
AQO-8530	Sure-Lok Fitting Tightening Tool, Aluminum	ea



For more information on: Part No. [ATO-8896](#) and [ATO-8897](#) see p. 400.
 Part No. [AQO-8503](#) and [AQO-8530](#) see p. 394.
 SecurityGuard ULTRA Guard Cartridge System for UHPLC, see p. 316.

Fittings

Sure-Lok™ Fingertight Male Nut Fittings

- Fingertight to 5000 psi (345 bar)
- Compatible with all 10-32 HPLC fittings
- Polymer construction compatible with nearly all HPLC and GPC solvents



Sure-Lok Fingertight Male Nut (PEEK)

Ordering Information

Sure-Lok Fingertight Male Nuts

Part No.	Description	Unit
AQO-1388	PEEK Sure-Lok Fingertight Male Nut	ea
AQO-1389	PEEK Sure-Lok Fingertight Male Nut	10/pk

Nut and Ferrule Plugs

- Wrench tight to 10000 psi (690 bar)



Nut and Ferrule

Ordering Information

Nut and Ferrule

Part No.	Description	Unit
AQO-3018	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea

Column Sealing Plugs

- Seal column for storage
- 10-32 threads fit most columns



Ordering Information

Column Sealing Plugs

Part No.	Description	Unit
AQO-0217	Column Sealing Plug, 10-32 thread size	10/pk

Analytical Column Couplers

Sure-Lok Coupler

- Universal and reusable
- Solvent resistant material
- Low dead-volume connection
- Compatible with all 10-32 internal-threaded fittings

Applications:

- Filter to column
- Column to column
- Precolumn to column
- Column to detector



Sure-Lok Coupler (PEEK)

Sure-Lok Couplers contain two Sure-Lok male nuts at either end of a 5 cm long 1/16 in. tubing. The PEEK biocompatible coupler has all parts composed of PEEK, including the 0.010 in. ID tubing. Fingertight to 5000 psi (345 bar).

Ordering Information

Sure-Lok Couplers

Part No.	Description	Unit
AQO-1392	PEEK Sure-Lok Coupler, 0.010 in. ID	ea
AQO-1393	PEEK Sure-Lok Coupler, 0.010 in. ID	10/pk

Column Coupler

Don't let resolution be a limiting factor!

- Couple several columns together
- Maintain separation efficiency
- No influence on backpressure



Ordering Information

Column Coupler

Part No.	Description	Unit
AQO-7654	Onyx Column Coupler, PEEK, 0.020 in. ID	ea

PREP Column Coupler



Ordering Information

PREP Column Coupler

Part No.	Description	Unit
AQO-8376	PREP Coupler, Stainless Steel Tube, Nuts, and Ferrules 10-32 Threads, 1/16 in. OD x 0.030 in. ID	ea

Fittings

Sure-Fit™ Connectors

- Self-adjusting to any port depth regardless of manufacturer, with virtually no dead volume
- Fingertight to 6000 psi (414 bar)
- No twisting or bending of tubing



Ordering Information

Sure-Fit Connectors

Part No.	Description	Unit
Sure-Fit Single-Ended Connector		
AQO-5726	Stainless Steel Connectors, 0.007 in. ID x 20 cm L	2/pk

1/4 in.-28 Flangeless Fittings

- For use with 1/16 in. or 1/8 in. polymeric tubing
- Easy 2-piece design
- Replaces Cheminert® and Omnifit® fittings
- Pressure rated to 1400 psi (97 bar)



Ordering Information

Flangeless Fittings

Part No.	Description	Unit
AQO-2949	Flangeless Nut and Ferrule for 1/16 in. tubing, 1/4 in.-28 threads, red Delrin	10/pk
AQO-2950	Flangeless Nut and Ferrule for 1/8 in. tubing, 1/4 in.-28 threads, green Delrin	10/pk
AT0-2951	Teflon Tubing, 5 ft. L x 1/16 in. OD x 0.010 in. ID	ea
AT0-2953	Teflon Tubing, 5 ft. L x 1/16 in. OD x 1/32 in. (0.031 in.) ID	ea
AT0-2955	Teflon Tubing, 5 ft. L x 1/8 in. OD x 1/16 in. (0.062 in.) ID	ea

10-32 PEEK Mixing Tee

- Use with 1/16 in. OD polymeric or metal tubing
- Mixing tee for pre- or post-column derivatization
- Simple-to-use fingertight design
- Pressure rated to 4000 psi (276 bar)



Ordering Information

PEEK Mixing Tee

Part No.	Description	Unit
AQO-2002	PEEK Tee, 0.020 in. thru-hole*	ea

*Fittings not included, use PEEK Sure-Lok fingertights part no. [AQO-1389](#), see p.396

Backpressure Regulators

- Adjustable with preset pressure ratings
- Consistent backpressure at various flow rates
- Flow-through, low-volume design (146mL)



Ordering Information

Backpressure Regulators

Part No.	Description	Unit
AQO-0222	40 psi Backpressure Regulator	ea
AQO-0223	75 psi Backpressure Regulator	ea
AQO-0224	100 psi Backpressure Regulator	ea



For UHPLC Stainless Steel Zero Dead-Volume Union, see p. 393

SecurityLINK HPLC/UHPLC Fingertight Fittings

- No Tools
Easy installation
- Zero Dead-Volume
Fitting self-adjusts at column inlet
- Torque Limiting
Prevents system and column damage
- UHPLC/HPLC Compatibility
Pressure rated to 19000 psi

SecurityLINK 
UHPLC Connections in a Click

Standards

HPLC Column Check Standards

We recommend using check standards to verify performance of all new columns and periodically over their lifetime. Standards are grouped by column type (e.g. normal phase standard for Si, -NH₂, -Diol, -NO₂, alumina and PAC).



App ID 14744

Reversed Phase 1
(For C1, C18, CN and Phenyl)

Part No.: ALO-3034

Unit quantity: 2 mL
Contains: Uracil; Benzamide; Benzophenone; Biphenyl (refer to product insert for specific details)
Diluent: Acetonitrile

Test Conditions

Mobile Phase: Acetonitrile/Water (percentages depend on phase)
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL for 3 and 5 µm particles*
1.5 µL for 10 µm particles
Detection: UV @ 254 nm

* For Ultracarb C8, ODS(20), ODS(30) inject 1.5 µL for all column sizes.

App ID 14754

Reversed Phase 2
(For Prodigy C8, ODS(2), ODS(3); Luna C5, C8, C18, PFP(2), Phenyl-Hexyl; Jupiter C4, C5, C18; Jupiter Proteo; Columbus C8, C18; Aqua; PhenoSphere-NEXT C8, C18; Synergi; Gemini C18, C6-Phenyl; Gemini NX-C18; Clarity Oligo-RP; Oligo-MS; Kinetex C8, C18, XB-C18, PFP, Phenyl-Hexyl; 4.6 mm ID Aeris WIDEPORE XB-C18, XB-C8, C4; Aeris PEPTIDE XB-C18)

Part No.: ALO-3045

Unit quantity: 2 mL
Contains: Uracil; Acetophenone; Toluene; Naphthalene
Diluent: Acetonitrile / Water (75:25)

Test Conditions

For Jupiter C18, all Luna (except CN), Aqua, Synergi, Gemini, Prodigy, Clarity Oligo-RP and Columbus columns
Mobile Phase: Acetonitrile/Water (65:35)*
Flow Rate: 1.0 mL/min; 0.75 mL/min for 3 µm particles
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

Test Conditions

For Jupiter C4 and C5 columns
Mobile Phase: Acetonitrile/Water (50:50)
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

* Columns with dimensions of 50 x 2.0 mm, 30 x 2.0 or 1.0 mm, the mobile phase ratio should be 50:50. Some 50 x 2.0 mm columns use 65:35.
For other columns not listed above, see test chromatogram enclosed with column purchased.

App ID 15640

Onyx Monolithic Reversed Phase
(For Onyx C8, C18, and HD-C18)

Part No.: ALO-7836

Unit quantity: 2 mL
Contains: Thiourea 10 µg/mL; Progesterone 100 µg/mL; Anthracene 10 µg/mL
Diluent: Acetonitrile/Water (60:40)

Test Conditions

Mobile Phase: Acetonitrile/Water (60:40)
Flow Rate: 2.0 mL/min*
Injection Volume: 1.0 µL
Detection: UV @ 254 nm
Storage
Conditions: Refrigerate @ 4 °C

* For a 50 x 4.6 mm column

App ID 19812

Aeris™ Narrow ID
(For 2.1 mm ID Aeris WIDEPORE XB-C18, XB-C8, C4)

Part No.: ALO-8931

Unit quantity: 2 mL
Contains: Uracil; Acetophenone; Toluene; Naphthalene; Acenaphthalene (2.5 mg/mL)
Diluent: Acetonitrile/Water (50:50)

Test Conditions

Mobile Phase: Acetonitrile/Water (55:45)
Flow Rate: 0.25 mL/min*
Injection Volume: 0.1 µL
Detection: UV @ 254 nm

* For a 150 x 4.6 mm column

App ID 14743

Normal Phase
(For Si, NH₂, NO₂, Diol, Alumina, PAC, Clarity Oligo-WAX, and Luna CN)

Part No.: ALO-3033

Unit quantity: 2 mL
Contains: Meta-xylene; Nitrobenzene
Diluent: Hexane/Acetonitrile (99:1)

Test Conditions

Mobile Phase: Hexane/Acetonitrile (99:1)
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

App ID 16399

HILIC Phase
(For Luna HILIC; Kinetex HILIC)

Part No.: ALO-8317

Unit quantity: 2 mL
Contains: Toluene; Uracil; Cytosine
Diluent: Acetonitrile (containing toluene) / Water, no buffer (85:15)

Test Conditions

Mobile Phase: Acetonitrile/100 mM Ammonium Formate, pH 3.2 (90:10)
Flow Rate: 1.0 mL/min*
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

* For a 150 x 4.6 mm column

App ID 14760

PolymerX™ RP-1

Part No.: ALO-7260

Unit quantity: 2 mL
Contains: Cytosine 13 mg/mL; Uracil 13 mg/mL; Uridine 33 mg/mL
Diluent: Water

Test Conditions

Mobile Phase: 0.05 M Citric Acid, pH 4.2
Flow Rate: 0.75 mL/min*
Temperature: Ambient
Injection Volume: 5 µL
Detection: UV @ 254 nm
Storage
Conditions: Refrigerate @ 4 °C

* For a 5 µm 250 x 4.6 mm column

App ID 14752

Aqueous SEC 1
(For Yarra 3 µm SEC, BioSep-SEC-S, and other protein SEC columns)

Part No.: ALO-3042

Unit quantity: Dry; Reconstituted to 2 mL
Contains: Bovine thyroglobulin; Human gamma globulin (contains IgA and IgG); Ovalbumin; Myoglobin; Uridine (reconstitute with 1 mL of 100 mM Sodium Phosphate pH 6.8)
Diluent: 100 mM Sodium phosphate, pH 6.8
Storage: Add 0.1% Na₂S₂O₃ to the solution and refrigerate

Test Conditions

Mobile Phase: 100 mM Sodium phosphate, pH 6.8
Flow Rate: 1.0 mL/min for a 300 x 7.8 mm column
Injection Volume: 10 µL
Detection: UV @ 280 nm

App ID 14753

Aqueous SEC 2
(For PolySep GFC-P and other aqueous-soluble analysis columns)

Part No.: ALO-3043

Unit quantity: 2 mL
Contains: Ethylene Glycol
Diluent: Water

Test Conditions

Mobile Phase: Water
Flow Rate: 0.8 mL/min
Injection Volume: 15 µL
Detection: RI

App ID 14759

STAR-ION™ A300

Part No.: ALO-3420

Unit quantity: 2 mL
Contains: Fluoride (5 mg/mL); Chloride (10 mg/mL); Nitrite (20 mg/mL); Bromide (20 mg/mL); Nitrate (20 mg/mL); Phosphate (30 mg/mL); Sulfate (20 mg/mL)
Diluent: 1.7 mM NaHCO₃/1.8 mM Na₂CO₃

Test Conditions

Mobile Phase: 1.7 mM NaHCO₃/1.8 mM Na₂CO₃
Flow Rate: 1.5 mL/min for a 100 x 4.6 mm column
Injection Volume: 20 µL
Detection: Suppressed Conductivity



Flow rates and Injection volumes are for 250 x 4.6 mm size columns, unless otherwise noted.

HPLC Column Check Standards ordering information continues on next page

Standards

HPLC Column Check Standards (cont'd)

App ID 14756

Chiral Test Mix 2
(Applicable to the following Chirex columns)

Part No.: [ALO-3047](#)

Chirex Phase	Phase Description	Bond Type
3010	(S)-Valine and DNAn	Covalent
3011	(S)-Leucine and DNAn	Covalent
3012	(R)-Phenylglycine and DNAn (DNAn = 3,5-Dinitroaniline)	Covalent

Unit quantity: 2 mL
Contains: N-dansyl-DL-valine (cyclohexylammonium salt); CAS[84540-67-0]
Diluent: 10 mM ammonium acetate in methanol

Test Conditions

Mobile Phase: 10 mM ammonium acetate in methanol
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

App ID 14758

Chiral Test Mix 4
(Applicable to the following Chirex columns)

Part No.: [ALO-3049](#)

Chirex Phase	Phase Description	Bond Type
3126	N,S-dioctyl-(D)-Penicillamine	Ionic

Unit quantity: 2 mL
Contains: DL-Aspartic Acid CAS [617-45-8]
Diluent: 2 mM Copper sulfate pentahydrate in water/Isopropanol (95:5)

Test Conditions

Mobile Phase: 2 mM Copper sulfate pentahydrate in water/Isopropanol (95:5)
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

App ID 14746

Chiral Test Mix 5
(Applicable to the following Lux columns)

Part No.: [ALO-8412](#)

Phase	Description
Lux Cellulose-1	Cellulose Tris (3,5-Dimethyl-phenylcarbamate)
Lux Cellulose-2	Cellulose Tris (3-Chloro-4-methylphenylcarbamate)
Lux Cellulose-3	Cellulose Tris (4-Methyl-benzoate)
Lux Cellulose-4	Cellulose Tris (4-Chloro-3-methylphenylcarbamate)
Lux Amylose-2	Amylose Tris (5-Chloro-2-methylphenylcarbamate)

Unit quantity: 2 mL
Contains: trans-Stilbene oxide, 0.5 mg/mL, CAS [1439-07-2]
Diluent: Hexane/Isopropanol (90:10)

Test Conditions

Mobile Phase: Hexane/Isopropanol (90:10)
Flow Rate: 0.5 mL/min
Injection Volume: 2.0 µL
Detection: UV @ 220 nm

App ID 14745

Carbohydrate Mix 1
(For Rezex RNM, RAM & other carbohydrate analysis columns)

Part No.: [ALO-3035](#)

Unit quantity: 2 mL
Contains: Maltotriose Hydrate; Maltose; Ribitol
Diluent: Water

Test Conditions

Mobile Phase: Water
Flow Rate: 0.4 mL/min for a 300 x 7.8 mm column
Temperature: 85 °C
Injection Volume: 5.0 µL
Detection: RI

App ID 14746

Carbohydrate Mix 2
(For Rezex RPM & other carbohydrate analysis columns)

Part No.: [ALO-3036](#)

Unit quantity: 2 mL
Contains: Melezitose; Glucose; Fructose; Ribitol
Diluent: Water

Test Conditions

Mobile Phase: Water
Flow Rate: 0.6 mL/min for a 300 x 7.8 mm column
Temperature: 85 °C
Injection Volume: 5.0 µL
Detection: RI

App ID 14747

Carbohydrate Mix 3
(For Rezex RCM, RCU & other carbohydrate analysis columns)

Part No.: [ALO-3037](#)

Unit quantity: 2 mL
Contains: Melezitose; Maltose; Glucose; Mannose; Fructose; Ribitol
Diluent: Water

Test Conditions

Mobile Phase: Water
Flow Rate: 0.6 mL/min for a 300 x 7.8 mm column
Temperature: 85 °C
Injection Volume: 1.0 µL
Detection: RI

App ID 14748

Oligosaccharide Standard
(For Rezex RSO, RNO & other oligosaccharide analysis columns)

Part No.: [ALO-3038](#)

Unit quantity: 2 mL
Contains: Light corn syrup
Diluent: Water

Test Conditions

Mobile Phase: Water
Flow Rate: 0.3 mL/min for a 200 x 10 mm column
Temperature: 85 °C
Injection Volume: 5.0 µL
Detection: RI

App ID 14749

Organic Acid Standard
(For Rezex ROA & other organic acid analysis)

Part No.: [ALO-3039](#)

Unit quantity: 2 mL
Contains: Oxalic acid; Citric acid; Tartaric acid; Succinic acid; Formic acid; Acetic acid
Diluent: 5 mM Sulfuric Acid

Test Conditions*

Mobile Phase: 0.005N H₂SO₄
Flow Rate: 0.5 mL/min
Temperature: 85 °C
Injection Volume: 5.0 µL
Detection: UV @ 210 nm

* For a 300 x 7.8 mm column

App ID 14750

Cation-Exchange
(For SCX, SA, CM)

Part No.: [ALO-3040](#)

Unit quantity: 2 mL
Contains: Uracil; Cytosine
Diluent: Water

Test Conditions

Mobile Phase: 0.15 M (NH₄)₂HPO₄, pH 6.0
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

App ID 14751

Anion-Exchange
(For SAX, SB, DEAE, PEI)

Part No.: [ALO-3041](#)

Unit quantity: 2 mL
Contains: Uridine, UMP (refer to product insert for specific details)
Diluent: Water

Test Conditions

Mobile Phase: 0.15 M (NH₄)₂HPO₄, pH 6.0
Flow Rate: 0.6 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm



Flow rates and Injection volumes are for 250 x 4.6 mm size columns, unless otherwise noted.



For GC Column Performance Check Standards, see p. 175

Capillary PEEK HPLC Tubing

- Chemically inert and biocompatible
- Pressure rated to 7000 psi (482 bar)
- Easily bendable and cuttable

PEEK HPLC tubing is an excellent alternative to stainless steel tubing for most HPLC applications. PEEK (polyetheretherketone) is chemically inert to virtually all HPLC solvents (only 100 % methylene chloride, THF, concentrated nitric acid or concentrated sulfuric acid will affect PEEK), and is 100 % biocompatible. PEEK tubing can be used with stainless steel nuts and ferrules or polymeric fittings such as the Phenomenex fingertight Sure-Lok™ fittings (see p. 396).

This PEEK HPLC tubing is pressure tested to 7000 psi and rated at 5000 psi for continuous use (for standard 0.010 in. ID tubing). PEEK withstands extremely high temperatures and is rated for continuous use up to 100 °C. PEEK tubing is color coded for easy identification. All colors are permanent and there is no leaching.



Standard PEEK



Polymer Tubing Cutter

Ordering Information

Straight PEEK Tubing

Part No.	Length (feet)	OD (inch)	ID (inch)	Color	Unit
ATO-1107	5	1/16	0.010	blue	ea
ATO-1260	5	1/16	0.007	yellow	ea
ATO-1259	5	1/16	0.005	red	ea

Part No.	Description	Unit
----------	-------------	------

PEEK Tubing Kit

ATO-1964	PEEK Tubing Kit, includes one each of: ATO-1259 (5 ft. x 1/16 in. x 0.005 in.) ATO-1260 (5 ft. x 1/16 in. x 0.007 in.) ATO-1107 (5 ft. x 1/16 in. x 0.010 in.) ATO-1265 (5 ft. x 1/8 in. x 0.080 in.) ATO-1110 (Polymer Tubing Cutter)	ea
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Part No.	Description	Unit
----------	-------------	------

Polymer Tubing Cutter

ATO-1110	Polymer Tubing Cutter	ea
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i PEEKsil is compatible with most organic solvents. Effective pH range from 0 to 10.

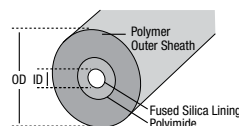
➔ For more information on Part Nos. [AQO-8503](#) and [AQO-8530](#), see p. 394. See also our Core-Shell Performance Enhancement kit on p. 395.

➔ For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp.317-318

PEEKsil™ Tubing for UHPLC / HPLC

- Minimizes extra-column effects and band broadening
- Exceptionally smooth inner surfaces

PEEKsil is polymer-sheathed fused silica tubing. The PEEK portion is mechanically strong and has ideal sealing characteristics when used with conventional metal or PEEK ferrule systems. Capable of withstanding high pressures up to 10000 psi (689 bar), the exceptionally smooth inner surfaces are free of the imperfections common in steel tubing, which lessens the possibility of path blockages, ultimately providing lower band broadening. The precision-cut, ultra-square and smooth tube ends enable optimal low volume connections to be made, which will improve overall chromatographic performance. For higher efficiencies and improved resolution, PEEKsil tubing is recommended to help optimize your UHPLC system. For critical UHPLC connections a convenient fittings and tubing kit Part No.: [AQO-8892](#) is available (see p. 395).



PEEKsil tubing showing the precision ground and square cut end enabling a zero dead volume connection.



Ordering Information

PEEKsil Tubing for UHPLC/HPLC

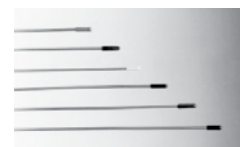
Part No.	Description	Unit
ATO-8896	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 20 cm L, Red	5/pk
ATO-8897	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 10 cm L, Red	5/pk

Related Accessory Items

AQO-8503	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing	10/pk
AQO-8530	Sure-Lok Fitting Tightening Tool, Aluminum	ea

Capillary Stainless Steel Tubing

- Passivated and solvent rinsed
- Precut and polished ends



Ordering Information

Capillary Stainless Steel Tubing

Part No.	Length	Unit
0.005 in. ID x 0.062 in. (1/16 in.) OD		
ATO-2996	5 cm	5/pk
ATO-2997	10 cm	5/pk
ATO-2998	20 cm	5/pk
0.010 in. ID x 0.062 in. (1/16 in.) OD		
ATO-0456	5 cm	5/pk
ATO-0457	10 cm	5/pk
ATO-0458	20 cm	5/pk
ATO-0460	50 cm	2/pk
ATO-0461	1 m	2/pk
0.020 in. ID x 0.062 in. (1/16 in.) OD		
ATO-0465	10 cm	5/pk
ATO-0466	20 cm	5/pk
ATO-0469	1 m	2/pk

Tubing

Teflon® (PTFE) Tubing

- Resistant to virtually all corrosive chemicals and organic solvents
- Pressure rated to 500 psi (35 kg/cm²)



Ordering Information

Teflon Tubing

Part No.	OD (inch)	ID (inch)	Wall Thickness (inch)	Length (feet)
ATO-2951	1/16	0.010	0.026	5
ATO-2952	1/16	0.010	0.026	10
ATO-2953	1/16	1/32 (0.031)	0.015	5
ATO-2954	1/16	1/32 (0.031)	0.015	10
ATO-2955	1/8	1/16 (0.062)	0.030	5
ATO-2956	1/8	1/16 (0.062)	0.030	10
ATO-8609	1/4	1/8 (0.125)	0.060	5
ATO-8610	1/4	1/8 (0.125)	0.060	10

Tubing Cutters

Terry Tools are compact tubing cutters for either 1/16 or 1/8 in. OD glass-lined tubing or stainless steel tubing. The specially-hardened cutting wheels make clean, right-angle cuts with minimal burring or chipping of the tubing. Zero dead-volume connections, essential in most GC and MS and all HPLC plumbing applications, can be easily achieved.



Terry Tool
Stainless Steel Tubing Cutter



The Polymer Tubing Cutter makes clean, square cuts on both 1/16 and 1/8 in. OD polymeric tubing, especially PEEK tubing

Ordering Information

Tubing Cutters

Part No.	Description	Unit
AQO-1305	1/16 in. Terry-Tool tubing cutter	ea
AQO-1306	1/8 in. Terry-Tool tubing cutter	ea
AQO-1307	Replacement cutting wheels for both AQO-1305 and AQO-1306	3/pk
ATO-1110	Polymer Tubing Cutter	ea

Wrenches / Spanners

Three of the most popular sizes of wrenches (spanners) used in UHPLC/HPLC are offered.



Ordering Information

Wrenches/Spanner

Part No.	Description	Unit
AQO-8903	Wrench, Open End, 1/4 x 5/16 in.	ea
AQO-8959	Wrench, Open End, 3/8 x 7/16 in.	ea
AQO-8904	Wrench, Open End, 1/2 x 9/16 in.	ea



SecurityGuard ULTRA installation onto core-shell columns, as well as later cartridge replacement, requires 3 wrenches, which must be purchased separately: one 3/8 in. wrench ([AQO-8959](#) fits core-shell column end-fitting), and two 1/16 in. wrenches ([AQO-8903](#) fits ULTRA cartridge and holder). See SecurityGuard ULTRA p. 316

Rheodyne Fitting Wrench



Ordering Information

Real Rheodyne Fitting Wrench

Part No.	Mfr. No.	Description	Unit
AVO-4219	6810	The Real Rheodyne Fitting Wrench	ea

*For additional information, see p. 405

Empty HPLC Column Assemblies

Stainless Steel

- Thoroughly washed, ultrasonically cleaned and passivated
- Highly polished mirror-finish tubing
- Female/inverted Type 316 stainless steel end-fittings, 4 stainless steel frits and 2 column plugs included



Ordering Information

Stainless Steel Empty HPLC Column Assemblies

Part No.	ID (mm)	OD (inches)	Length (mm)
AQQ-3019	1.0	1/8	100
AQQ-0182	2.0	1/4	150
AQQ-0183	2.0	1/4	250
AQQ-7262	4.6	1/4	30
AQQ-0186	4.6	1/4	50
AQQ-0187	4.6	1/4	100
AQQ-0188	4.6	1/4	150
AQQ-0189	4.6	1/4	250
AQQ-0195	7.8	3/8	300
AQQ-0197	10.0	1/2	250
AQQ-7849	21.2	1	100
AQQ-7499	21.2	1	150
AQQ-0200	21.2	1	250

Column End-Fittings

Ordering Information

HPLC Column End-Fittings**

Part No.	Size (Column-Capillary)	Unit
AQQ-1874	1/8 in. - 1/16 in. (for 1.0 mm ID)	ea
AQQ-1875	1/4 in. - 1/16 in. (for 2.1 to 4.6 mm ID)	ea
AQQ-1876	3/8 in. - 1/16 in. (for 7.8 mm ID)	ea
AQQ-1877	1/2 in. - 1/16 in. (for 10.0 mm ID)	ea
AQQ-1878	1 in. - 1/16 in. (for 21.2 mm ID)	ea

**Includes male and female end fittings with ferrule and column sealing plug. Purchase frits separately.

Frits

- 316 stainless steel
- 1/16 and 1/32 inch thicknesses
- 0.5 and 2.0 µm pore sizes

To ensure proper frit selection, match the frit pore size with the packing material particle size (Table 1). Problems may occur if a large pore frit is used with a small particle size material. This combination can lead to the packing material escaping or clogging the frit, resulting in shortened column life or a damaged flow cell.

Table 2 will assist you in choosing the proper size (diameter, thickness, and porosity) frit in relation to the material particle size and column internal diameter.

Table 1. Frit Pore Size Selection Guide

When particle size of your material is:		Frit pore size should be:	
2-4 µm		0.5 µm	
5-20 µm		2 µm	

Table 2. Frit Size Selection Guide

Material Particle Size (µm)	Column Internal Diameter (mm)	Frit Diameter (inches)	Frit Thickness (inches)	Frit Pore Size (µm)
2 - 4	1.0	1/8	1/32	0.5
5 - 20	1.0	1/8	1/32	2.0
2 - 4	2.0-5.0	1/4	1/32	0.5
5 - 20	2.0-5.0	1/4	1/32	2.0
5 - 20	6.0-8.0	3/8	1/32	2.0
5 - 20	9.0-10.0	1/2	1/32	2.0
5 - 20	11.0-23.0	1	1/16	2.0



Ordering Information

Frits				
Part No.	Diameter (inches)	Thickness (inches)	Pore Size (µm)	Unit
AQQ-0537	1/8	1/32	2.0	10/pk
AQQ-0538	1/4	1/32	0.5	10/pk
AQQ-0539	1/4	1/32	2.0	10/pk
AQQ-0541	3/8	1/32	2.0	10/pk
AQQ-0543	1/2	1/32	2.0	10/pk
AQQ-8166*	1	1/16	2.0	2/pk

* Only for use with Column Assembly Part No. [AQQ-0200](#).



All Phenomenex Valco-compatible end-fittings listed are female/inverted (internal threaded) and compatible with 10-32 threaded male nuts.

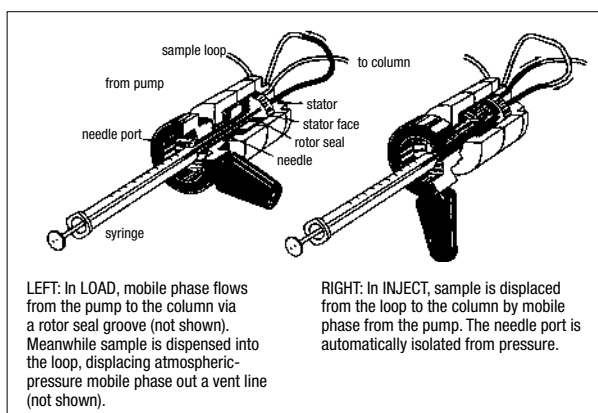


For Fittings, see pp. 393-397

Sample Injector

Rheodyne® 7725

- Sample loading by syringe through built-in needle port
- Continuous flow during switching (no interrupt)
- A front-end pressure screw for easy seal adjustment
- Wide port angles for improved access to fittings
- Pressure rated to 7000 psi (490 kg/cm²)
- 5 µL to 5 mL removable sample loops



Ordering Information

7725 Sample Injectors

Part No.	Mfr. No.	Description
AVO-2346	7725	Sample Injector ¹
AVO-2347	7725i	Sample Injector, with Position Sensing Switch ¹

Sample Loops for 7725 Valves Only

AVO-2349	7755-020	5 µL Sample Loop
AVO-2350	7755-021	10 µL Sample Loop
AVO-2351	7755-022	20 µL Sample Loop
AVO-2352	7755-023	50 µL Sample Loop
AVO-2353	7755-024	100 µL Sample Loop
AVO-2354	7755-025	200 µL Sample Loop
AVO-2355	7755-026	500 µL Sample Loop
AVO-2356	7755-027	1 mL Sample Loop
AVO-2357	7755-028	2 mL Sample Loop
AVO-2358	7755-029	5 mL Sample Loop

Spare Replacement Parts for Model 7725 Injector

AVO-3500	7725-999	Complete RheBuild® Kit for valves 7725, 7725i, 7726 (see p.405 for description)
AVO-0169	7125-047	Vespel Rotor Seal
AVO-2416	7125-079	Tefzel Rotor Seal
AVO-2362	7725-026	Stator Face Assembly
AVO-0171	7125-054	Needle Port Cleaner
AVO-0180	7215	#22-Gauge Needle
AVO-2365	6000-263	Nut 10pk
AVO-2366	6000-264	Long Nut 10pk
AVO-2368	6000-110	Ferrule 5pk

¹The 7725 and 7725i have a 20 µL stainless steel loop installed. They are supplied with instructions, fittings for all ports, needle port cleaner, two vent tubes, two hex wrenches, mounting screws, and a #22-gauge needle with Luer hub. Maximum operating temperature is 80 °C.

→ Syringes for Rheodyne sample injectors are listed on pp. 25-26.

Sample Injector

Rheodyne Injector Model 9725 Totally Metal-Free (PEEK)

- Inert flow passages of Tefzel®, PEEK, and alumina-ceramic (pH range 0 to 14)
- Not affected by buffers, acids, bases or halide salts
- Complete fill 5 µL to 5 mL sample loops using excess sample
- Partial-fill 0.1 µL to 5 mL with zero sample waste
- Valve will operate to 5000 psi (344 bar)
- Loops will operate to 5000 psi (344 bar) depending on ID and solvent
- Use with 1 to 2 mm ID micro, 3 to 6 mm analytical or milligram-scale prep columns



Ordering Information

PEEK Sample Injectors

Part No.	Mfr. No.	Description
AVO-1074	9725	PEEK Sample Injector
AVO-4642	9725i	PEEK Sample Injector, with Position Sensing Switch
AVO-1086	9125-076	Suction Needle Adapter
AVO-3433	9725-999	Complete RheBuild® Kit for valves 9725, 9725i (see p. 405 for description)

i Although PEEK material is highly resistant to most chemicals, PEEK is not recommended for applications requiring high concentrations of THF (Tetrahydrofuran), methylene chloride, nitric acid or sulfuric acid.

Sample Injector

Rheodyne 8125 Low-Dispersion

- For microbore and analytical HPLC columns
- Accurately inject as little as 0.1 µL of sample
- Improve peak resolution

Ordering Information

Low-Dispersion Sample Injector

Part No.	Mfr. No.	Description
AVO-0181	8125	Low-Dispersion Sample Injector
AVO-3431	8125-999	Complete RheBuild® Kit for valve 8125 (see p. 405 for description)

Sample Injectors

Rheodyne® 3725i Preparative

- For preparative HPLC columns, 1 to 10 cm ID



Ordering Information

Preparative Sample Injectors

Part No.	Mfr. No.	Description
AVO-2054	3725i	PEEK Preparative Sample Injector, with Position Sensing Switch
AVO-2056	3725i-038	Stainless Steel Preparative Sample Injector, with Position Sensing Switch
AVO-3432	3725-999	Complete RheBuild® Kit for valves 3725, 2715i, 3725-038, 3725i-038 (see p. 405 for description)

Switching Valve/Injector

Rheodyne Valve Model 7000

- Permits column switching and selection in various configurations
- Enables sample clean-up and trace sample enrichment
- Enables column programming and backflushing
- Enables dual-column selection
- Field-changeable switching patterns



Ordering Information

Switching Valves

Part No.	Mfr. No.	Description
AVO-2376	7000	Switching Valve/Injector
AVO-2378	7010	Sample Injection Valve
AVO-3430	7010-999	Complete RheBuild® Kit for valves 7010, 7000 (see p. 405 for description)
AVO-1073	7012	Loop Filler Port
AVO-1092	9010	PEEK Switching Valve/Injector
AVO-2381	9013	PEEK Needle Port

Sample Injector Loops and Fittings

Stainless steel external loops are supplied with unattached fittings so the tube can be completely bottomed in the injector port before the ferrule is swaged on. RheFlex PEEK loops do not require this precaution, because the ferrule can slide and reposition itself along the tube when the fitting is reinserted into a port.



Ordering Information

Sample Injector Loops

Part No.	Mfr. No.	Description	Unit
Stainless Steel Loops for 7125 and 7010 Valves			
AVO-2390	7020	5 µL, 0.007 in. ID	ea
AVO-2391	7021	10 µL, 0.012 in. ID	ea
AVO-2392	7022	20 µL, 0.020 in. ID	ea
AVO-2393	7023	50 µL, 0.020 in. ID	ea
AVO-2394	7024	100 µL, 0.020 in. ID	ea
AVO-2395	7025	200 µL, 0.030 in. ID	ea
AVO-2396	7026	500 µL, 0.030 in. ID	ea
AVO-2397	7027	1 mL, 0.030 in. ID	ea
AVO-2398	7028	2 mL, 0.040 in. ID	ea
AVO-2399	7029	5 mL, 0.040 in. ID	ea
Loops for 8125 Low Dispersion Injector (Stainless Steel)			
AVO-2937	8020	5 µL, 0.008 in. ID	ea
AVO-2938	8021	10 µL, 0.008 in. ID	ea
AVO-2939	8022	20 µL, 0.010 in. ID	ea

PEEK (for all valves)

AVO-1076	9055-020	5 µL, 0.007 in. ID	ea
AVO-1077	9055-021	10 µL, 0.010 in. ID	ea
AVO-1078	9055-022	20 µL, 0.010 in. ID	ea
AVO-1079	9055-023	50 µL, 0.020 in. ID	ea
AVO-1080	9055-024	100 µL, 0.020 in. ID	ea
AVO-1081	9055-025	200 µL, 0.020 in. ID	ea
AVO-1082	9055-026	500 µL, 0.030 in. ID	ea
AVO-1083	9055-027	1 mL, 0.030 in. ID	ea
AVO-1084	9055-028	2 mL, 0.030 in. ID	ea
AVO-1085	9055-029	5 mL, 0.030 in. ID	ea



1. Loops for the 7725 Valve are listed with the valve on p. 403. Note: Loops designed for 7125, 7010 and 8125 valves are not interchangeable with the wide-angle ports of 7725 valves.
2. Loops not listed for other valves are available. Call your Phenomenex Technical Consultant.



Ordering Information

RheFlex Fittings

Part No.	Mfr. No.	Description	Unit
AVO-2383	6000-054	RheFlex Std. Fitting Set (5 nuts and 5 ferrules)	ea
AVO-2384	6000-055	RheFlex Short Fitting Set (5 nuts and 5 ferrules)	ea
AVO-2386	6000-051	RheFlex Ferrules (5 ferrules)	ea

Valves

RheBuild® Kits

Each kit contains all the parts necessary to refurbish the corresponding valve. For front-loading injection valves, the kit includes: rotor seal, stator face assembly, isolation seal, needle guide, needle port cleaner, 2 hex keys and repair instructions. Type 70's Switching Valves and Model 7010 Injector Valve do not include Stator Face Assemblies. Refer to the specific valve on the previous pages for ordering information.



Rheodyne® Fitting Wrench

Slotted Wrench for Rheodyne Valves

- Fits around tubing to tighten any 1/4 or 5/16 in. nut
- Access hard-to-reach areas
- Saves time and effort

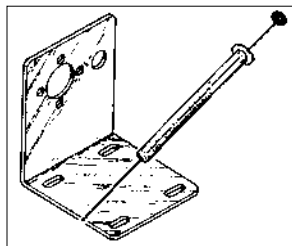


Ordering Information

Real Rheodyne Fitting Wrench

Part No.	Mfr. No.	Description	Unit
AV0-4219	6810	The Real Rheodyne Fitting Wrench	ea

Syringe and Injector Accessories



The #22-gauge needle (Mfr. No. 7215) has a Kel-F® luer hub that fits any luer tip syringe.

Model 7160 and 7160-010 mounting bracket (shown) accommodate all Rheodyne high pressure injectors and valves.

Ordering Information

Syringe and Injector Accessories

Part No.	Mfr. No.	Description	Unit
AV0-0180	7215	#22-Gauge Needle with CTFE Luer Hub	ea
AV0-0170	7125-008	Needle Guide	ea
AV0-0171	7125-054	Needle Port Cleaner	ea
AV0-2425	7160-010	Valve Angle Bracket	ea
AV0-2426	7160	Mounting Panel	ea

➔ Syringes for Rheodyne sample injectors are listed on pp. 25-26.

Valve Stators



Ordering Information

Valve Stators

Part No.	Mfr. No.	Description	Unit
AV0-0172	7125-067	Stator Face Assembly for Valve Model 7125	ea
AV0-4719	7725-010	Stator for Valve Models 7725, 7725i	ea
AV0-0175	7010-040	Stator for Valve Models 7000, 7010, 7125, 7030, 7040	ea
AV0-2422	8125-098	Stator for Valve Model 8125	ea
AV0-2423	9125-043	Peek Stator & Support Ring for 9010/9125	ea

Rotor Seals



Ordering Information

Rotor Seals

Part No.	Mfr. No.	Description	Unit
VespeI® (pH Range 0 to 10)			
AV0-2412	7010-039	Rotor Seal for Valve Models 7000, 7010, 7040	ea
AV0-0169	7125-047	Rotor Seal for Valve Models 7125, 7725, 7725i	ea
AV0-2414	8125-038	Rotor Seal for Valve Model 8125	ea
Tefzel® (pH Range 0 to 14)			
AV0-2415	7010-071	Rotor Seal for Valve Models 7000, 7010, 7040	ea
AV0-2416	7125-079	Rotor Seal for Valve Models 7125, 7725, 7725i	ea
AV0-2417	8125-097	Rotor Seal for Valve Model 8125	ea
AV0-2418	9010-051	Rotor Seal for Valve Model 9010	ea
AV0-2419	9125-082	Rotor Seal for Valve Models 9725 and 9125	ea

i All other Rheodyne valves and accessories not listed are available.

➔ For Stainless Steel and PEEK Capillary Tubing used with Rheodyne valves, see p. 400



ANSWERS

to Your Most Common Chromatography Questions!

With 100s of years of chromatography experience amongst our team, we can surely help answer your most pressing chromatography questions. And now, we've made it easier than ever to find answers.

SEARCH



CHAT



Give us a call,
we would love to help!

CALL

“*Being on the purchasing side of the equation, I have to be focused on factors such as customer service, quality of product and, of course, the ever present bottom line – Phenomenex help me in all 3 of these aspects.*

Their columns and consumables are top of the line - which keep my chemists happy – and all the products across the board are very reasonably priced. And their customer service and technical consulting are second to none - they are always available with answers to my questions and suggestions for our problems and their chromatography expertise is unmatched.

In short, I never hesitate to turn to Phenomenex for any and all of our chromatography needs.”

Johnny Brendell
Quality Chemical Laboratories, USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

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Frequently Asked Questions (FAQs)

We've put together a small sample of questions we are commonly asked.

Q. Which Kinetex® C18 (USP: L1) phase would be best for my method?

A. The Kinetex Core-Shell column portfolio contains five distinct yet complementary C18 selectivities. The general purpose Kinetex C18 provides the expected hydrophobic selectivity, and the additional four C18 derivatives incorporate stationary phase modifications to provide useful selectivity variations within the portfolio. For example, the Kinetex PS C18's embedded positive charge promotes improved peak shape for basic compounds under acidic conditions, and the Kinetex EVO C18 (pH stable 1 – 12 pH) allows mobile phase flexibility in dealing with compounds with ionizable groups.

Q. Do I need an adapter to use a Phenomenex column with a Waters® ACQUITY® UPLC® system?

A. No, Phenomenex columns will connect properly to the hardware that comes standard with a Waters ACQUITY UPLC system. The newer Waters columns, including ACQUITY columns, have the same port depth as Phenomenex columns so you will not need any special adapters.

 To watch an Installation video see, www.youtube.com/watch?v=cfn1UNbloUk

Q. What are chiral isomers? How do I recognize chiral centers?

A. A molecule and its non-superimposable mirror image is called an enantiomer. A simple example to illustrate an enantiomer is our hands. The left and right hand are mirror images of each other however they cannot be superimposed.

The easiest way to recognize is by identifying asymmetric carbon with 4 different substituents attached to it. There may be multiple asymmetric carbons in a single structure which would lead to a number of enantiomers. If there are no asymmetric carbons, then the plane of symmetry should be considered to figure out the chiral center. In general, a molecule with a plane of symmetry is achiral (no chiral center). Aside from carbon, nitrogen, and sulfur compounds can also confer chirality.

Q. What factors affect LC column lifetime?

A. The following factors contribute to the degradation of chromatography and subsequent replacement of HPLC columns:

1. Over time, the stationary phase backbone (i.e. silica) will begin to breakdown, resulting in the formation of column voids. This results in peak broadening and splitting, and subsequently loss of sensitivity and resolution.
2. The accumulation of fine particles can also cause an increase in pressure, which will further decrease lifetime.
3. Even under neutral pH, the stationary phase ligand may be lost over time resulting in reduced retention and efficiency.

The injection of problematic samples and/or harsh running conditions can significantly shorten column life (i.e. number of injections). To maximize column lifetime, especially with problematic samples, we recommend SecurityGuard™ and SecurityGuard ULTRA. Phenex™ syringe filters can also increase column lifetimes and improve system uptime by removing particulates from your sample prior to analysis.

Q. In SPE, how should I choose the right sorbent mass?

A. To choose the correct sorbent mass, the volume of sample to be extracted should be known. There are 2 choices for the SPE sorbent namely: polymeric and silica-based sorbent. The general rule for sample loading is to load no more than 10-15% of the bed mass for a polymeric SPE and 5% of the bedmass for silica-based SPE. For example, you can load approximately 1-1.5 mg of analyte on a 10 mg polymeric SPE sorbent and 0.5 mg of analyte on a 10 mg silica-based sorbent.

Q. What are the benefits of microelution SPE?

A. Microelution SPE provides many benefits over traditional SPE formats such as increased sensitivity, the ability to process small sample volumes, time and cost savings by not drying down the eluted analyte, and a reduction in the loss of thermally labile and very hydrophobic analytes.

Q. How can peak capacity be improved in GC?

A. The peak capacity (n) of a GC separation can be improved by selecting high efficiency column dimensions and an optimum carrier gas flow rate. In general, smaller IDs and thin film stationary phases are considered high efficiency dimensions because they result in high efficiencies and slim peaks.

The n value can also be increased by the following:

- connecting 2 stationary phases of complementary selectivity in series in one dimensional separation ($n = n_1 + 2n_2$)
- connecting 2 stationary phases of complementary selectivity by comprehensive 2-dimensional chromatography ($n = n_1 \times n_2$)

Q. I am using an inert column for my GC analysis and I still see peak tailing. What could be the reason for this?

A. For analysis of active compounds, it is extremely important to use both a highly inert column and a highly inert inlet liner. The liner is the first place of potential analyte interaction during GC analysis, and it is important that your analytes are not adsorbed. Zebtron™ PLUS liners undergo a rigorous deactivation process and are tested for inertness to ensure reliable results when working with highly active compounds such as underivatized acids and active bases.

Abbreviations

Å	Angstrom	H ₂ SO ₄	sulfuric acid	NO ₂	nitro
ACN	acetonitrile (methyl cyanide)	H ₃ PO ₄	phosphoric acid	NP	normal phase
AGP	alpha-1-acid glycoprotein	HAC	hydroxyapatite chromatography	o-CP	o-chlorophenol
alpha	alpha (separation factor)	HCl	hydrochloric acid	OD	outer diameter
amu	atomic mass unit	HETP	height equivalent to a theoretical plate	ODS	octadecylsilane
α	alpha (separation factor)	hex	hexagonal (6-sided) nut	OH	hydroxyl, diol or glycerol phase
aq. sol.	aqueous solution	HF	hydrofluoric acid	PAC	polar amino cyano
AUFS	absorption units full scale	HFIP	hexafluoroisopropanol	PAH	polyaromatic hydrocarbon
BET	Brunner, Emmett and Teller method of surface analysis	HIC	hydrophobic interaction chromatography	PCTFE	Kel-F
BHT	butylhydroxytoluene	HILIC	hydrophilic interaction liquid chromatography	PEEK	polyetherether ketone
BSA	bovine serum albumin	HPCE	high-performance capillary electrophoresis	PEG	polyethylene glycol
BuOAc	butyl acetate	HPLC	high performance liquid chromatography	PEI	polyethyleneimine
C	Celsius	Hz	Hertz	PFA	Teflon, (perfluoroalkoxy monomer copolymerized)
C1	methyl silane phase (trimethyl silyl)	IC	ion chromatography	PFM	pentafluorophenyl
C18	octadecyl silane phase	ID	internal diameter	PFFPA	pentafluoropropionic acid
C2	ethyl silane phase	IEC	ion-exchange chromatography	pH	parts hydrogen (measure of acidity)
C3	propyl silane phase	IEX	ion-exclusion chromatography	PHM	polyhydroxymethacrylate
C4	butyl silane phase	in.	inch	PITC	phenylisothiocyanate (Edman's reagent)
C5	pentyl silane phase	IPA	isopropanol (isopropyl alcohol)	pK _a	dissociation constant of an acid
C6	hexyl silane phase	IPC	ion pair chromatography	PM	permethylated
C8	octyl silane phase	IR	infrared	PMMA	polymethyl methacrylate (acrylic)
CC	chiral chromatography	ISO	International Standards Organization	PMP	polymethylpentene
CCl ₄	carbon tetrachloride	ISRP	internal surface reversed phase	PO ₄ ³⁻	phosphate ion
CH ₃ COOH	acetic acid	IUPAC	International Union of Pure and Applied Chemistry	ppb	parts per billion
CHCl ₃	chloroform	I/O	input/output	ppm	parts per million
Cl	chemical ionization	k	capacity factor	PRP	polymeric reversed phase
CH ₂ Cl ₂	dichloromethane (methylene chloride)	kDa	kilo Daltons	PSF	polysulfone
CLP	Contract Lab Program	kg	kilogram	psi	pounds per square inch
cm	centimeter	kg/cm ²	kilogram per centimeter squared	PTC	phenylthiocarbonyl
CM	carboxymethyl	KH ₂ PO ₄	potassium dihydrogen phosphate	PTFE	Teflon [poly(tetrafluoroethylene)]
CMC	critical micelle concentration	L	length	PTH	phenylthiohydantoin
CN	cyano	lbs	pounds	PVA	polyvinyl alcohol
COOH	carboxylic acid	LC	liquid chromatography	PVC	polyvinyl chloride
CSP	chiral stationary phase	LCD	liquid crystal display	PVDF	Kynar, polyvinylidene difluoride
CTA	cellulose triacetate	LC-MS	liquid chromatography/mass spectroscopy	P&A	partition and adsorption chromatography
CTAB	cetyltrimethylammonium bromide	LEC	ligand-exchange chromatography	p/m	plates per meter (N)
CuAc	copper acetate	LED	light-emitting diode	QA	quality assurance
CuSO ₄	copper sulfate	μg	microgram	QC	quality control
CV	coefficient of variation	μL	microliter	RAM	random access memory
D	depth	μm	micrometer	RI	refractive index
Da	Dalton	μM	micromolar	RP	reversed phase
Dabsyl	4-N,N-dimethylaminoazobenzene-4-sulfonyl chloride	μmol/m ²	micromoles per meter squared	R _s	resolution
Dansyl	5-N,N-dimethylaminonaphthylene-1-sulfonyl chloride	m ² /g	meters squared per gram	RS232	registered standard for I/O serial interface
DC	direct current	MB	megabyte	RSD	relative standard deviation
DCM	dichloromethane (methylene chloride)	MC	methylene chloride (dichloromethane)	SAS	short alkyl silyl (C1)
DEAE	diethylaminoethyl	MDEA	methyl-diethylamine	SAX	strong anion-exchange
DEAM	diethylaminomethyl	MECC	micellar electrokinetic capillary chromatography	SCX	strong cation-exchange
df	film thickness dimension (GC)	MeCN	methyl cyanide (acetonitrile)	SDS	safety data sheet
dia	diameter	MeOH	methanol	SDS	sodium dodecyl sulfate
DMAC	dimethylacetamide	meq/g	milliequivalent per gram	SEC	size exclusion chromatography
DMF	dimethylformamide	mg/mL	milligram per milliliter	SFC	supercritical fluid chromatography
DMSO	dimethylsulfoxide	min	minute	SFE	supercritical fluid extraction
DNPH	dinitrophenylhydrazine	mL/g	milliliter per gram	Si	silica
dp	degree of polymerization	mL/min	milliliter per minute	SLE	simplified liquid extraction
ECD	electrochemical detection	mm	millimeter	S/N	signal-to-noise ratio
ECDV	extra column dead-volume	mM	millimolar	sol.	solution
EDTA	ethylenediamine tetraacetic acid	MOS	monooctyl silane	SPE	solid phase extraction
ELSD	evaporative light scattering detector	Mp	peak molecular weight	SS	stainless steel
em	emission (wavelength)	MS	mass spectrometry	ST	standard taper
EPA	Environmental Protection Agency	MS-DOS	Microsoft Disk Operating System	TEA	triethylamine
ESI	electrospray ionization	msec	milli-seconds	TEAA	tetraethyl ammonium acetate
ETFE	Tefzel, ethylene tetrafluoroethylene copolymer	MTBE	methyl tert-butyl ether	temp.	temperature
EtOAc	ethyl acetate	mV	milli-volt	TFA	trifluoroacetic acid
EtOH	ethanol	MW	molecular weight	THF	tetrahydrofuran
ex	excitation (wavelength)	MWD	molecular weight distribution	TLC	thin-layer chromatography
F	Fahrenheit	MW/Mn	molecular weight per molecular number	TMS	trimethyl chlorosilane
FID	Flame Ionization Detector	N	efficiency	USP	United States Pharmacopoeia
FLR	fluorescence	Na ₂ PO ₄	sodium phosphate	UV	ultraviolet
FMOC	9-fluorenylmethylchloroformate	NaCO ₃	sodium carbonate	V	Volt
FPLC	fast protein liquid chromatography	NaHCO ₃	sodium bicarbonate	VA	vanillic acid
FTIR	Fourier-transform infrared	NaN ₃	sodium azide	VAC	volts alternating current
g	gram	NaOAc	sodium acetate	v/v	volume per volume
GC	gas chromatography	NF	National Formulary	w	width
GFC	gel filtration chromatography	NH ₂	amino	w	watts
GLP	good laboratory practice	NH ₄ Ac	sodium acetate	WAX	weak anion-exchange
GMP	good manufacturing practice	NIOSH	National Institute of Occupational Safety and Health	WCX	weak cation-exchange
GnHCl	guanidine hydrochloride	NIST	National Inst. of Standards & Technology	w/v	weight per volume
GPC	gel permeation chromatography	nm	nanometer	XLPE	cross-linked high-density polyethylene
H	height	NMP	N-methyl pyrrolidone	ZDV	zero dead-volume

GC Column Installation Instructions

The following is a brief reminder of the general precautions required in handling and installing any organic-coated fused silica capillary column. Consult your GC manual for more details.

Fused silica capillary columns become brittle if the polyimide coating applied during manufacture is damaged. Avoid temperatures above 370 °C, and excessive bending, twisting, and abrasion of columns, which will damage this protective coating. Remember, even if the column does not break immediately, when the protective coating is damaged the column may break spontaneously later.

All foreign material including debris from the septa or ferrules must be kept out of the column.

The stationary phase, which coats the inside of the column, must also be protected. The ends of the column will be sealed or protected by a septum when you receive the column. Once the ends are open in preparation for installation, the column should be installed in a chromatograph as soon as practical and a flow of dry, oxygen-free carrier gas maintained until the column is removed and resealed.

Installing the Column

A. Instrument and Capillary Column Preparation

1. Turn off all heated zones and allow them to cool.
2. Make sure you have carrier gas of sufficient purity; replace carrier gas purifiers, if appropriate.
3. Clean and deactivate injector and detector sleeves as necessary.
4. Replace seals and septum, and deactivate liner if necessary.
5. Inspect the column for damage.
6. Cut a centimeter or two off an end of the column. Use a sapphire scribe or a ceramic scoring-wafer to score the tubing before breaking it.
7. While pointing the end of the column down, install a nut and ferrule on it. Make sure the ferrule is the right size and pointed in the correct direction.
8. Cut an additional centimeter or two from the end of the column to remove ferrule fragments. Check the end. A 20-power magnifying glass is recommended. If the break is not clean and the end square, cut the column again.
9. Mount the column in the GC oven without damaging the column coating. It should not have sharp bends or touch the walls of the oven.
10. Insert the column into the injector exactly the correct distance specified in the instrument manual. Use correction fluid to mark the exact insertion distance.
11. Tighten the ferrule nut until the column resists movement. One-quarter turn past finger tight is about right. Do not connect the column to the detector at this time.
12. Adjust the head pressure to obtain the flow rate listed on the test chromatogram.
13. Check the inlet connections for leaks.
14. Confirm gas flow through the column by observing bubbles when the column outlet end is immersed in a vial of nontoxic solvent such as acetone.
15. Set gas flow rates for the detector including the make up rate.



Warning: It is advisable to wear safety glasses.



Warning: Cyano columns are susceptible to oxidation and hydrolysis. Care must be taken to avoid leaks, water, strong acids and high temperatures.

Figure 1: Proper and Improperly Cut Capillary End

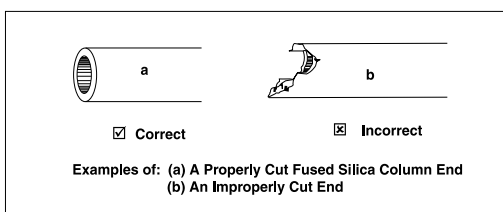


Figure 2: Cutting Fused Silica Tubing

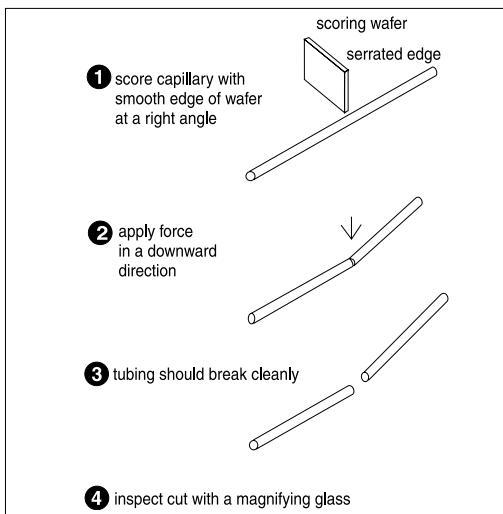
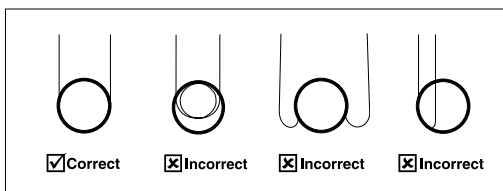


Figure 3: Column Hanging Diagrams



Warning: Avoid sharp bends when installing columns.

GC Column Installation Instructions

B. Conditioning and Testing the Capillary Column

- Purge the column with carrier gas for approximately 15 minutes. Further conditioning may be desirable.
- Insert the outlet end of the column into the detector exactly the distance prescribed in the instrument manual, repeating steps 7 through 9. Use correction fluid to mark the exact insertion distance.
- Set gas-flow rates to instrument specifications. Warning! Some detectors may be damaged by heating without proper gas flow.
- Check the system for leaks. It is preferable to use a thermal-conductivity-type leak detector. Do not use soaps or liquid-based leak detectors with capillary columns. Never heat the column without checking thoroughly for leaks first.
- Set injector and detector temperatures. Turn the detector on when steady state temperatures are achieved.
- Increase the oven temperature to the maximum continuous operating temperature for the column. Warning! Do not exceed the maximum operating temperature of the column. Maintain that temperature until a flat baseline is observed. If this takes more than half an hour, it could indicate a problem.
- Inject a detectable unretained sample such as methane to determine dead volume time and linear gas velocity. Adjust gas pressure to obtain proper values for your analytical method.
- Set oven to starting temperature. Inject another sample of a detectable unretained substance. Reset the carrier gas velocity to desired value.
- Check the performance of the GC and the column by injecting a known sample or performance test mix. If all peaks tail, it could indicate loose fittings, improper column installation, or broken liner. See the Section on Troubleshooting Installation Problems.
- Calibrate the instrument.
- Inject a sample, ensuring that the vaporized sample volume does not exceed the inlet sleeve's buffer volume
- For short-term standby operation of the GC instrument continue carrier gas flow at 100-200 °C. Long term standby conditions require that the column be removed from the instrument, flame-sealed or end-capped with septa, and stored away from light in its original box.

Troubleshooting Installation Problems

More often than not, GC column problems are traceable to something improperly done during installation. For a more complete treatment of the subject, ask for your *FREE* guidebook "GC Troubleshooting".



High Performance Operation Recommendation Before Use:
This column should be conditioned for at least 4 hours at its "maximum" isothermal temperature OR at 20 °C above the maximum temperature of the method, whichever is less.

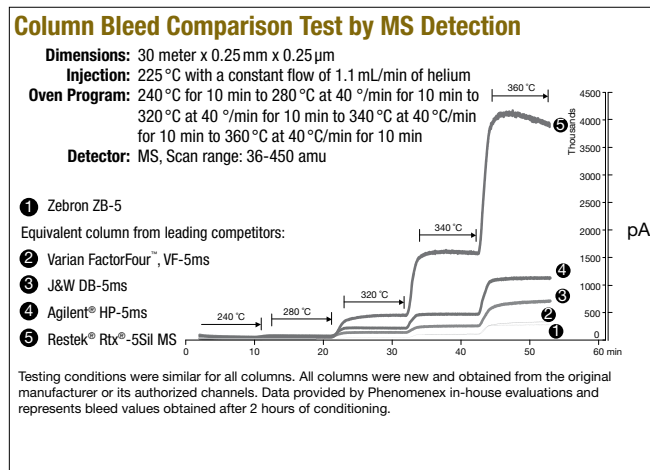
Zebron GC Columns MS Certification

Simply because GC-MS is one of the most important and rapidly growing techniques, many manufacturers have designated these columns "MS Certified" in order to draw attention to them. Designed to bleed less at higher temperatures, these columns can analyze a broad range of compounds at lower levels than ever before.

To provide such columns, some manufacturers "high-grade" or select the best-performing capillary columns from batches of their standard columns and label these "MS grade". Other manufacturers modify the chemistry of the polymer backbone (with, e.g., silphenylene) in order to make lower bleed at higher temperature limits possible. This last approach can change selectivity, however, which then leads to problems when the method is upgraded from a traditional to the new "MS-certified" column.

Phenomenex MS-certified Zebron columns, however, are neither hand-selected nor will they change selectivity. Instead, they offer excellent thermal performance with identical selectivity compared to traditional "non-MS columns". Every column is manufactured to provide very high levels of batch-to-batch and column-to-column reproducibility, along side some of the most exacting bleed specifications in the industry — your assurance of a quality column that will perform for demanding applications.

Now anyone doing trace analysis can directly transfer their method to a true low bleed, high-temperature column without virtually any selectivity changes. Zebron is the clear choice.



HPLC Calculations

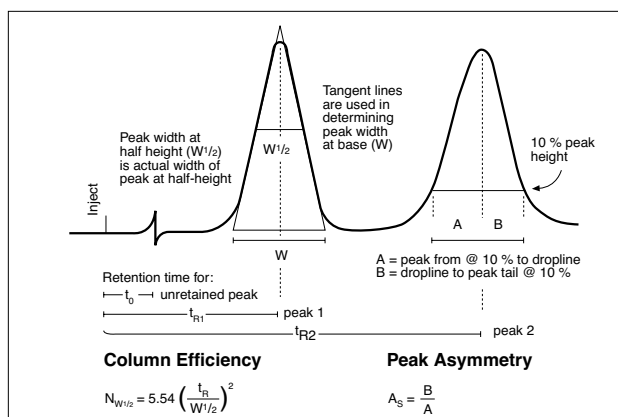
Column Efficiency

In general, **N** = Number of Theoretical Plates, **a** is a constant depending on method used, **t_R** = retention time of peak, and **W** = the peak width at a given peak height.

$$N = a \left(\frac{t_R}{W} \right)^2$$

Method	a
Peak Width ½ Peak Height	5.54
Peak Width at 4.4 % Peak Height (5s method)	25
Tangential (ca. 13.5 %)	16

The peak width at ½ height is the most commonly used method for calculating HPLC column efficiency.



Peak Asymmetry

$$A_s = B/A \text{ at } 10\% \text{ peak height}$$

Capacity Factor

(also known as Retention Factor or Relative Retention)

The Capacity Factor, **k**, of a sample component is a measure of the degree to which that component is retained by the column relative to an unretained component (such as uracil).

$$k = (t_R - t_0) / t_0$$

Where **t_R** is the elution time of retained component, and **t₀** is the elution time of the unretained sample.

Separation Factor

(also known as Selectivity)

The selectivity parameter, **α**, is a measure of the spacing between two peaks and is expressed as:

$$\alpha = k_2 / k_1$$

Resolution

R_s, defined as the amount of separation between two adjacent peaks, is given by:

$$R_s = \frac{\sqrt{N}}{4} \left(\frac{\alpha - 1}{\alpha} \right) \left(\frac{k}{k + 1} \right)$$

where **k** is the average value for the two peaks.

Adjusting Flow Rate for Different Column IDs

When scaling up from analytical to preparative mode or when scaling down from analytical to microbore LC, it is often desirable to keep retention times constant. The flow rate can be adjusted so that the columns operate at the same linear velocity.

When switching from a column with a radius (0.5 x ID) of **r1** to another with a radius of **r2**, the flow rate must be altered by a factor of **X**, where:

$$X = (r2/r1)^2$$

For example, when scaling up from a 250 x 4.6 mm column to a 250 x 10 mm ID column, the flow rate must be increased by a factor of 4.73 in the 10 mm column to generate the same linear velocity as that of the 4.6 mm ID column, as derived below:

$$X = (5.0/2.3)^2 = 4.73$$

The general formula which will convert flow rate from any given column dimension to any other is as follows:

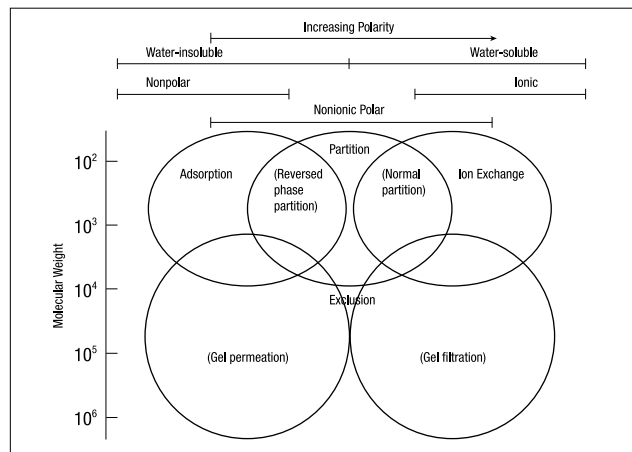
$$F2 = F1 \times (L2/L1) \times (r2/r1)^2$$

Where: **L** = length of the column, in mm
r = radius of the column, in mm
F = flow rate, in mL/min
1 designates the first, or reference, column
2 designates the second column

Effect of Different Conditions on Sample Retention

Change in Separation	Effect on Retention Time:		
	t ₀	Run Time	Band Spacing
Flow rate	F	1/F	None
Column volume	V _m	V _m	None
Increase in percentage of strong solvent	None	Decrease	Small change
New strong solvent	None	Changes	Changes
pH value	None	Changes	Changes
Column packing (e.g., cyano vs. C18)	Little	Changes	Changes
Increase temperature	None	Decrease	Small change
New mobile phase additives	None	Changes	Changes

Applications of Liquid Chromatography



(From: D.L. Saunders, in Chromatography, 3rd ed, E. Heftmann, Ed., p. 81, Van Nostrand Reinhold: New York, 1975. With permission.)

Chromatographic Parameters

Parameters	Unit	Symbols Kirkland <i>et al.</i> *	ASTME E-19**	Chromatographia**
Retention time of an unretained solute	s	t_0	t_M	t_m
Retention time, measured from the start	s	t_R	t_r	t_{m+s}
Reduced retention time	s	$t'_R = t_R - t_0$	$t'_R = t_r - t_M$	$t'_s = t_{m+s} - t_m$
Band width	s	w	y_1	w_b
Capacity factor (Retention factor)	—	$k = \frac{t'_R}{t_0}$	$k = \frac{t'_R}{t_M}$	$k = \frac{t'_s}{t_m}$
Selectivity factor	—	$\alpha = \frac{k_2}{k_1} = \frac{t'_{R2}}{t'_{R1}}$	$r_j = \frac{t'_{Rj}}{t'_1}$	$r = \frac{t'_{m+s}}{t'_s}$
Resolution	—	$R_s = 2 \left(\frac{t'_{R2} - t'_{R1}}{w_2 + w_1} \right)$	$R_j = 2 \left(\frac{t'_{Rj} - t'_{R1}}{y_j + y_1} \right)$	$R_s = 2 \left(\frac{t'_{m+s} - t'_s}{w'_b + w'_b} \right)$
Number of theoretical plates	—	$N = 16 \left(\frac{t_R}{w} \right)^2$	$n = 16 \left(\frac{t_R}{y_1} \right)^2$	$n = 16 \left(\frac{t_{m+s}}{w_b} \right)^2$
Column length	cm	L	L	L
Height equivalent of a theoretical plate (plate height)	cm	$H = \frac{L}{N}$	$H = \frac{L}{n}$	$h = \frac{L}{n}$
Linear velocity of the mobile phase	cm s ⁻¹	$u = \frac{L}{t_0}$	$\bar{u} = \frac{L}{t_M}$	$\bar{u} = \frac{L}{t_m}$

*Modern Practice of Liquid Chromatography, Ed. J.J. Kirkland, Wiley, New York (1971).
 **B. Versino and F. Geib, Supplement in: Chromatographia 3 (1970).

Amounts of Sample That Can Be Separated

Column Type	ID (mm)	Approx. Dead Volume (mL)*	Typical Flow Rate (mL)	Typical and (Max.) Injection Masses (mg)	Typical and (Max.) Injection Volumes (μL)**
Capillary (Fused Silica)	0.32	0.0075	0.001 - 0.02	0.001 (0.01)	1 (10)
Microbore	1.0	0.07	0.02 - 0.1	0.01 (0.1)	5 (25)
Analytical	4.6	1.5	0.5 - 2.0	0.1 (2.5)	10 (200)
Semi-Prep	10.0	7.3	5.0 - 20	1.0 (25)	50 (1000)
Preparative	20.0	29.2	10 - 200	5.0 (500)	200 (5000)

*The column Dead Volume (Vo) may be estimated from:

$$\text{Column Dead Volume (mL)} = V_0 = 0.487 \times d^2 \times L$$

Where: L = column length (cm); 15 cm (150mm) used for calculation.
 d = column ID (cm, not mm)

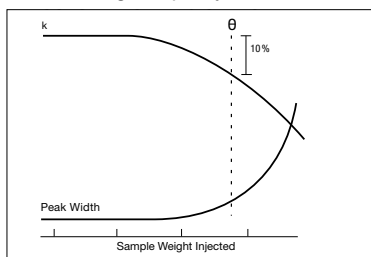
**The maximum allowable Sample Injection Volume (Vi) can be estimated as follows:

$$\text{Maximum Injection Volume} = V_i = \frac{V_r}{2\sqrt{N}}$$

Where: Vr = the retention volume of the first peak (mL)
 N = number of theoretical plates per column

Column Loading Capacity

Retention time and peak width are independent of the amount of sample injected up to a point called the column capacity (θ). Above this point, retention times (k) decrease and peak widths increase. When retention decreases by 10% of its normal value, the column capacity has been exceeded. Increases in peak width can cause overlap with adjacent peaks, reducing the purity of collected fractions. Analytical scale columns have capacities on the order of 1 mg, while preparative scale columns can separate tens of milligrams or even grams depending on the diameter of the column.

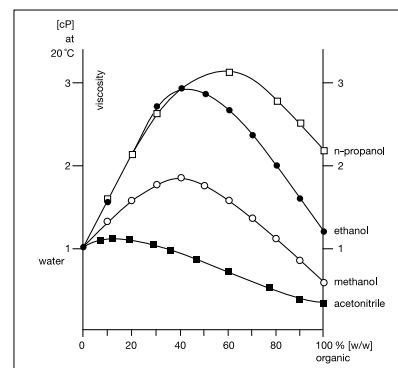


Probes for Column Characterization

The following tests are not 100% accurate for column characterization and it should be noted that there will be exceptions where a column gives a false value caused by other interaction mechanisms with the stationary phase and analyte probe.

Hydrophobicity	Tested by k' butylbenzene
Polarity	Tested by k' caffeine
H-bonding	Tested by α (k' caffeine/k' phenol)
Aromatic Selectivity	An estimate of ligand selectivity by π - π interaction
Silanol Activity	Tested by α (k' benzylamine/k' phenol)

Viscosity of Solvent Mixtures as a Function of Composition

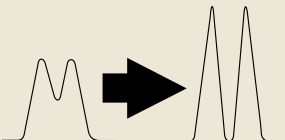
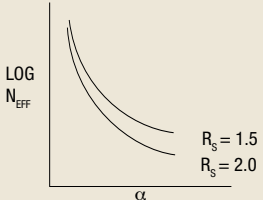
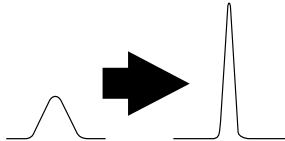
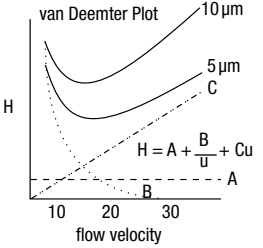
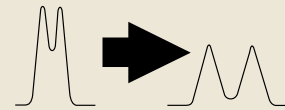
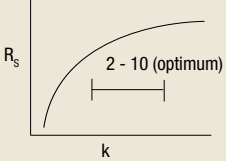


Reversed Phase Method Development

Factors Controlling Resolution

The equation below shows how resolution is affected by the controllable factors: Selectivity, Efficiency and Retention:

$$R_s = \frac{\sqrt{N}}{4} \left(\frac{\alpha-1}{\alpha} \right) \left(\frac{k}{k+1} \right)$$

Goal	Factor	Control
	<p>Selectivity Factor $\alpha = k_2 / k_1$</p> <p>α (alpha) = k_2 / k_1. For closely spaced peaks, the alpha value is close to 1.0, so small changes in alpha have large effects on the resulting resolution.</p> <p>Improve selectivity (α) by altering the composition of the mobile phase or stationary phase. pH and temperature are two other potential variables to control, if appropriate.</p>	
	<p>Efficiency Factor $N = -8 \ln(f) (t_r / w)^2$</p> <p>Since resolution is a function of the square root of N, large changes in N are required to make small changes in resolution. Increasing efficiency is often an overrated method of improving resolution.</p> <p>Improve efficiency (N) by increasing column length, decreasing particle size of column packing, or decreasing flow rate. Minimize extra-column dead volume.</p>	
	<p>Retention Factor $k = (t_r - t_0) / t_0$</p> <p>This is a function of k, the average retention factor for 2 adjacent bands. When k is small (0-1), this factor severely limits resolution. Larger values of k will improve resolution, yet increase associated retention times. Above k = 20, the amount of improvement is small.</p> <p>Improve k by changing the eluent strength.</p>	

- Where: k = Retention factor = $(t_r - t_0) / t_0$ (previously known as capacity factor)
- f = Fractional height of peak, e.g., 0.5, 0.1
- W_f = Width of peak at fractional height f
- t_r = Elution time of the retained component
- t_0 = Elution time of an unretained component (one that elutes in the void volume)
- H = Height equivalent to a theoretical plate (HETP) = $\frac{L}{N}$, or as defined by the terms of the van Deemter plot above
- A = Eddy diffusion
- B = Longitudinal diffusion
- C = Mass transfer kinetics of the analyte between mobile and stationary phase
- u = Linear velocity

HPLC Column Protection

Upon Receipt Of The Column

- Verify the column you received is the column you ordered
- Check the column for physical damage that may have occurred during shipping
- Test the column immediately to verify quality and performance
- All columns are shipped in the testing solvent, unless otherwise specified

Each Phenomenex manufactured HPLC column is individually packed and tested to ensure outstanding column quality. Every column is supplied with its Test Chromatogram and a Specification Sheet that indicates testing conditions, operating parameters, column serial number and identity.

The warranty period begins upon receipt of the column. Testing is especially important if the column is to be placed in storage. Test the column using the same conditions in the test chromatogram. Use the formulas on p. 412 to determine column efficiency and peak asymmetry.

Chromatographic performance depends on the entire system, not just the column. Columns are QC tested using optimum conditions to minimize band-spreading from "Extra Column Effects." See pp. 398-399 for HPLC Column Performance Check Standards. Most variations from the Phenomenex test data are due to extra column effects created by your system's design (e.g., injector, flow cell, connecting tubing, etc.). If you have any questions regarding your test results or the column quality, or if there are signs of damage, contact your local distributor or Phenomenex immediately.

Mobile Phase Considerations

- Use only HPLC grade solvents
- Use only highest purity chemicals and reagents
- Degas and filter all mobile phases prior to use
- Make sure solvents are miscible (see Table p. 416)
- Always check sample solubility
- If possible, use the mobile phase as the diluent (sample solvent)

Stationary Phase Considerations

- Maintain pH between 2.0 and 8.0**
- Use guard columns
- Avoid aldehydes and ketones with amino columns

**Consult Phenomenex for columns that have extended pH ranges.

Backpressure and Flow Rates

- Keep backpressures below 3500 psi (245 bar), for HPLC columns. For Luna and Gemini columns, keep backpressures below 5000 psi (345 bar). For Core-Shell columns, keep backpressures below 6000 psi (400 bar) for 3.0 and 4.6 mm ID columns. For 2.1 mm ID columns the backpressure limit is 15000 psi (1000 bar)
- Avoid any sudden pressure and flow rate changes
- If high backpressure is observed reverse flush the column (Check column care guide before proceeding)
- Use a backpressure regulator if you are experiencing out-gassing problems in the detector cell

Columns can be operated at any flow rate that is consistent with the backpressure limitations described below. Flow rates should be optimized to provide the highest efficiency for your sample.

Typical Column Flow Rates & Backpressures (RP) *column length

Particle Size (µm)	Internal Diameter(mm)	Typical Flow Rate (mL/min)	Typical Pressure (psi)	
			150 mm*	250 mm*
1.7	2.1	0.5	6700	NA
2.6	2.1	0.5	6800	NA
2.6	3.0	0.8	5500	NA
2.6	4.6	1.85	5000	NA
3	2.0	0.2	1500	2400
3	3.0	0.6	1500	2400
3	4.6	1.25	1500	2300
5	2.0	0.2	650	1000
5	3.0	0.5	900	1400
5	4.6	1.0	850	1200
10	10.0	5.0	350	500
10	21.2	15.0	350	500

Phenomenex

Storing The Column

- Column storage conditions affect column lifetime
- Never store columns containing buffers or ion-pairing reagents
- Flush with at least five column volumes of mobile phase without buffer to remove any buffers or salts

Storage Conditions for Silica-Based HPLC Columns

Column Type	Storage Solvent
Reversed Phase (RP) C18, C12, C8, C4, C2, C1, Phenyl, PFP	65% Acetonitrile/ 35% Water
Normal Phase (NP) Silica, CN, NH ₂ , PAC, Diol, Alumina	Isopropanol or Hexane
Ion-Exchange SAX, SCX, WAX, WCX	Methanol*
Size Exclusion Diol	0.05% Na ₂ SO ₄ in Water or 10% Methanol
HILIC Luna HILIC	80% Acetonitrile/ 20% Water

*Flush column with 50 mL HPLC grade water prior to storage solvent

Column Cleaning Procedures

Due to interactions between the stationary phase and sample components, HPLC columns may occasionally require cleaning or regeneration. The following conditions apply to Phenomenex silica-based columns with the exception of chiral columns.

- Flow rates should be 1/5 - 1/2 of the typical flow rate
- To estimate the column volume, use the following equation:

$$V = \pi r^2 L$$

V = column volume in mL
r = column radius in cm
L = column length in cm

UNBONDED SILICA COLUMNS (SI)

Rinse with 10 column volumes each of:

- Hexane
- Methylene Chloride
- Isopropanol
- Methylene Chloride
- Mobile Phase

Water Removal: Flush column with 30 mL 2.5% 2,2-dimethoxy propane and 2.5% glacial acetic acid in hexane.

REVERSED PHASE COLUMNS (C18, C12, C8, C5, C4, C2, C1, PHENYL, PFP, CN, NH₂)

Rinse with 10 column volumes each of:

- 95% Water/5% Acetonitrile (for buffer removal)
- THF
- 95% Acetonitrile/5% Water
- Mobile Phase

REVERSED PHASE PROTEIN/PEPTIDE COLUMNS (C18, C12, C8, C5, C4, Phenyl)

Rinse with 20 column volumes of mobile phase with buffer removed.

Run gradient (2x):

- (A) 0.1% aqueous TFA in water
- (B) 0.1% TFA in Acetonitrile/Isopropanol (1:2)

25% B to 100% B for 30 minutes
Equilibrate with 10 column volumes of mobile phase. Do not store column in TFA.

BONDED NORMAL PHASE COLUMNS (CN, NH₂, DIOL, PAC)

Rinse with 10 column volumes each of:

- Chloroform
- Isopropanol
- Methylene Chloride
- Mobile Phase

Exception: Recommended for cleaning Luna Amino when used in reversed phase mode:

1. Wash with at least 30 column volumes of Sodium Hydroxide pH 11.0
2. Flush with at least 30 column volumes of water (HPLC grade)
3. Re-equilibrate to mobile phase conditions.

GFC/SEC COLUMNS FOR PROTEINS (Yarra SEC, BIOSEP-SEC-S)

Rinse with 5 column volumes of:

0.1 M Phosphate buffer pH 3.0.

For strongly retained proteins:

Run 100% Water to 100% Acetonitrile to 100% Water over 60 minutes OR wash with 5 column volumes of SDS or 6 M Guanidine Thiocyanate or 10% DMSO. Do not backflush columns!

ION-EXCHANGE COLUMNS (SAX, SCX, NH₂, WAX, WCX)

Rinse with 10 column volumes each of:

- 500 mM Phosphate Buffer pH 7
 - 10% Acetic Acid (Aq)
 - 5 column volumes of Water
 - 10 column volumes of Phosphate Buffer pH 7
 - 5 column volumes of Water
 - 10 column volumes of Methanol
 - 10 column volumes of Water
- For protein removal, follow the above procedure with this exception: Substitute 10 column volumes of Methanol with 10 column volumes of 5 M Urea or 5 M Guanidine Thiocyanate.

HILIC

Rinse with 10 column volumes each of:

- 95% Water/5% Acetonitrile (for buffer removal)
- 95% 100 mM Ammonium Acetate, pH 5.8 / 5% Acetonitrile
- 95% Water/5% Acetonitrile
- Mobile Phase



HPLC columns running water-free, flammable organic solvents (e.g., normal phase, chiral, GPC) can generate static electricity and should be properly grounded to avoid a potentially dangerous electrical discharge.

Solvent Miscibility Table

Solvent Miscibility Table

Solvent	Polarity Index	Refractive Index @ 20°C	UV(nm) Cutoff @ 1AU	Boiling Point (C°)	Viscosity (cPoise)	Solubility in Water (% w/w)
Acetic Acid	6.2	1.372	230	118	1.26	100
Acetone	5.1	1.359	330	56	0.32	100
Acetonitrile	5.8	1.344	190	82	0.37	100
Benzene	2.7	1.501	280	80	0.65	0.18
n-Butanol	4.0	1.394	254	125	0.73	0.43
Butyl Acetate	3.9	1.399	215	118	2.98	7.81
Carbon Tetrachloride	1.6	1.466	263	77	0.97	0.08
Chloroform	4.1	1.446	245	61	0.57	0.815
Cyclohexane	0.2	1.426	200	81	1.00	0.01
1,2-Dichloroethane ¹	3.5	1.444	225	84	0.79	0.81
Dichloromethane ²	3.1	1.424	235	41	0.44	1.6
Dimethylformamide	6.4	1.431	268	155	0.92	100
Dimethyl Sulfoxide ³	7.2	1.478	268	189	2.00	100
Dioxane	4.8	1.422	215	101	1.54	100
Ethanol	5.2	1.360	210	78	1.20	100
Ethyl Acetate	4.4	1.372	260	77	0.45	8.7
Di-Ethyl Ether	2.8	1.353	220	35	0.32	6.89
Heptane	0.0	1.387	200	98	0.39	0.0003
Hexane	0.0	1.375	200	69	0.33	0.001
Methanol	5.1	1.329	205	65	0.60	100
Methyl-t-Butyl Ether ⁴	2.5	1.369	210	55	0.27	4.8
Methyl Ethyl Ketone ⁵	4.7	1.379	329	80	0.45	24
Pentane	0.0	1.358	200	36	0.23	0.004
n-Propanol	4.0	1.384	210	97	2.27	100
Iso-Propanol ⁶	3.9	1.377	210	82	2.30	100
Di-Iso-Propyl Ether	2.2	1.368	220	68	0.37	
Tetrahydrofuran	4.0	1.407	215	65	0.55	100
Toluene	2.4	1.496	285	111	0.59	0.051
Trichloroethylene	1.0	1.477	273	87	0.57	0.11
Water	9.0	1.333	200	100	1.00	100
Xylene	2.5	1.500	290	139	0.61	0.018

 Immiscible	Synonym Table
 Miscible	¹ Ethylene Chloride
	² Methylene Chloride
	³ Methyl Sulfoxide
	⁴ tert-Butyl Methyl Ether
	⁵ 2-Butanone
	⁶ 2-Propanol

Immiscible means that in some proportions two phases will be produced

Solvent Polarity Chart

Relative Polarity	Compound Formula	Group	Representative Solvent Compounds
↑ Increasing Polarity ↓	R - H	Alkanes	Petroleum ethers, ligroin, hexanes
	Ar - H	Aromatics	Toluene, benzene
	R - O - R	Ethers	Diethyl ether
	R - X	Alkyl halides	Tetrachloromethane, chloroform
	R - COOR	Esters	Ethyl acetate
	R - CO - R	Aldehydes and ketones	Acetone, methyl ethyl ketone
	R - NH ₂	Amines	Pyridine, triethylamine
	R - OH	Alcohols	Methanol, ethanol, isopropanol, butanol
	R - COHN ₂	Amides	Dimethylformamide
	R - COOH	Carboxylic acids	Acetic acid
Polar	H - OH	Water	Water

a selection of HPLC Material Sorbent Characteristics

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list and the accuracy of data is not guaranteed.

Phenomenex Sorbents

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m ² /g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m ²)	End Capping	pH Range	USP Packing
Aeris WIDEPORE XB-C18	Core-Shell 3.6	—	—	25	—	—	Yes	1.5-9	L1
Aeris WIDEPORE XB-C8	Core-Shell 3.6	—	—	25	—	—	Yes	1.5-9	L7
Aeris WIDEPORE C4	Core-Shell 3.6	—	—	25	—	—	Yes	1.5-9	L26
Aeris PEPTIDE XB-C18	Core-Shell 1.7, 2.6, 3.6, 5	100	—	200	10 [†]	—	Yes	1.5-9	L1
Aqua C18	Spher. 3, 5	125	1.05	320	15	—	Proprietary	2.5-7.5	L1
Aqua C18	Spher. 5	200	1.15	215	11	—	Proprietary	2.5-7.5	L1
bioZen Glycan	Core-Shell 2.6	100	—	200	—	—	—	2.0-7.5	—
bioZen Peptide PS-C18	Spher. 1.6, 3	100	—	260	9	—	—	1.5-8.5 ^Δ	—
bioZen Peptide XB-C18	Core-Shell 1.7, 2.6	100	—	200	10	—	—	1.5-9 [‡]	—
bioZen Intact C4	Core-Shell 3.6	200	—	25	—	—	—	1.5-9 [‡]	—
bioZen Intact XB-C8	Core-Shell 3.6	200	—	25	—	—	—	1.5-9 [‡]	—
bioZen WCX	Spher. 6	—	—	—	—	—	—	2-12	—
Bondclone Silica	Irreg. 10	148	1.1	300	0	—	No	—	L3
Bondclone C18	Irreg. 10	148	1.1	300	10, Monomeric	1.61	Yes	2.5-7.5	L1
Clarity Oligo-RP	Spher. 3, 5, 10	110	—	375	14	—	Yes	1-12	—
Clarity Oligo-SAX	Polymer 5	N/A	—	—	—	—	N/A	1-14	—
Clarity Oligo-MS	Core-Shell 1.3, 1.7, 2.6, 5	100	—	200	12	—	Yes	1.5-10	L1
Clarity Oligo-XT	Hybrid Core-Shell 1.7, 2.6, 5	100	—	200	11	—	Yes	1-12	L1
Gemini C18	Hybrid Spher. 3, 5, 10	110	—	375	14	—	Yes	1.0-12.0	L1
Gemini C6-Phenyl	Hybrid Spher. 3, 5	110	—	375	12	—	Yes	1.0-12.0	L11
Gemini NX-C18	Hybrid Spher. 3, 5, 10	110	—	375	14	—	Yes	1.0-12.0	L1
HyperClone BDS C8	Spher. 3, 5	130	0.6	155	7	—	Yes	2.0-7.5	L7
HyperClone BDS C18	Spher. 3, 5	130	0.6	155	11	—	Yes	2.0-7.5	L1
HyperClone MOS (C8)	Spher. 3, 5	120	0.6	155	6.5	—	Yes	2.0-7.5	L7
HyperClone ODS (C18)	Spher. 3, 5	120	0.6	155	10	—	Yes	2.0-7.5	L1
HyperClone CN (CPS)	Spher. 3, 5	120	0.6	155	4	—	No	2.0-7.5	L10
Jupiter C4	Spher. 5, 10, 15	300	—	170	5.0	6.30	Yes	1.5-10	L26
Jupiter C5	Spher. 5	300	—	170	5.5	5.30	Yes	1.5-10	—
Jupiter C18	Spher. 5, 10, 15	300	—	170	13.34	5.50	Yes	1.5-10	L1
Jupiter Proteo	Spher. 4, 10	90	—	475	15	—	Yes	1.5-10.0	—
Kinetex EVO C18	Hybrid Core-Shell 1.7, 2.6, 5	100	—	200	11 [†]	—	Yes	1-12	L1
Kinetex C18	Core-Shell 1.3, 1.7, 2.6, 5	100	—	200	12 [†]	—	Yes	1.5-8.5 ^Δ	L1
Kinetex PS C18	Core-Shell 2.6	100	—	200	9 [‡]	—	Yes	1.5-8.5 ^Δ	L1
Kinetex XB-C18	Core-Shell 1.7, 2.6, 5	100	—	200	10 [†]	—	Yes	1.5-8.5 ^Δ	L1
Kinetex C8	Core-Shell 1.7, 2.6, 5	100	—	200	8 [‡]	—	Yes	1.5-8.5 ^Δ	L7
Kinetex Biphenyl	Core-Shell 1.7, 2.6, 5	100	—	200	11 [†]	—	Yes	1.5-8.5 ^Δ	L11
Kinetex Phenyl-Hexyl	Core-Shell 1.7, 2.6, 5	100	—	200	11 [†]	—	Yes	1.5-8.5 ^Δ	L11
Kinetex F5	Core-Shell 1.7, 2.6	100	—	200	9 [‡]	—	Yes	1.5-8.5 ^Δ	L43
Kinetex HILIC	Core-Shell 1.7, 2.6, 5	100	—	200	0	—	No	2.0-7.5	L3
Kinetex Polar C18	Core-Shell 2.6	100	—	200	3.6 [‡]	—	Yes	1-8.5	L1
Kinetex PAH	Core-Shell 3.5	100	—	200	12 [†]	—	Yes	1.5-8.5 ^Δ	L118
Luna PFP(2)	Spher. 3, 5	100	1.0	400	11.5	2.20	Yes	1.5-9.0 [‡]	L43
Luna Phenyl-Hexyl	Spher. 3, 5, 10, 15	100	1.0	400	17.5	4.00	Yes	1.5-9.0 [‡]	L11
Luna Silica(2)	Spher. 3, 5, 10, 15	100	1.0	400	0	—	No	2.0-7.5	L3
Luna C5	Spher. 5, 10	100	1.0	440	12.5	7.85	Yes	1.5-9.0 [‡]	—
Luna C8	Spher. 5, 10	100	1.0	440	14.75	5.50	Yes	1.5-9.0 [‡]	L7
Luna C8(2)	Spher. 3, 5, 10, 15	100	1.0	400	13.5	5.50	Yes	1.5-9.0 [‡]	L7
Luna C18	Spher. 5, 10	100	1.0	440	19	3.00	Yes	1.5-9.0 [‡]	L1
Luna C18(2)-HST	Spher. 2.5	100	1.0	400	17.5	3.00	Yes	1.5-9.0 [‡]	L1
Luna C18(2)	Spher. 3, 5, 10, 15	100	1.0	400	17.5	3.00	Yes	1.5-9.0 [‡]	L1
Luna CN	Spher. 3,5,10	100	1.0	400	7.0	3.80	Yes	1.5-7.0	L10
Luna HILIC	Spher. 3, 5	200	—	200	5.7	4.30	No	1.5-8.0	L20
Luna NH ₂	Spher. 3,5,10	100	1.0	400	9.5	5.80	No	1.5-11.0	L8
Luna SCX	Spher. 5,10	100	—	400	0.55% Sulfur Load	—	No	2.0-7.0	—
Luna Omega C18	Spher. 1.6	100	—	260	10.35	2.5	Yes	1.5-8.5	L1
Luna Omega PS C18	Spher. 1.6, 3,5	100	—	260	8.8	—	Yes	1.5-8.5	L1
Luna Omega Polar C18	Spher. 1.6, 3,5	100	—	260	8.5	—	Yes	1.5-8.5	L1
Luna Omega SUGAR	Spher. 3	100	—	260	<2	—	Yes	2.0-7.0	L8
Onyx C18	C18 Bonded Rod**	130*	1.0	300	18	3.6	Yes	2.0-7.5	L1
PhenoSphere C6	Spher. 3, 5, 10	80	0.5	220	6, Monomeric	2.27	Yes	2.5-7.5	L15
PhenoSphere SCX	Spher. 5, 10	80	0.5	220	6, Monomeric	0.4 meq/g	No	2.5-7.5	—
PhenoSphere SAX	Spher. 5, 10	80	0.5	220	4, Monomeric	0.6 meq/g	No	2.5-7.5	L14

[†] Effective Carbon Load. ^{**} Mesopore size listed. Macropore size is 2 µm. ^Δ pH range is 1.5-10 under isocratic conditions. pH range is 1.5-8.5 under gradient conditions. [‡] pH range is 1.5-10 under isocratic conditions. pH range is 1.5-9.0 under gradient conditions.

a selection of HPLC Material Sorbent Characteristics

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list and the accuracy of data is not guaranteed.

Phenomenex Sorbents (cont'd)

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m ² /g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m ²)	End Capping	pH Range	USP Packing
PhenoSphere-NEXT Silica	Spher. 3, 5	120	—	380	—	—	No	—	L3
PhenoSphere-NEXT C8	Spher. 3, 5	120	—	380	10	—	Yes	2.5-7.5	L7
PhenoSphere-NEXT C18	Spher. 3, 5	120	—	380	14	—	Yes	2.5-7.5	L1
PhenoSphere-NEXT Phenyl	Spher. 5	120	—	380	11	—	Yes	2.5-7.5	L11
PolymerX RP-1	Spher. 3, 5, 7, 10, 15	100	—	410	0	N/A	No	0-14	L21
Prodigy ODS(2)	Spher. 5	150	1.1	310	18.5, Monomeric	3.50	Yes	2.0-9.0	L1
Prodigy C8	Spher. 5	150	1.1	310	12.6, Monomeric	5.00	Yes	2.0-9.0	L7
Prodigy ODS (3)	Spher. 3, 5, 10	100	1.0	450	15.5, Monomeric	—	Yes	2.0-9.0	L1
Prodigy Phenyl (PH-3)	Spher. 5	100	—	450	10.0, Polymeric	—	No	2.0-9.0	L11
SphereClone Silica	Spher. 5	80	—	200	-	—	No	—	L3
SphereClone C6	Spher. 5	80	—	200	6	—	Yes	2.5-7.5	L15
SphereClone C8	Spher. 3, 5	80	—	200	6	—	Yes	2.5-7.5	L7
SphereClone ODS (1)	Spher. 3, 5	80	—	200	7	—	Partial	2.5-7.5	L1
SphereClone ODS (2)	Spher. 3, 5, 10	80	—	200	12	—	Yes	2.5-7.5	L1
SphereClone NH ₂	Spher. 3, 5	80	—	200	2	—	No	2.5-7.5	L8
SphereClone SAX	Spher. 5, 10	80	—	200	—	—	No	2.5-7.5	—
Synergi Fusion-RP	Spher. 2.5	100	—	400	12	—	Yes	1.5-9.0 [†]	L1
Synergi Max-RP	Spher. 2.5	100	—	400	17	—	Yes	1.5-9.0 [†]	—
Synergi Hydro-RP	Spher. 2.5	100	—	400	19	—	Proprietary	1.5-7.5	L1
Synergi Polar-RP	Spher. 2.5	100	—	400	11	—	Proprietary	1.5-7.0	—
Synergi Fusion-RP	Spher. 4, 10	80	1.05	475	12	—	Yes	1.5-9.0 [†]	L1
Synergi Max-RP	Spher. 4, 10	80	1.05	475	17	3.21	Yes	1.5-9.0 [†]	L87
Synergi Hydro-RP	Spher. 4, 10	80	1.05	475	19	2.45	Proprietary	1.5-7.5	L1
Synergi Polar-RP	Spher. 4, 10	80	1.05	475	11	3.15	Proprietary	1.5-7.0	L11
Ultracarb C8	Spher. 5	60	0.80	550	14, Monomeric	2.71	Yes	2.5-7.5	L7
Ultracarb ODS (20)	Spher. 3, 5	90	0.75	370	22, Monomeric	3.53	Yes	2.5-7.5	L1
Ultracarb ODS (30)	Spher. 5	60	0.80	550	31, Monomeric	4.06	Yes	2.5-9.0	L1

[†] pH range is 1.5-10 under isocratic conditions. pH range is 1.5-9.0 under gradient conditions.

*As per Sander, L.C., and Wise, S.A., Anal. Chem. 1984, 56, 504-510,

$$\text{where } N(\mu\text{mol}/\text{m}^2) = \frac{10^9 P_c}{1200 n_c - P_c (M-1)} \cdot \frac{1}{S}$$

and P_c = percent carbon of bonded phase, n_c is the number of carbon atoms in the bonded silane molecule, M is the molecular weight of the bonded silane molecule, and S is the specific surface area of the bonded silica in m²/g.

NOTE: Phenomenex has not verified above values experimentally, and does not guarantee their accuracy. Above specifications subject to change without prior notice.

Non-Aqueous SEC/GPC Materials

Packing Material	Particle Shape/Size (µm)	Pore Size** (Å)	Exclusion Limit***
Phenogel 50 Å	Spher. 5, 10	50	3 x 10 ³
Phenogel 100 Å	Spher. 5, 10	100	6 x 10 ³
Phenogel 500 Å	Spher. 5, 10	500	1 x 10 ⁴
Phenogel 10 ³ Å	Spher. 5, 10	10 ³	7 x 10 ⁴
Phenogel 10 ⁴ Å	Spher. 5, 10	10 ⁴	5 x 10 ⁵
Phenogel 10 ⁵ Å	Spher. 5, 10	10 ⁵	1 x 10 ⁶
Phenogel 10 ⁶ Å	Spher. 5, 10	10 ⁶	1 x 10 ⁷
Phenogel Linear	Spher. 5, 10	Mixed	1 x 10 ⁷

Aqueous SEC/GFC Materials

Packing Material	Particle Shape/Size (µm)	Pore Size** (Å)	Exclusion Limit***
bioZen SEC-2	Spher. 1.8	150	4 x 10 ⁵
bioZen SEC-3	Spher. 1.8	300	7 x 10 ⁵
Yarra SEC-2000	Spher. 3, 5	145	3 x 10 ⁵
Yarra SEC-3000	Spher. 3, 5	290	7 x 10 ⁵
Yarra SEC-4000	Spher. 3, 5	500	1 x 10 ⁶
BioSep-SEC-S 2000	Spher. 5	145	3 x 10 ⁵
BioSep-SEC-S 3000	Spher. 5	290	7 x 10 ⁵
BioSep-SEC-S 4000	Spher. 5	500	1 x 10 ⁶
PolySep-GFC-P 1000	Spher.	N/A	2 x 10 ³ (PEG)
PolySep-GFC-P 2000	Spher.	N/A	9 x 10 ³ (PEG)
PolySep-GFC-P 3000	Spher.	N/A	50 x 10 ³ (PEG)
PolySep-GFC-P 4000	Spher.	N/A	20 x 10 ⁴ (PEG)
PolySep-GFC-P 5000	Spher.	N/A	20 x 10 ⁵ (PEG)
PolySep-GFC-P 6000	Spher.	N/A	10 x 10 ⁶ (PEG)
PolySep-GFC-P Linear	Spher.	N/A	10 x 10 ⁷ (PEG)

**Pore Size is expressed in Angstroms (10⁻¹⁰ meters). This is actually a convention used by manufacturers to indicate the approximate molecular weight of compounds that can be separated on a given SEC packing; these values do not indicate the actual size (diameter) of the pores on the surface of the particle.

***Exclusion Limit is expressed in Daltons (the molecular weight) of the specified compound excluded from the pores of the base material. Practically speaking however, the exclusion limit is more accurately a reflection of the hydrodynamic volume occupied by the solvated compound.

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