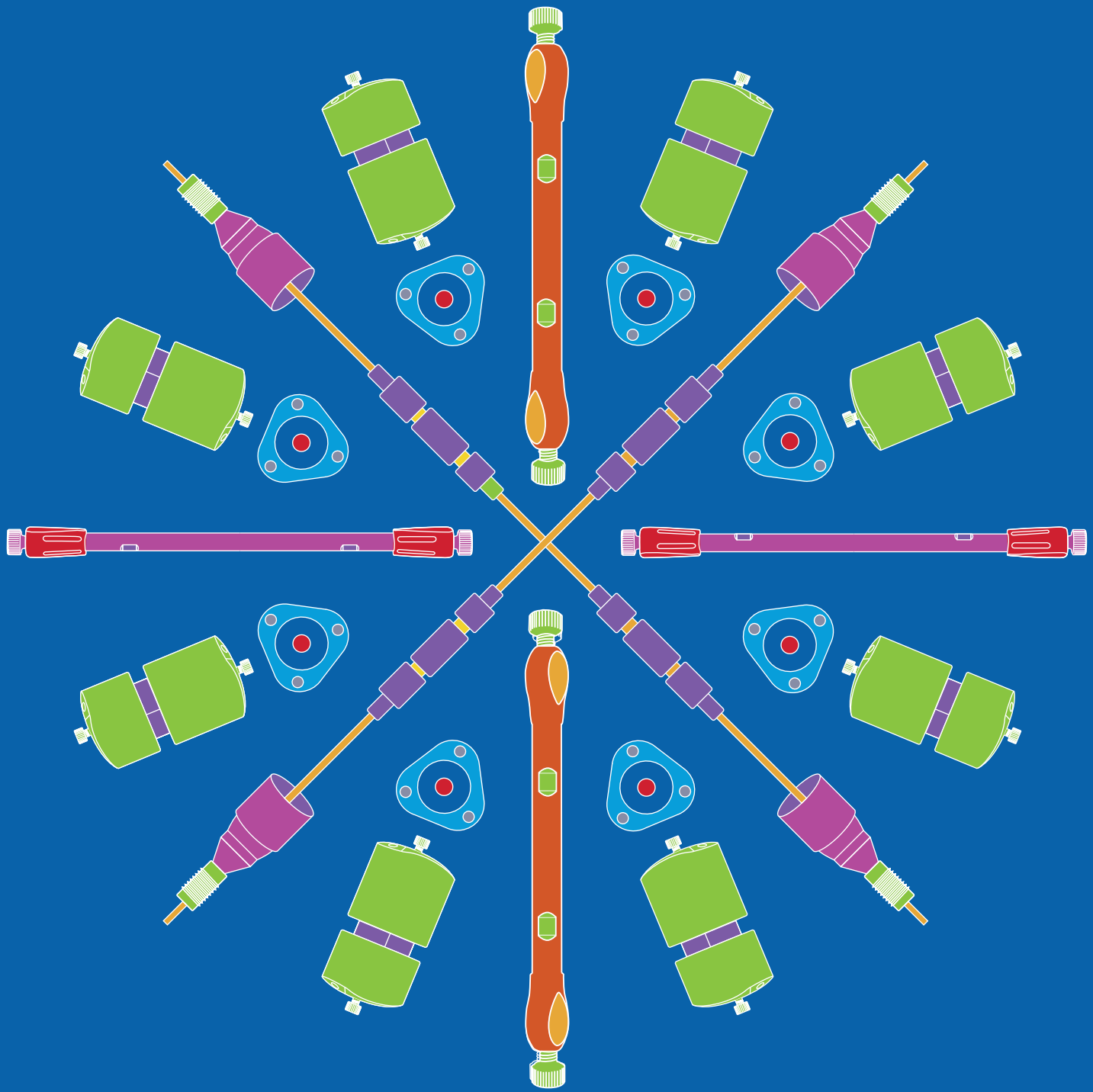
LC Product Guide
2025/26



phenomenex™

Welcome

Our Mission

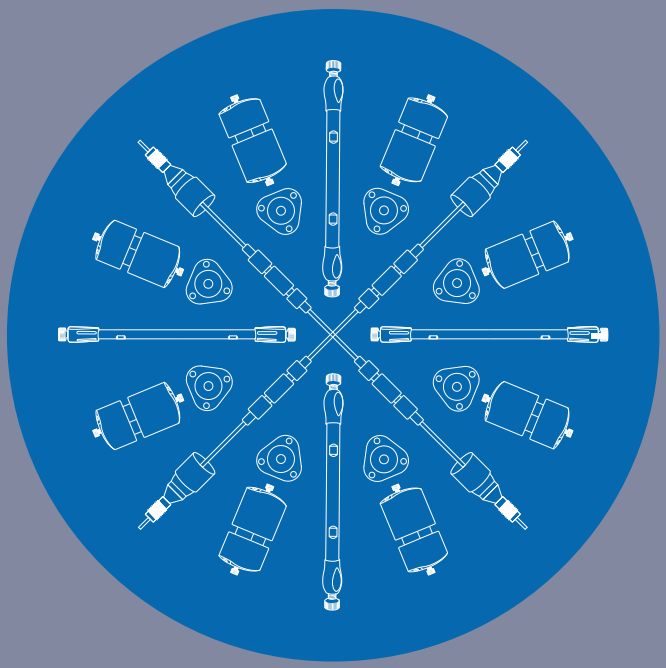
Keeping scientists at the heart of our every day through unforgettable support and standout technology to build a brighter future together.

Our Promise

Our mission drives us to build sincere and meaningful relationships by working alongside scientists and connecting labs with exceptional technology, unrivaled service, and world-class technical support.

The Phenomenex team is empowered by a culture built on trust, integrity, and kindness — one that places scientists at the heart of our every day. We are inspired by the impact our customers make on the world and we will always go above and beyond to help them in our shared pursuit to create a brighter future for humanity. That is our promise.

Dr. Kaveh Kahen
President



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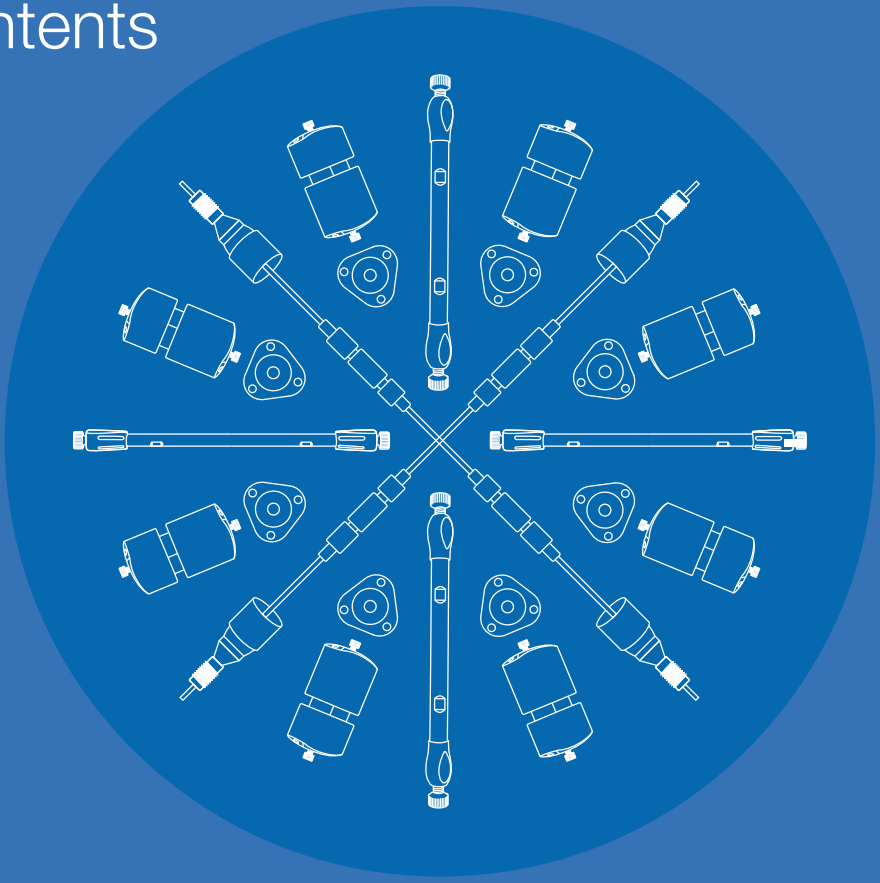

LC 4

Overview of Sub-techniques (HPLC, SFC, Flash, Nano, Micro) 5

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Liquid Chromatography and Diverse Techniques

Explore Phenomenex's extensive portfolio, which includes a wide selection of columns, separation modes, and specialized products designed to meet the diverse needs of your workflows. For personalized assistance in choosing the best product for your application or to inquire about our available options, please chat with us at www.phenomenex.com/chat.

Nano LC Columns

High powered sensitivity for exceedingly small samples (Column ID 50-75 µm).

Micro LC Columns

Increased sensitivity for small samples (Column ID 0.15-0.5 mm).

UHPLC Columns

High speed separations of analytes (Column ID 1.0-2.1 mm).

Analytical LC Columns

General, all-purpose separations (Column ID 2.1-4.6 mm).

Semi-Prep and Preparative LC Columns

Large scale isolation and purifications (7.8-100 mm).

Separation Mode	Description
Reversed Phase	Used to separate hydrophobic compounds.
Normal Phase	Used to separate hydrophobic compounds and matrices that are retained too strongly by reversed phase.
HILIC	Used to polar organic compounds that are poorly retained by reversed phase.
Ion Exchange	Used to separate charged compounds.
Ion Exclusion	Used to separate organic acids, carbohydrates, sugars, starches, and oligosaccharides.
Chiral LC	Used to separate enantiomers.
Size Exclusion Chromatography (SEC)	Used to separate biomolecules and polymers.

Recommended Products:

Biozen™ LC Columns for the Analysis of Biologics
Kinetex™ Core-Shell Columns
Gemini™ pH Flexible LC Columns
Luna™ and **Luna Omega** Fully Porous Columns
Lux™ Chiral and SFC Columns
Synergi™ Fully Range Selectivity LC Columns

Find more ways to select the right LC column, start on page 230.

High-Performance Liquid Chromatography (HPLC)

A widely-used technique for separating, identifying, and quantifying compounds. Liquid chromatography columns in HPLC are designed to withstand the high pressures required for efficient separation.

Key Features: High resolution, reproducibility, and sensitivity.

Ultra-High Performance Liquid Chromatography (UHPLC)

Key Features: Smaller particle size columns, higher pressure limits.

Supercritical Fluid Chromatography

A versatile analytical technique that achieves fast, efficient, and environmentally friendly separations. SFC has a broad applicability across various industries and reduced environmental impact, also is available in Chiral and Achiral column chemistries.

Flash Chromatography

An efficient chromatography technique with low to medium pressure widely used in organic and medicinal chemistry for the purification of compounds. Our Claricep™ portfolio offers a range of particle chemistries, cartridge dimensions, and diverse loading styles.

Large Scale Purification

Bulk media offers a wide variety of medias in a bulk ordering format with excellent reproducibility, long lifetimes and consistent particle size distribution to maintain performance.

Aeris™ Bio Core-Shell Technology

Core-Shell HPLC / UHPLC Columns for Proteins and Peptides

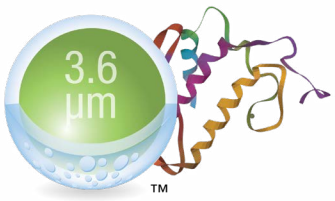
Find newer methods in our Biozen Portfolio
See pp. 210-230

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.

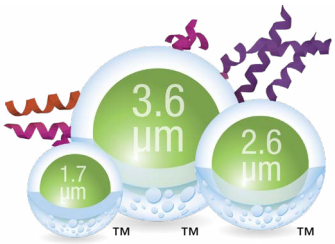
These columns can provide improved resolving power, selectivity, throughput, sensitivity, column lifetime, and method flexibility compared to other fully porous and core-shell columns typically used for bioseparations.

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 partition into and out of the particle.

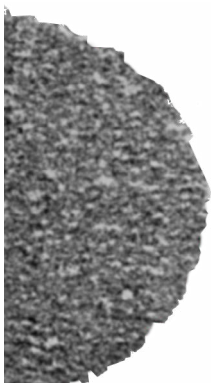
2. Expert manufacturing combined with tight packing specifications and high particle density reduces losses in efficiency and performance due to band broadening.

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 homogenuous 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**

To see our entire BioSeparations column and accessory portfolio, visit:
www.phenomenex.com/biopharm

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**

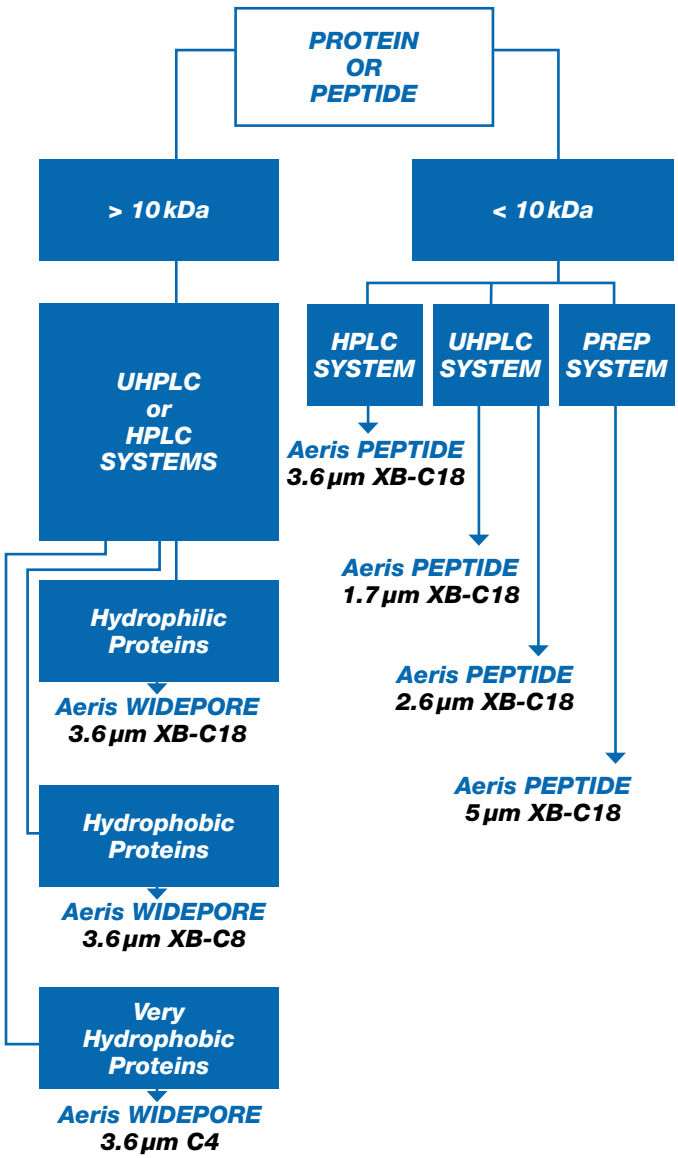
For increased resolving power, use a longer column, preferably a 250 mm (or 150 mm for the Aeris 1.7 µm XB-C18). Due to the lower backpressure of Aeris 3.6 µm, one can easily run 250 mm columns on both HPLC and UHPLC systems, AND one can couple multiple 250 mm columns together and run them inline for even better results. For maximum UHPLC resolution, the 150 mm length Aeris 1.7 µm or 250 mm 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 300 Å 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

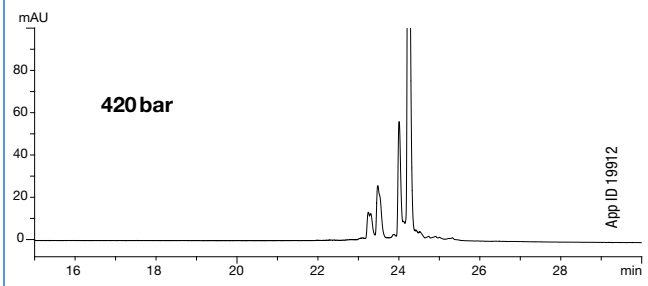
Packing Material	Total Particle Size (µm)	Porous Shell (µm)	Core Size (µm)	pH Stability	Temp Stability °C	Pressure Stability bar
Aeris WIDEPORE	3.6	0.2	3.2	1.5 - 9	90	600
Aeris PEPTIDE	1.7	0.22	1.25	1.5 - 9	90	1000
Aeris PEPTIDE	2.6	0.35	1.9	1.5 - 9	90	1000
Aeris PEPTIDE	3.6	0.5	2.6	1.5 - 9	90	600
Aeris 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

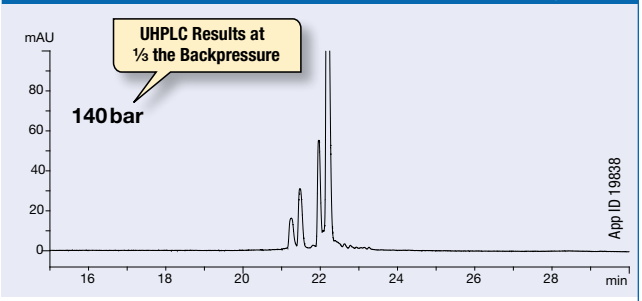
Aeris WIDEPORE 3.6 µm C4



Conditions for both columns:

Column: Aeris WIDEPORE 3.6 µm C4
ACQUITY® BEH300 1.7 µm C4
Dimensions: 150 x 2.1 mm
Mobile Phase: A: Water with 0.1 % TFA
B: Acetonitrile with 0.1 % TFA
Gradient: A/B (97:3) to A/B (35:65) over 45 min

Waters® ACQUITY® BEH300 1.7 µm C4



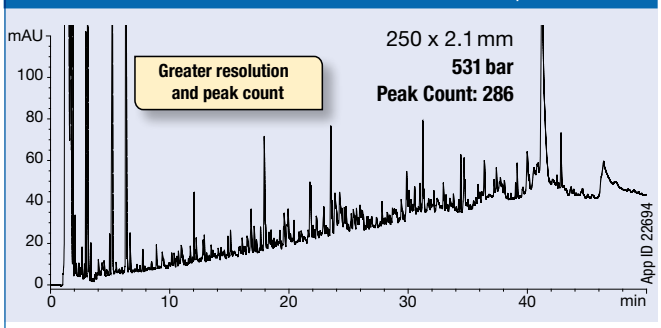
Flow Rate: 0.3 mL/min
Injection Volume: 10 µL
Temperature: 40 °C
Instrument: Agilent® 1200
Detection: UV @ 214 nm (ambient)
Sample: Human Epidermal Growth Factor (EGF)

Ultra-High Resolving Power on UHPLC Systems with Aeris PEPTIDE 2.6 µm Columns of 250 mm 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

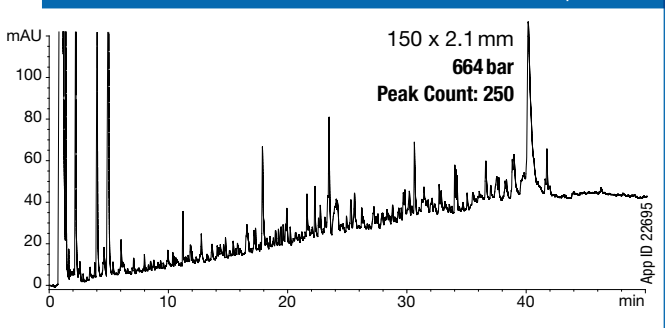
Aeris PEPTIDE 2.6 µm XB-C18



Conditions for both columns:

Column: Aeris PEPTIDE 2.6 µm XB-C18
ACQUITY® BEH130 1.7 µm C18
Dimensions: as noted
Mobile Phase: A: 20 mM Ammonium formate, pH 3.2 in 2 % Acetonitrile
B: 20 mM Ammonium formate, pH 3.2 in 90 % Acetonitrile

Waters® ACQUITY® BEH130 1.7 µm C18



Gradient:	**Time (min)**	**% B**
	0	3
	2	3
	49	50
	54	95

Flow Rate: 0.4 mL/min
Temperature: 40 °C
Detection: UV @ 240 nm (ambient)
Sample: IgG1 (Ascites Fluid) R+A Tryptic Digest

Comparative separations may not be representative of all applications.

Aeris Core-Shell LC Columns for Proteins & Peptides *(cont'd)*

Aeris™ Bio Core-Shell Technology

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-Y0	00F-4505-E0	00G-4505-E0	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-E0	00D-4507-E0	00F-4507-E0	00G-4507-E0	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 /3pk
XB-C18	00F-4632-E0	00G-4632-E0	00F-4632-N0	00G-4632-N0	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 /ea
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-E0	00F-4482-E0	00G-4482-E0	AJ0-8769
XB-C8	00D-4481-E0	00F-4481-E0	00G-4481-E0	AJ0-8771
C4	00D-4486-E0	00F-4486-E0	00G-4486-E0	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 SecurityGuard Cartridge Holders and Cartridges, see pages 150-154.

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pages 206-207.

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pages 210-211.

For more about SecurityGuard ULTRA, see page 155.

Aqua™

A C18 Column with Polar Endcapping

Use Luna™ Omega Polar C18, an Improved Alternative to Aqua 125 Å
See page 108.

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***
						/10pk	/10pk
C18 125Å	00B-4311-B0	00C-4311-B0	00F-4311-B0	00D-4311-E0	00F-4311-E0	AJ0-7510	AJ0-7511
						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***
						/10pk
C18 125Å	00B-4299-B0	00F-4299-B0	00G-4299-B0	00F-4299-Y0	00G-4299-Y0	AJ0-7510
C18 200Å	—	00F-4331-B0	—	—	—	AJ0-7510
						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‡**
				/10pk	/3pk
C18 125Å	00F-4299-E0	00G-4299-E0	00G-4299-N0	AJ0-7511	AJ0-7512
C18 200Å	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 pages 150-154.

*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282
‡SemiPrep SecurityGuard Cartridges require holder, Part No.: AJ0-9281

Axia Packed Preparative Columns

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.

Traditional Slurry Packing

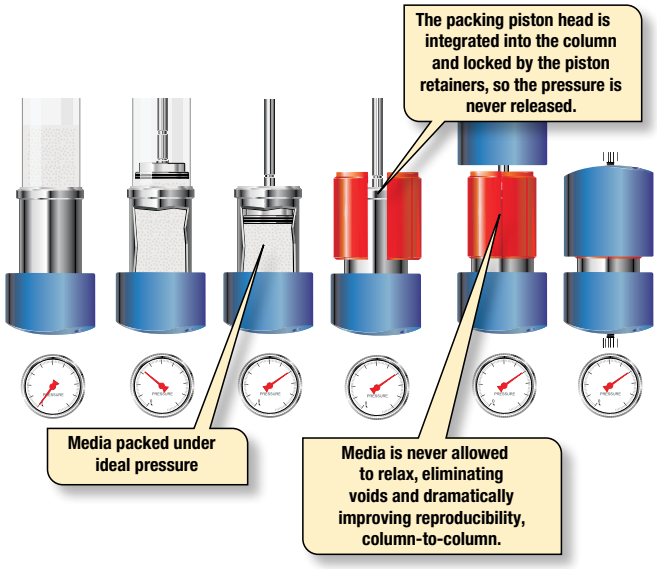
Traditional slurry packing processes, like the Waters® OBD™ (Optimum Bed Density) column packing approach, involves the column being removed from the column packing station once it is packed.

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**

Axia Packing Process Involves:

Compression → Final Column



Conventional Packing Process Involves:

Compression → Decompression → Recompression → Final Column

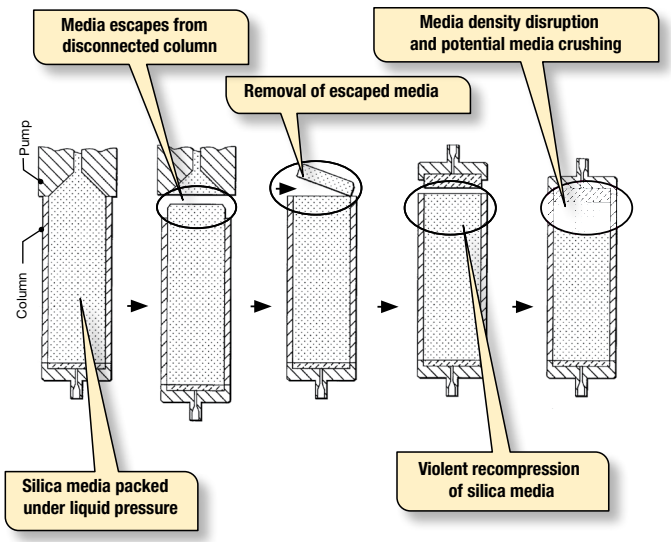


Diagram from Waters Corporation U.S. Patent No. 7,399,410

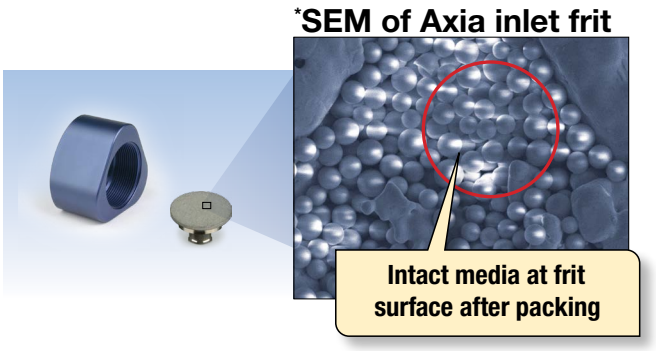
Axia Packed Preparative Columns *(cont'd)*

U.S. Patent No. 7, 674, 383

Axia packed columns produce uniform media bed with intact particles

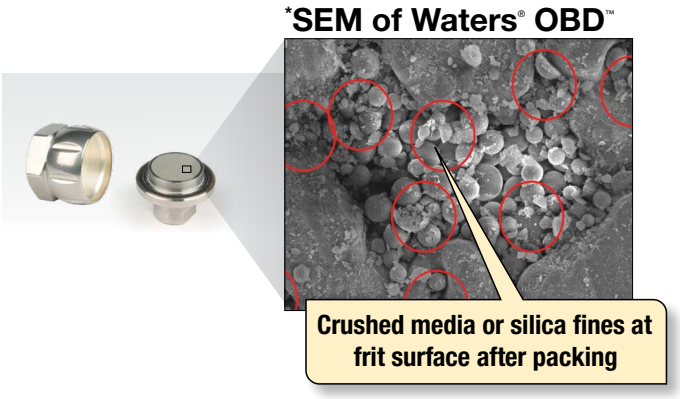
The highly tuned patented process and hardware eliminates potential decompression ensuring bed stability and optimal packing density.

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.



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.



*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**

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

Axia Packed Preparative Columns *(cont'd)*

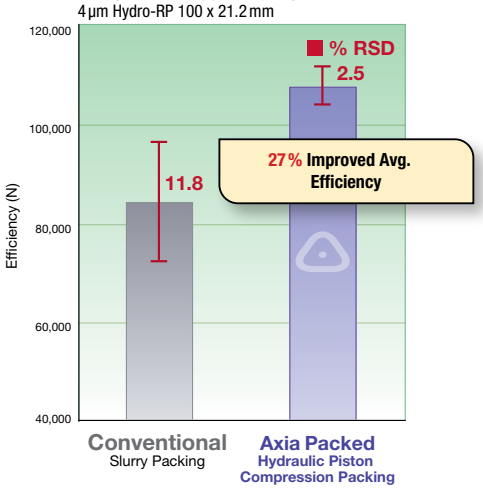
U.S. Patent No. 7, 674, 383

Expect Better Performance. Expect an Excellent Axia Column. Every Time.

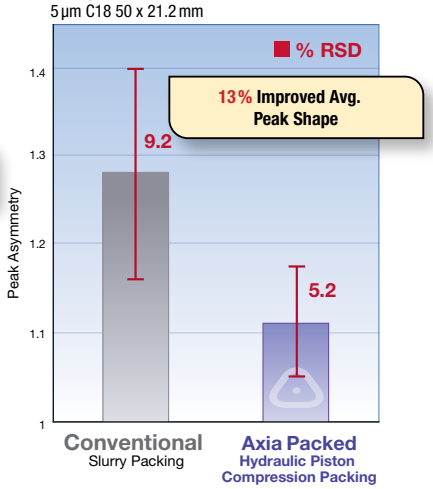
The completely automated packing system offers feedback control and infinite tuning of packing density to specific media characteristics such as mechanical strength and porosity. An optimum higher bed density can be consistently reproduced column-to-column. This directly translates into consistent efficiency and peak asymmetry measurements and decreases the column variability seen in traditionally packed preparative columns.

Consistent Quality. Column-to-Column. Batch-to-Batch

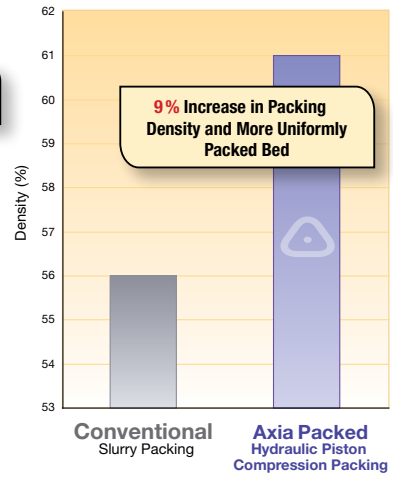
Reproducible Column-to-Column Efficiency
Average Efficiency (N) with Synergi 4 µm Hydro-RP 100 x 21.2 mm



Reproducible Column-to-Column Peak Asymmetry
Average Peak Asymmetry with Gemini 5 µm C18 50 x 21.2 mm



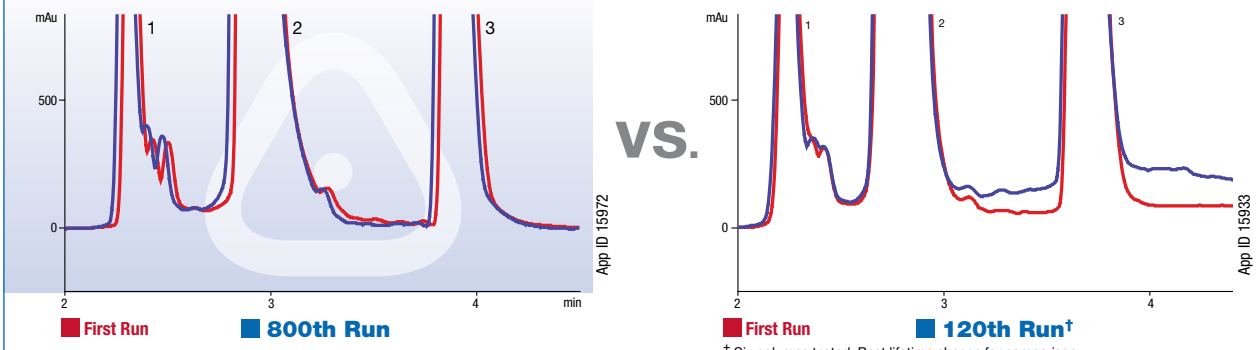
Density Comparison of Packed Beds



Compare Lifetime

Axia Packed
Luna 5 µm C18(2) Axia Packed

Competitive Preparative Column
Waters® XTerra® 5 µm Prep MS C18 OBD™



† Six columns tested. Best lifetime chosen for comparison.

Conditions for all except where noted:

Columns: Luna 5 µm C18(2) Axia Packed
Waters XTerra 5 µm Prep MS C18 OBD
Dimension: 50 x 21.2 mm (Luna)
50 x 19 mm (XTerra
Mobile Phase: A: 0.5 % TFA in Water B: 0.5 % TFA in Acetonitrile
Gradient: Linear 95:5 (A/B) to 5:95 (A/B) over 7 min, hold 3 min
Injection Volume: 500 µL

Flow Rate: 30 mL/min (Luna)
24 mL/min (XTerra)‡
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Triprolidine 1.6 mg
2. Methacycline 16 mg
3. Amitriptyline 5.25 mg

‡Same linear velocity

Comparative separations may not be representative of all applications.

U.S. Patent No. 7, 674, 383

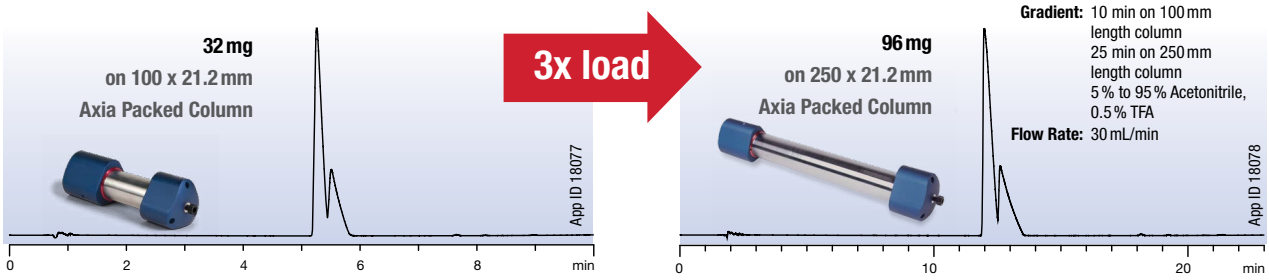
Seamless Scalability: 2 Options to Increase Sample Load

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.



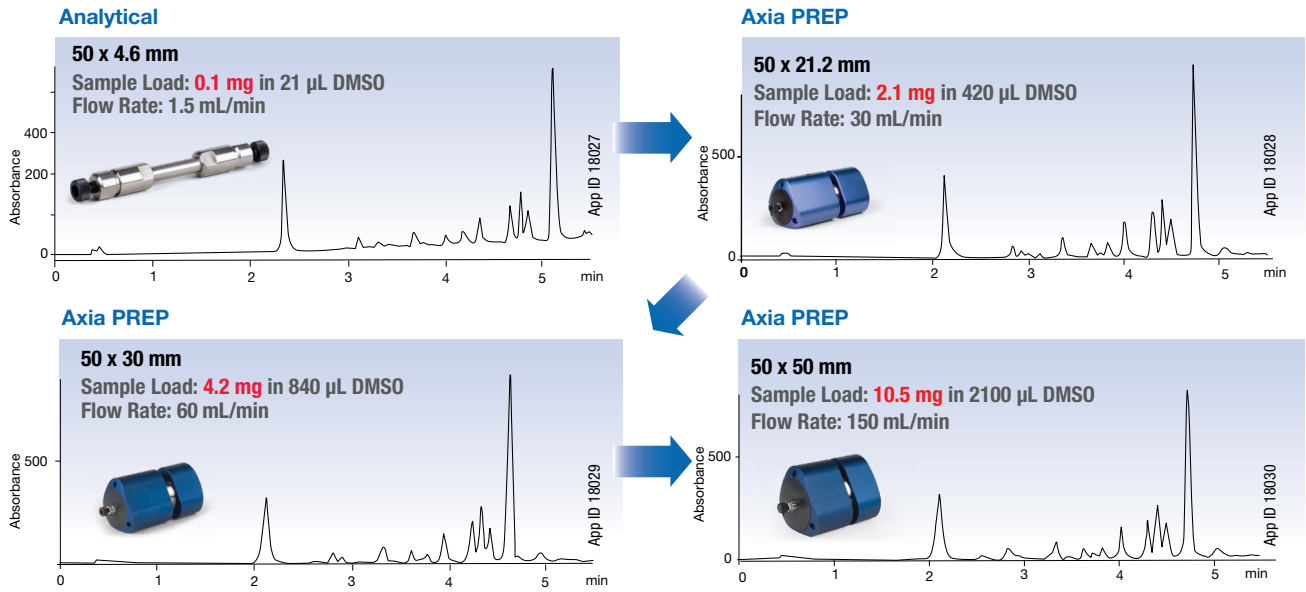
Option 2: Increase Column ID

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 µm 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
Injection: As Noted
Temperature: Ambient
Detection: UV @ 254 nm
Sample: Suzuki reaction mixture



SF=Scaling Factor

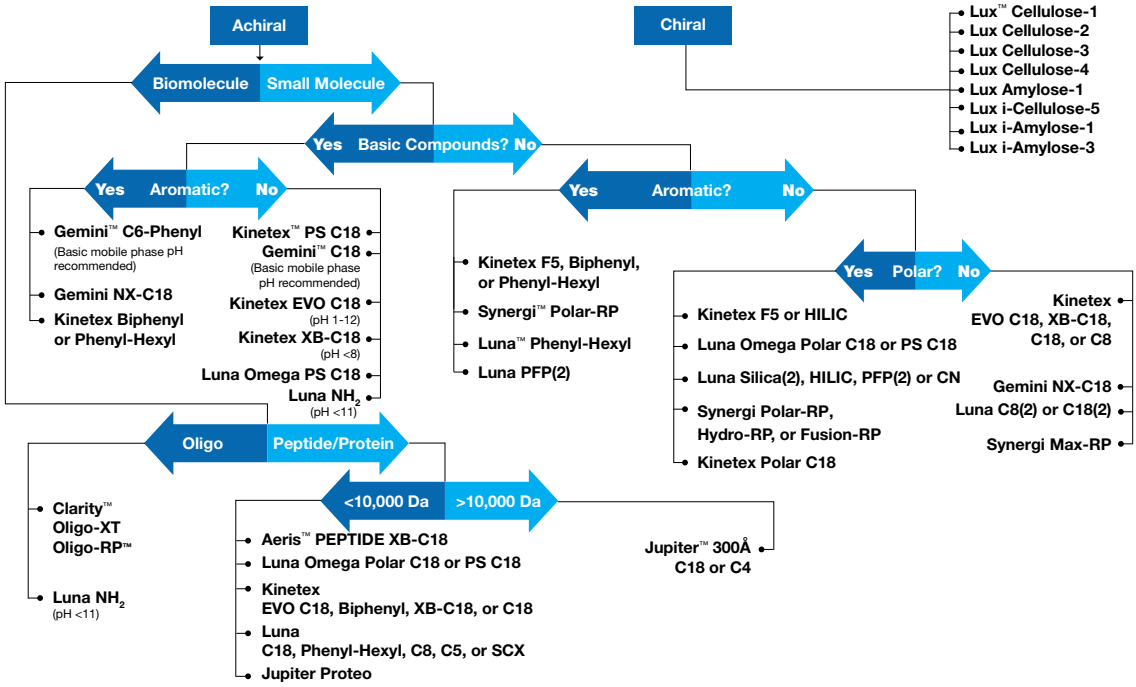
U.S. Patent No. 7, 674, 383

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.

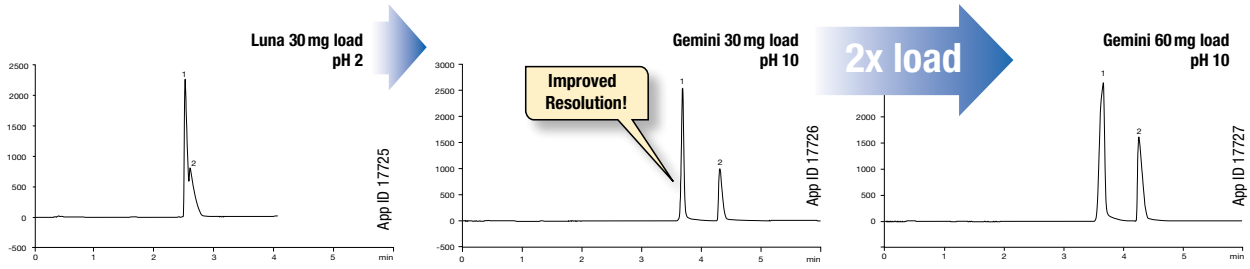
Column Selection Tree



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



Low pH

Column: Luna 5 µm C18(2) Axia Packed
Dimensions: 50 x 21.2 mm
Part No.: 00B-4252-P0-AX
Mobile Phase: A: 0.5 % TFA in Water, pH 2.0
B: Acetonitrile
Gradient: 95:5 to 5:95 (A/B) over 4 minutes
Flow Rate: 30 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Propranolol
2. Diphenhydramine

High pH

Column: Gemini 5 µm C18 Axia Packed
Dimensions: 50 x 21.2 mm
Part No.: 00B-4435-P0-AX
Mobile Phase: A: 50 mM Ammonium Bicarbonate, pH 10.0
B: Acetonitrile
Gradient: 95:5 to 5:95 (A/B) over 5 minutes
Flow Rate: 30 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Propranolol
2. Diphenhydramine

Axia Packed Preparative Columns *(cont'd)*

U.S. Patent No. 7, 674, 383

SFC APPROVED

Chiral Media Packed in Axia Technology

Resolve 92% of Your Enantiomers with Lux Chiral Preparative Columns*

Resolve Your Enantiomers with Eight 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)

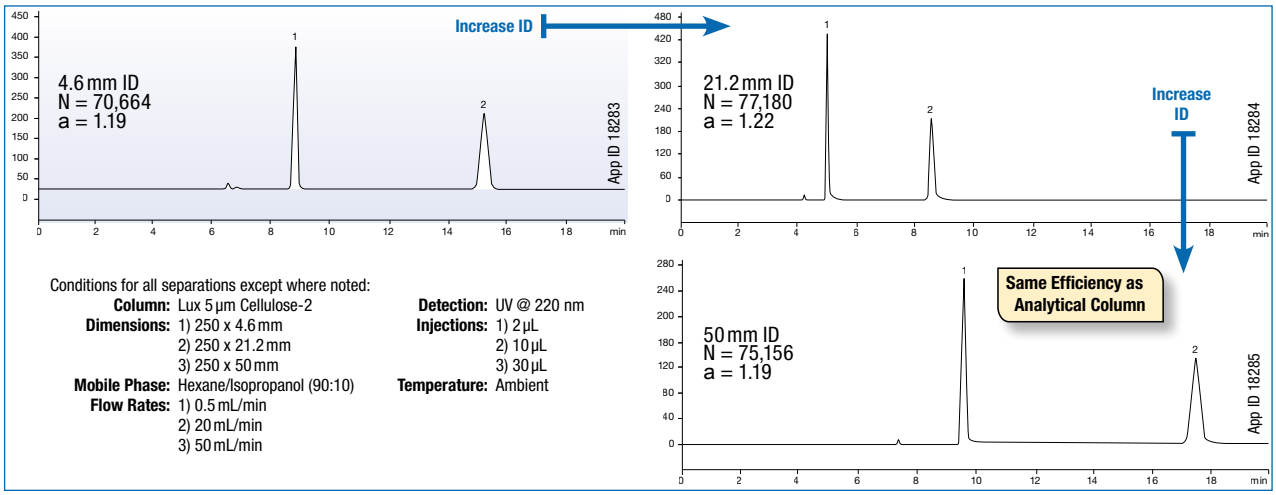
* based on screening 233 compounds on five Lux phases
Availability in 3 µm and 5 µm packed column
All Lux columns are pressure stable up to 300 bar and pH stable 2-9

For more chiral column information, see page 120-129.

Higher Purity Preparative Separations

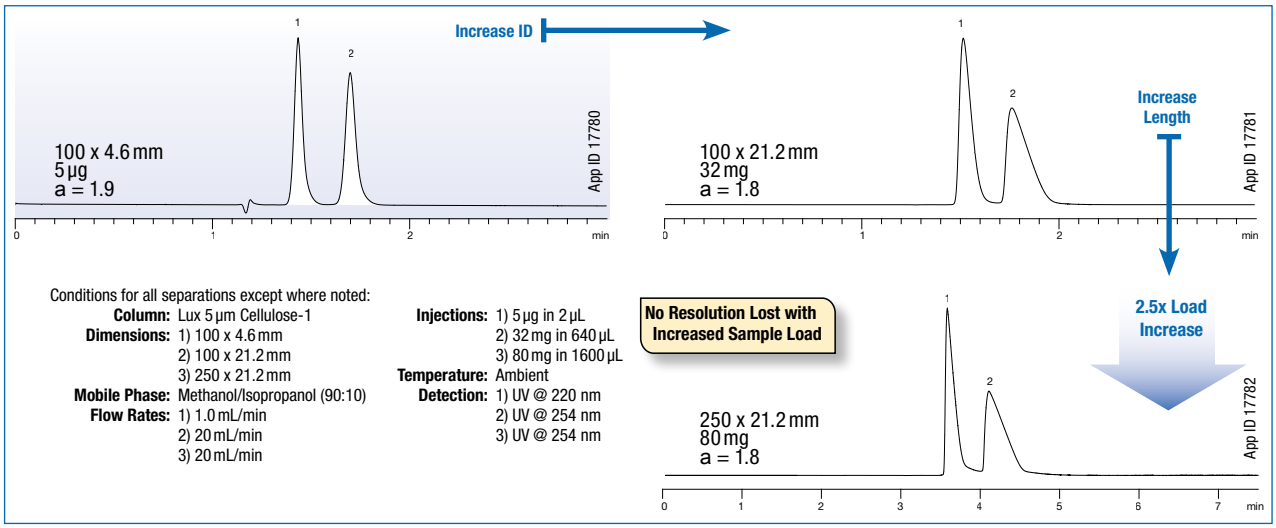
With award-winning Axia technology, analytical-like efficiency is achieved in a preparative column format.

High Efficiency trans-Stilbene Oxide from Analytical to Preparative



Conditions for all separations except where noted:
Column: Lux 5 µm Cellulose-2
Dimensions: 1) 250 x 4.6 mm
2) 250 x 21.2 mm
3) 250 x 50 mm
Mobile Phase: Hexane/Isopropanol (90:10)
Flow Rates: 1) 0.5 mL/min
2) 20 mL/min
3) 50 mL/min
Detection: UV @ 220 nm
Injections: 1) 2 µL
2) 10 µL
3) 30 µL
Temperature: Ambient

Direct Scale Up of Methocarbamol on Lux Cellulose-1



Conditions for all separations except where noted:
Column: Lux 5 µm Cellulose-1
Dimensions: 1) 100 x 4.6 mm
2) 100 x 21.2 mm
3) 250 x 21.2 mm
Mobile Phase: Methanol/Isopropanol (90:10)
Flow Rates: 1) 1.0 mL/min
2) 20 mL/min
3) 20 mL/min
Injections: 1) 5 µg in 2 µL
2) 32 mg in 640 µL
3) 80 mg in 1600 µL
Temperature: Ambient
Detection: 1) UV @ 220 nm
2) UV @ 254 nm
3) UV @ 254 nm

U.S. Patent No. 7, 674, 383

Axia: SFC Approved

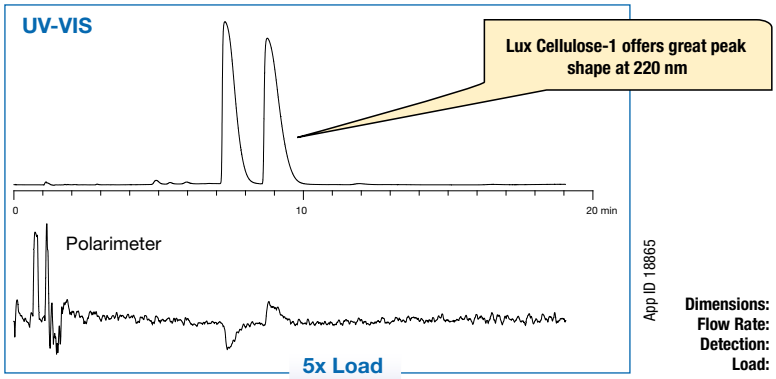
Complete SFC Screening

From analytical to Axia packed preparative achiral columns, Luna™, Gemini™, Synergi™, Kinetex™, and Lux™ chiral columns offer complementary selectivities, high efficiency, and high pressure stability 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.

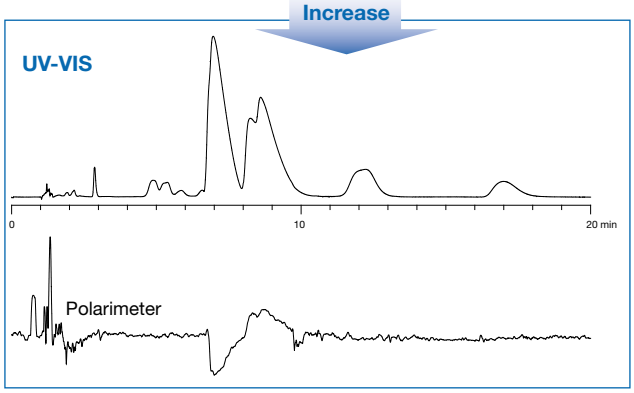
Baseline Separation of Enantiomers



App ID 18865

Dimensions: 250 x 4.6 mm
Flow Rate: 2.5 mL/min
Detection: UV @ 220 nm
Load: 300 µg in 10 µL

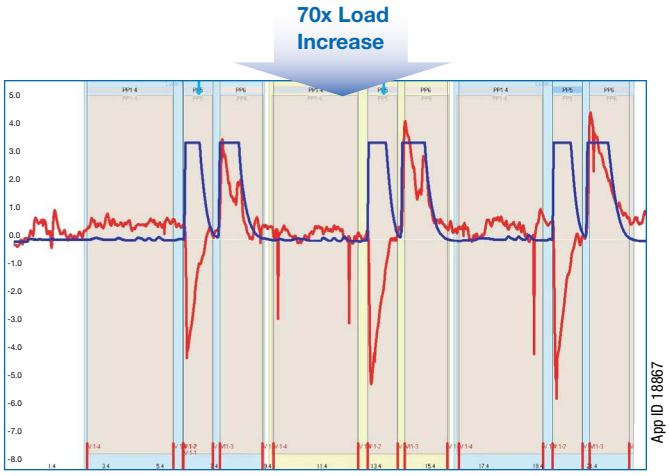
5x Load Increase



App ID 18866

Dimensions: 250 x 4.6 mm
Flow Rate: 2.5 mL/min
Detection: UV @ 254 nm
Load: 1.5 mg in 50 µL

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

70x Load Increase

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

App ID 18867

Dimensions: 250 x 21.2 mm
Flow Rate: 50 mL/min
Detection: UV @ 220 nm
Load: 105 mg in 3.5 mL

7.5 cycles per hr/ 787 mg per hr

For additional SFC information and applications, see pages 184-192.

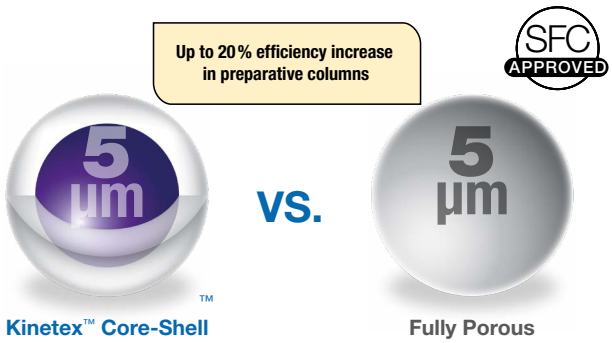
Axia™ Preparative Columns

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**

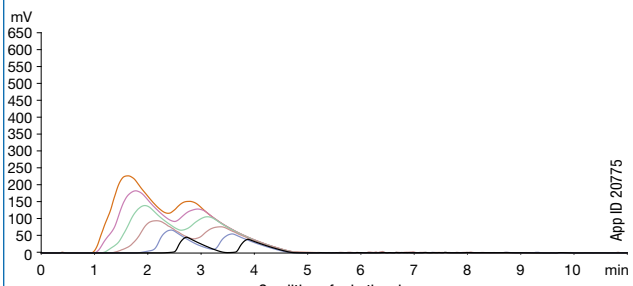


Axia columns packed with Kinetex 5 µm core-shell media provide higher efficiencies and loadability that is as good or better than columns packed with fully porous 5 µm media. Even under very challenging conditions, such as the purification of strong bases using a mobile phase containing formic acid (0.1 %) 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 (1.3 µm, 1.7 µm, 2.6 µm, and 5 µm) is fully scalable in retention and selectivity, makes transferring high performance HPLC/UHPLC methods to preparative and SFC applications, simple.

Compare Loadability

Waters® XBridge® 5 µm C18 Prep OBD™

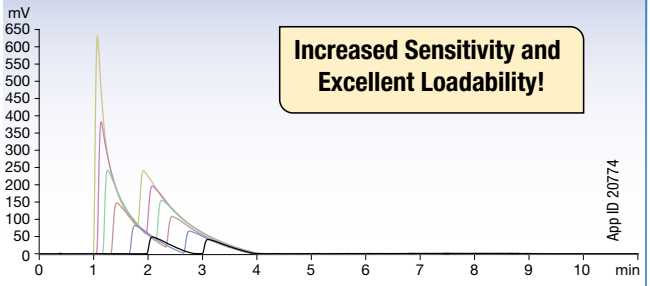


Conditions for both columns:

Columns: Kinetex 5 µm C18 Axia Packed
XBridge 5 µm C18 Prep OBD
Dimensions: 50 x 21.2 mm (Kinetex)
50 x 19 mm (XBridge)
Mobile Phase: A: Water with 0.5 % Formic acid
B: Acetonitrile with 0.5 % Formic acid
Gradient:

Time (min)	% B
0	20
8	50
11	50

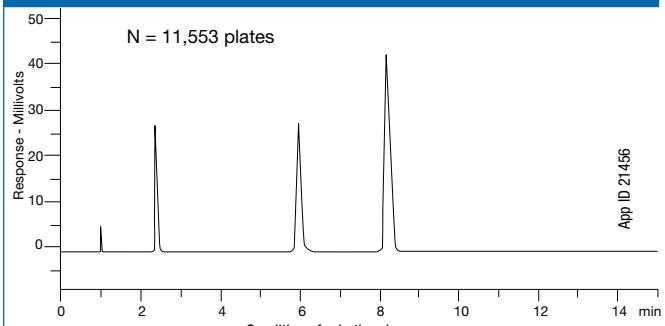
Kinetex 5 µm C18 Axia Packed



Flow Rate: 30 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 200 mg/mL in DMSO
1. Doxepin (From 1 - 500 mg on-column)
2. Amitriptyline (From 1 - 500 mg on-column)

Compare Efficiencies

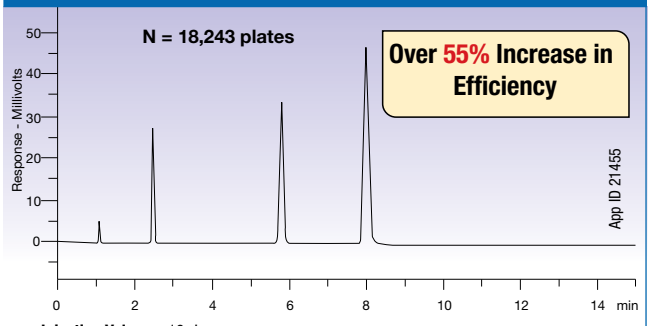
Waters® XBridge® 5 µm C18 Prep OBD™



Conditions for both columns:

Columns: Kinetex 5 µm XB-C18 Axia Packed
XBridge 5 µm C18 Prep OBD
Dimensions: 150 x 21.2 mm (Kinetex)
150 x 19 mm (XBridge)
Mobile Phase: Water/ Acetonitrile (50:50)
Flow Rate: 25 mL/ min

Kinetex 5 µm XB-C18 Axia Packed



Injection Volume: 10 µL
Temperature: Ambient
Detection: UV @ 254 nm
Sample:
1. Uracil
2. Acetophenone
3. Toluene
4. Naphthalene

Comparative separations may not be representative of all applications.

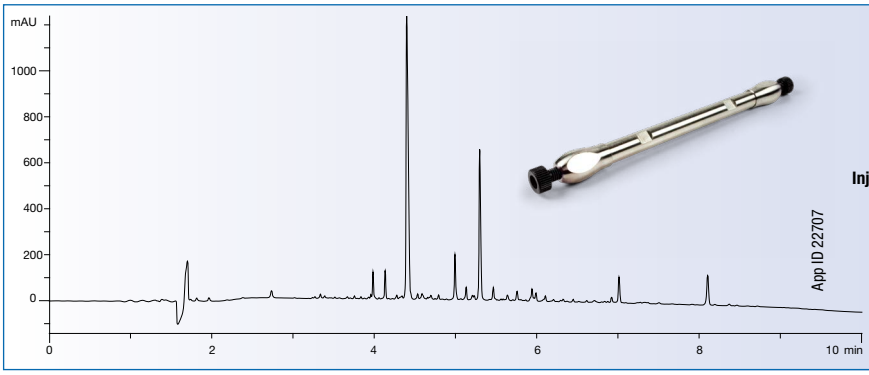
U.S. Patent No. 7, 674, 383

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.

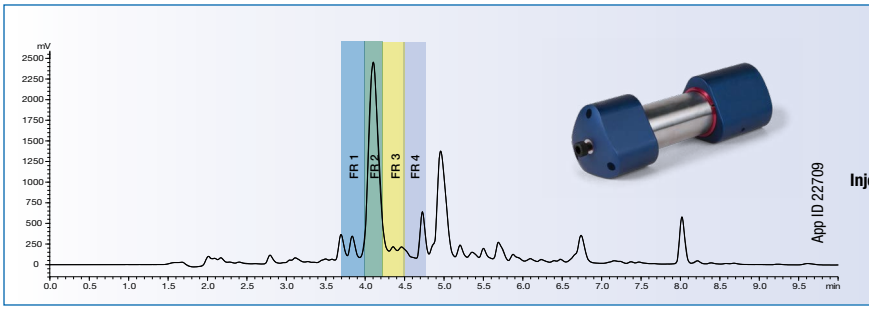
Seamless Scalability from HPLC/UHPLC to PREP

Analytical method — Aeris PEPTIDE 2.6 µm XB-C18



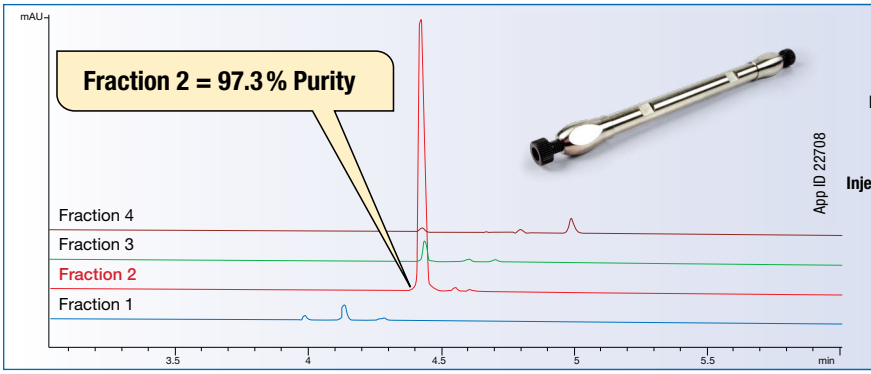
Column: Aeris PEPTIDE 2.6 µm XB-C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4505-E0
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Acetonitrile
Gradient: Linear 85:15 (A/B) to 5:95 (A/B) over 10 minutes
Injection Volume: 10 µL
Flow Rate: 1 mL/ min
Temperature: Ambient
Detection: UV @ 210 nm
Sample: Crude peptide mix

Preparative scale-up and fraction collection — Aeris PEPTIDE 5 µm XB-C18



Column: Aeris PEPTIDE 5 µm XB-C18 Axia Packed
Dimensions: 150 x 21.2 mm
Part No.: 00F-4632-P0-AX
Mobile Phase: A: 0.1% TFA in Water
B: 0.1% TFA in Acetonitrile
Gradient: Linear 85:15 (A/B) to 5:95 (A/B) over 10 minutes
Injection Volume: 1 mL
Flow Rate: 20 mL/ min
Temperature: Ambient
Detection: UV @ 210 nm
Sample: Crude peptide mix

Analytical fraction analysis — Aeris PEPTIDE 2.6 µm XB-C18



Column: Aeris PEPTIDE 2.6 µm XB-C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4505-E0
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Acetonitrile
Gradient: Linear 85:15 (A/B) to 5:95 (A/B) over 10 minutes
Injection Volume: 10 µL
Flow Rate: 1 mL/ min
Temperature: Ambient
Detection: UV @ 210 nm
Sample: Purified fractions

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.

Find additional information on SecurityGuard, see pages 150-154.

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™ Preparative Columns

U.S. Patent No. 7, 674, 383

Axia Packed Columns

Achiral Phases

SFC APPROVED

Ordering Information

Aeris™

Phase	Length	ID	Part No.
5 µm			
PEPTIDE XB-C18	150	21.2	00F-4632-P0-AX
	250	21.2	00G-4632-P0-AX

Kinetex™

Phase	Length	ID	Part No.
5 µm			
XB-C18	50	21.2	00B-4605-P0-AX
	50	30	00B-4605-U0-AX
	100	21.2	00D-4605-P0-AX
	100	30	00D-4605-U0-AX
	150	21.2	00F-4605-P0-AX
	150	30	00F-4605-U0-AX
	250	21.2	00G-4605-P0-AX
	250	30	00G-4605-U0-AX
EVO C18	50	21.2	00B-4633-P0-AX
	50	30	00B-4633-U0-AX
	100	21.2	00D-4633-P0-AX
	100	30	00D-4633-U0-AX
	150	21.2	00F-4633-P0-AX
	150	30	00F-4633-U0-AX
	250	21.2	00G-4633-P0-AX
	250	30	00G-4633-U0-AX
Biphenyl	100	21.2	00D-4627-P0-AX
	100	50	00D-4627-V0-AX
	150	21.2	00F-4627-P0-AX
	150	30	00F-4627-U0-AX
	250	21.2	00G-4627-P0-AX
HILIC	100	21.2	00D-4606-P0-AX
	150	21.2	00F-4606-P0-AX
	250	21.2	00G-4606-P0-AX
C18	50	21.2	00B-4601-P0-AX
	50	30	00B-4601-U0-AX
	100	21.2	00D-4601-P0-AX
	100	30	00D-4601-U0-AX
	150	21.2	00F-4601-P0-AX
	150	30	00F-4601-U0-AX
	250	21.2	00G-4601-P0-AX
	250	30	00G-4601-U0-AX
C8	50	21.2	00B-4608-P0-AX
	100	21.2	00D-4608-P0-AX
	150	21.2	00F-4608-P0-AX
	150	30	00F-4608-U0-AX
	250	21.2	00G-4608-P0-AX
	250	30	00G-4608-U0-AX
Phenyl-Hexyl	50	21.2	00B-4603-P0-AX
	100	21.2	00D-4603-P0-AX
	100	30	00D-4603-U0-AX
	150	21.2	00F-4603-P0-AX
	150	30	00F-4603-U0-AX
	250	21.2	00G-4603-P0-AX
	250	30	00G-4603-U0-AX
F5	50	30	00B-4724-U0-AX
	100	30	00D-4724-U0-AX
	150	21.2	00F-4724-P0-AX
	150	30	00F-4724-U0-AX
	250	21.2	00G-4724-P0-AX
	150	30	00F-4603-U0-AX

Jupiter™

Phase	Length	ID	Part No.
4 µm			
Proteo 90 Å	250	30	00G-4396-U0-AX
10 µm			
Proteo 90 Å	100	21.2	00D-4397-P0-AX
	250	21.2	00G-4397-P0-AX
	250	30	00G-4397-U0-AX
C18 300 Å	250	30	00G-4055-U0-AX

Gemini™

Phase	Length	ID	Part No.
5 µm			
NX-C18	50	21.2	00B-4454-P0-AX
	50	30	00B-4454-U0-AX
	75	30	00C-4454-U0-AX
	100	21.2	00D-4454-P0-AX
	100	30	00D-4454-U0-AX
	150	21.2	00F-4454-P0-AX
	150	30	00F-4454-U0-AX
	250	21.2	00G-4454-P0-AX
	250	30	00G-4454-U0-AX
C18	50	21.2	00B-4435-P0-AX
	50	30	00B-4435-U0-AX
	100	21.2	00D-4435-P0-AX
	100	30	00D-4435-U0-AX
	150	21.2	00F-4435-P0-AX
	150	30	00F-4435-U0-AX
	250	21.2	00G-4435-P0-AX
	250	30	00G-4435-U0-AX
C6-Phenyl	100	21.2	00D-4444-P0-AX
	150	21.2	00F-4444-P0-AX
	250	21.2	00G-4444-P0-AX
10 µm			
NX-C18	50	21.2	00B-4455-P0-AX
	100	21.2	00D-4455-P0-AX
	100	30	00D-4455-U0-AX
	100	50	00D-4455-V0-AX
	150	21.2	00F-4455-P0-AX
	150	30	00F-4455-U0-AX
	150	50	00F-4455-V0-AX
	250	21.2	00G-4455-P0-AX
	250	30	00G-4455-U0-AX
	250	50	00G-4455-V0-AX
C18	100	21.2	00D-4436-P0-AX
	100	30	00D-4436-U0-AX
	150	21.2	00F-4436-P0-AX
	150	30	00F-4436-U0-AX
	150	50	00F-4436-V0-AX
	250	21.2	00G-4436-P0-AX
	250	30	00G-4436-U0-AX
	250	50	00G-4436-V0-AX
C8(3)	250	21.2	00G-4763-P0-AX
	250	30	00G-4763-U0-AX
	250	50	00G-4763-V0-AX

Clarity™

Phase	Length	ID	Part No.
5 µm			
Oligo-RP™	100	21.2	00D-4442-P0-AX
	100	30	00D-4442-U0-AX
	250	21.2	00G-4442-P0-AX
Oligo-XT	100	21.2	00D-4745-P0-AX
	150	21.2	00F-4745-P0-AX
	150	30	00F-4745-U0-AX
	250	21.2	00G-4745-P0-AX
10 µm			
Oligo-RP	150	21.2	00F-4445-P0-AX
	150	30	00F-4445-U0-AX
	250	21.2	00G-4445-P0-AX

Make your Axia columns last longer with SecurityGuard PREP Holders and Cartridges. See pages 152-154.

For Axia Reducing Adapter, see page 212.

For PREP Column In-Line Filter, see page 219.

For SFC Information, see page 184.

For additional phases and sizes not displayed, contact your Phenomenex technical consultant or local distributor.

Axia™ Preparative Columns

U.S. Patent No. 7, 674, 383

Axia Packed Columns

Achiral Phases *(cont'd)*

SFC APPROVED

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
NH_2	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
	250	30	00G-4274-U0-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
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
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
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
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
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

Aqueous Size Exclusion (SEC) for Protein and Peptide Analysis

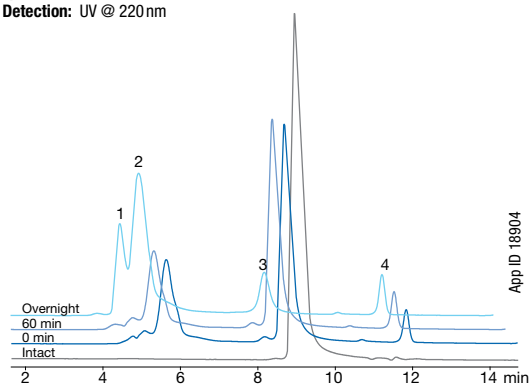
Gel Filtration Chromatography is used to analyze, characterize and/or desalt proteins, peptides, and other biomolecules; including antibodies, immunoglobulins, protein complexes, and protein aggregates. BioSep GFC columns offer many important benefits for your separation needs.

Low MW Proteins and Peptides on BioSep-SEC-s2000

PEGylated b-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 b-Lactoglobulin
3. b-Lactoglobulin
4. PEG Reagent

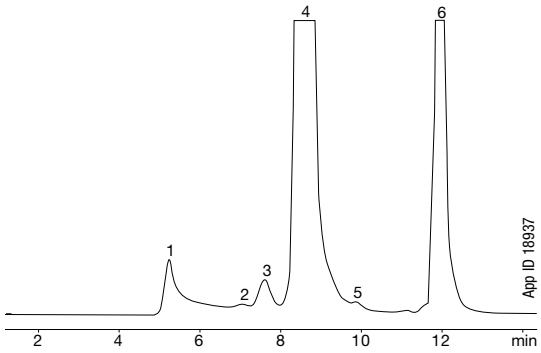


Medium MW Proteins on BioSep-SEC-s3000

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

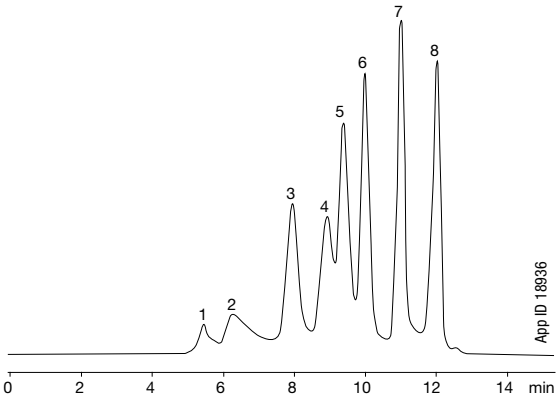


Large MW Proteins on BioSep-SEC-s4000

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. b-Amylase 200 kDa
6. BSA 66 kDa
7. Ribonuclease A 13.7 kDa
8. Uridine 244 Da



Ordering Information

Columns (mm)	Narrow Bore	Analytical		SecurityGuard™ Cartridges (mm)
Phases	300 x 4.6	300 x 7.8	600 x 7.8	4 x 3.0*
				/10pk
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.: KJ0-4282

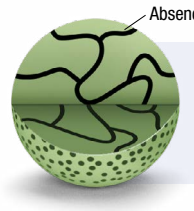
For ID: 4.6-7.8 mm

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

4 Advanced Particle Platforms

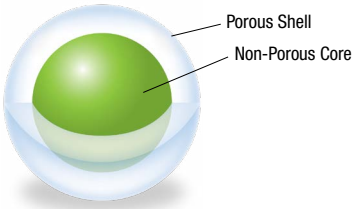
All four of the Biozen particle platforms were individually designed and built by Phenomenex to provide integral levels of performance, ruggedness, and reproducibility for biotherapeutic characterization applications. Individually, each platform differs in the proprietary processing techniques used to control particle size and morphology.

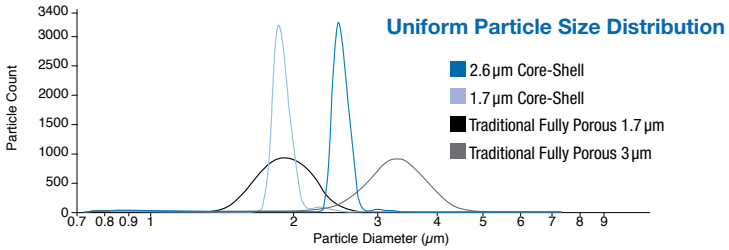
Thermally Modified Fully Porous



Through a proprietary series of thermal processing steps, we eliminate micropores and further improve consistency, leading to higher column efficiency and reproducibility.

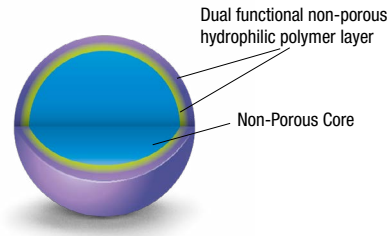
Core-Shell Technology

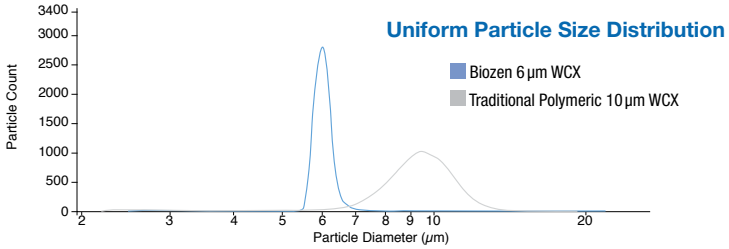




Using sol-gel processing techniques that incorporate nano structuring technology, a durable, homogeneous porous shell is grown on a solid silica core. This optimized process combined with industry leading column packing technology produces highly reproducible columns that generate extremely high efficiencies and sensitivity.

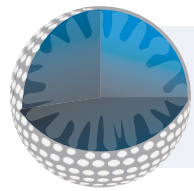
Monosized Polymeric Non-Porous





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.

Pore Controlled Technology

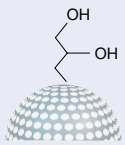


dSEC columns are packed with low pore volume silica coupled with a proprietary hydrophilic diol-type bonded surface chemistry that prevents the silica surface from interacting with protein samples.

10 Particle Chemistries

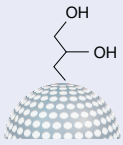
With a single innovative product line, you can now find a variety of quality, fit-for-purpose particle chemistries designed and tested for biologics.

Size Exclusion Chromatography



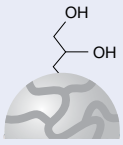
Biozen dSEC-2
1.8 µm and 3 µm

Inert, high-strength porous particle for the separation and quantitation of monoclonal antibody aggregates, and fragments.



Biozen dSEC-7
3 µm

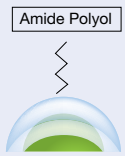
Inert, 700 Å large pore particle for the separation and quantitation of AAV, IgMs and other large biotherapeutics aggregate and fragment analysis.



Biozen SEC-3
1.8 µm

Inert, high density fully porous particle with high efficiency and high molecular weight (HMW) separation range of 10 k – 700 kDa.

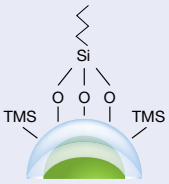
Glycan



Biozen Glycan
2.6 µm

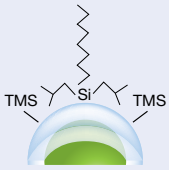
Provides an optimal combination of high efficiency and selectivity for released glycans.

Intact



Biozen WidePore C4
2.6 µm

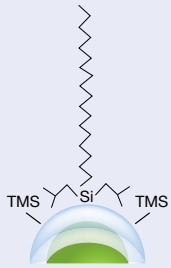
Core-shell particle with butyl stationary phase and optimal wide pore size distribution for better resolution of large biotherapeutics, including monoclonal antibodies and subunit analysis.



Biozen Intact XB-C8
3.6 µm

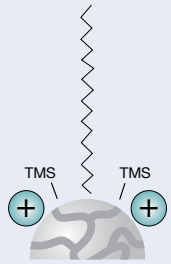
Large pore core-shell particle for fast intact and subunit biologic entry. C8 provides highly useful moderate hydrophobic selectivity.

Peptide



Biozen Peptide XB-C18
1.7 µm and 2.6 µm

Overall retention of both acidic and basic peptides through C18 stationary phase with di-isobutyl side chains.

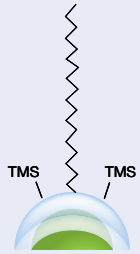


Biozen Peptide PS-C18
1.6 µm and 3 µm

Excellent retention through combined positively charged surface ligand and C18 ligand.

Note: Biozen Peptide PS-C18 available in core-shell for nano columns.

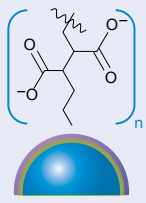
Oligonucleotides



Biozen Oligo
1.7 µm and 2.6 µm

Organo-silica core-shell particle bonded with a C18 stationary phase offers high selectivity for even minute oligo differences alongside high and low pH robustness.

Ion-Exchange

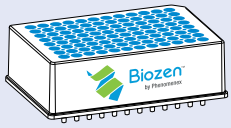


Biozen WCX
6 µm

Monosized particles grafted with linear polycarboxylate chains to envelop and separate proteins from acidic/basic variants.

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.

MagBeads

Streptavidin Coated
Higher binding capacity magnetic particles result in faster and reliable purification, clean-up, and isolation of proteins and peptide molecules.

To learn more, see page 32.

Oligo Characterization and Quantitation

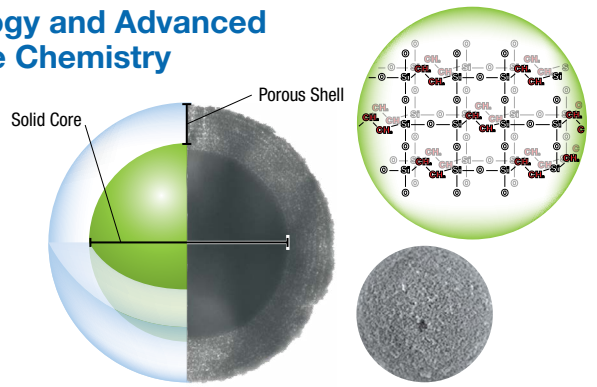
Advanced Oligonucleotide Analysis for Increased Recovery and Reproducibility

The Biozen Oligo LC Column brings a unique combination of core-shell versatility and high pH ruggedness necessary for oligonucleotide separations. Additionally, Biozen Oligo is packed in a unique bio-inert titanium hardware designed to minimize sample loss and adsorption issues typically seen with stainless steel hardware, demonstrating this column's optimal utility for oligonucleotide characterization and quantitation.

- **BioTi™ Hardware Reduces Sample Loss and Adsorption**
- **Robustness at High pH and Temperature**
- **Core-Shell Advantage for High Efficiency**

Patented Technology and Advanced Core-Shell Particle Chemistry

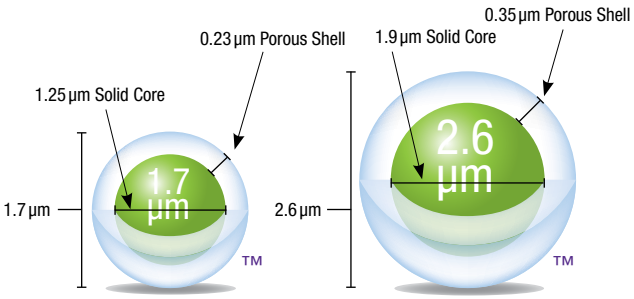
Patented Core-Shell Particle Chemistry



Biozen Oligo uses a patented organo-silica grafting process that incorporates uniform stabilizing ethylene cross-linking to provide resistance to high pH and temperature which are fundamental to reversed phase analysis of oligonucleotides.

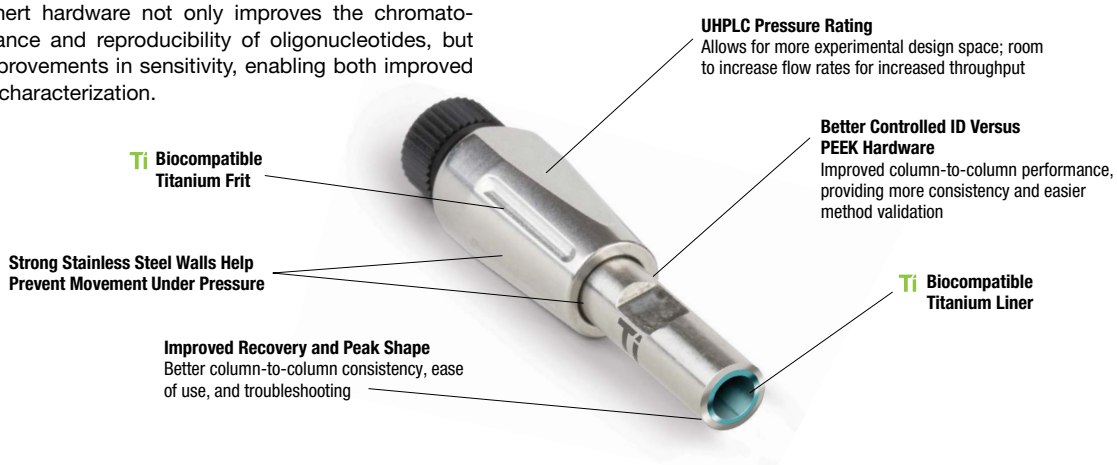
High Efficiency Core-Shell Particle

After meticulous core construction, a uniform porous silica layer is grown around the spherical solid silica core. This unique combination of precise particle architecture and particle size provides dramatic leaps in performance.



Inside Biozen Oligo's Biocompatible Hardware

The use of bioinert hardware not only improves the chromatographic performance and reproducibility of oligonucleotides, but also provides improvements in sensitivity, enabling both improved quantitation and characterization.

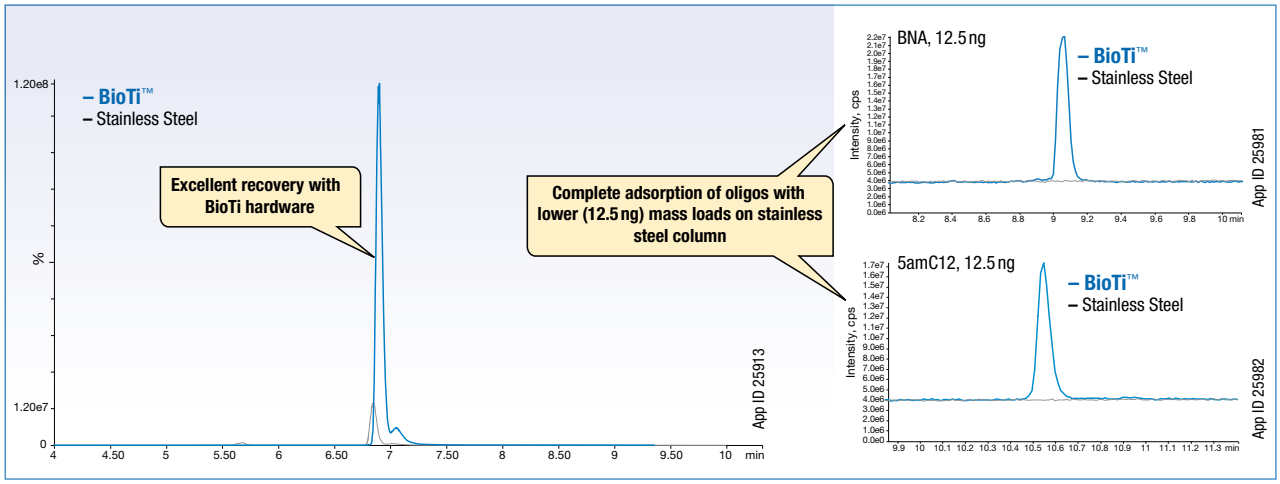


Oligo Characterization and Quantitation *(cont'd)*

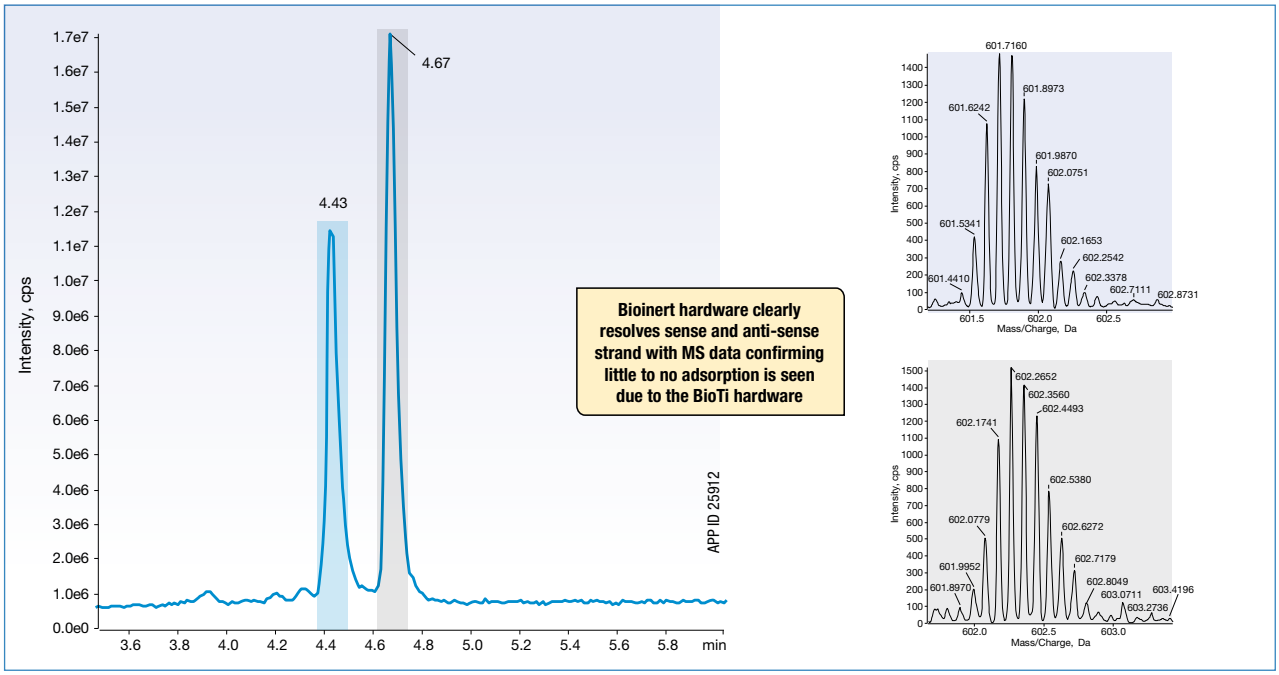
BioTi versus Traditional Stainless Steel Hardware

Oligos can chelate to trace heavy metals in stainless steel column hardware leading to poor recovery, inconsistent chromatography and problematic carryover. The Biozen Oligo bioinert hardware provides greater sensitivity as well as improved recovery, demonstrating this column's optimal utility for oligonucleotide characterization and quantitation.

BioTi Ensures Method Robustness and Consistency from Injection-to-Injection!



LC-MS Analysis of siRNA using Bioinert Hardware



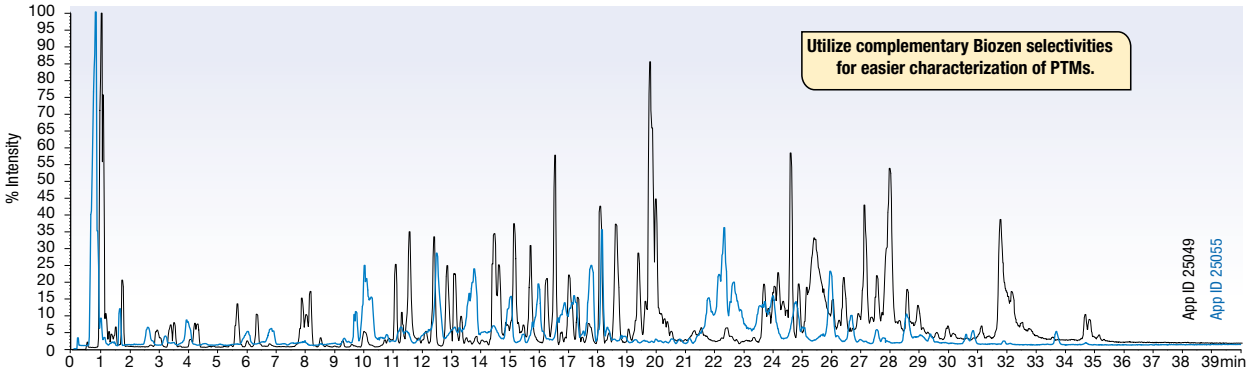
Ordering Information

Biozen Columns (mm)							Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
							/3pk	/3pk	ea
Biozen 1.7 µm Oligo	00B-4791-AN	00D-4791-AN	00F-4791-AN	—	—	—	AJ0-9820	AJ0-9822	AJ0-9000
Biozen 2.6 µm Oligo	00B-4790-AN	00D-4790-AN	00F-4790-AN	00B-4790-E0	00D-4790-E0	00F-4790-E0	AJ0-9820	AJ0-9822	AJ0-9000

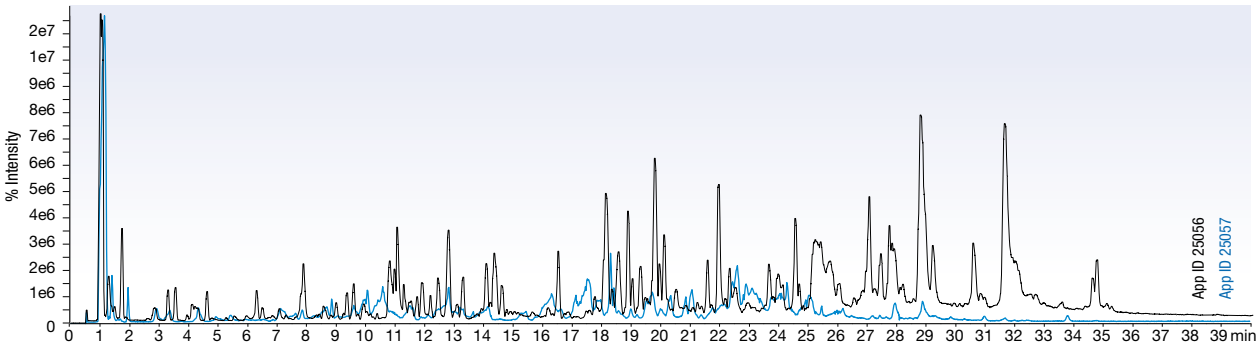
Peptide Mapping

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 LC columns to provide uniquely different selectivities and 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
Biozen 2.6 µm Peptide XB-C18
Dimensions: 150 x 2.1 mm
Part No.: 00F-4770-AN (1.6 µm Peptide PS-C18)
00F-4768-AN (2.6 µm Peptide XB-C18)
Mobile Phase: A: 0.1 % Formic Acid in Water
B: 0.1 % Formic Acid in Acetonitrile

Gradient:	**Time (min)**	**% B**
	0	1
	0.5	1
	50	50
	55	50
	56	95

Flow Rate: 0.3 mL/min
Temperature: 40 °C
Detection: QTOF (SCIEX® X500B)

Ordering Information

Biozen Columns (mm)							Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
							/3pk	—	ea
Biozen 1.6 µm Peptide PS-C18	00B-4770-AN	00D-4770-AN	00F-4770-AN	—	—	—	AJ0-9803	—	AJ0-9000
							/10pk	/10pk	ea
Biozen 3 µm Peptide PS-C18	00B-4771-AN	—	00F-4771-AN	—	00B-4771-E0	00F-4771-E0	AJ0-7605	AJ0-7606	KJ0-4282
							/3pk	—	ea
Biozen 1.7 µm Peptide XB-C18	00B-4774-AN	00D-4774-AN	00F-4774-AN	—	—	—	AJ0-9806	—	AJ0-9000
							/3pk	/3pk	ea
Biozen 2.6 µm Peptide XB-C18	00B-4768-AN	00D-4768-AN	00F-4768-AN	00G-4768-AN	00B-4768-E0	00F-4768-E0	AJ0-9806	AJ0-9808	AJ0-9000

Nano Low Flow Columns available in specific particle chemistries, see pages 37-40.

Aggregate Analysis

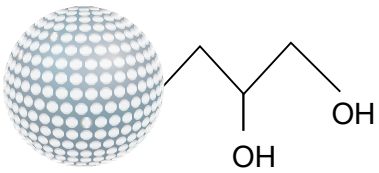
With the expectation of low level protein aggregation (<0.1% peak area compared to monomer) robust aggregate analysis is critically sought after. Biozen SEC columns are designed to address deficiencies in traditional SEC columns through low pore volume silica packed into BioTi™ hardware. Rest assured your resolution, peak shape, and % recovery demands, even at low concentrations, will be achieved.

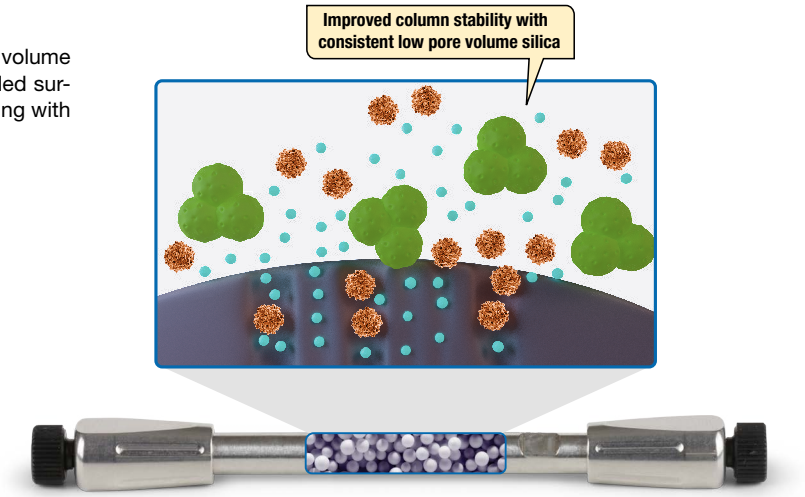
Biozen dSEC-2 Size Exclusion Columns

Advanced SEC Silica Particle Technology and Surface Chemistry for Characterization Biomolecules

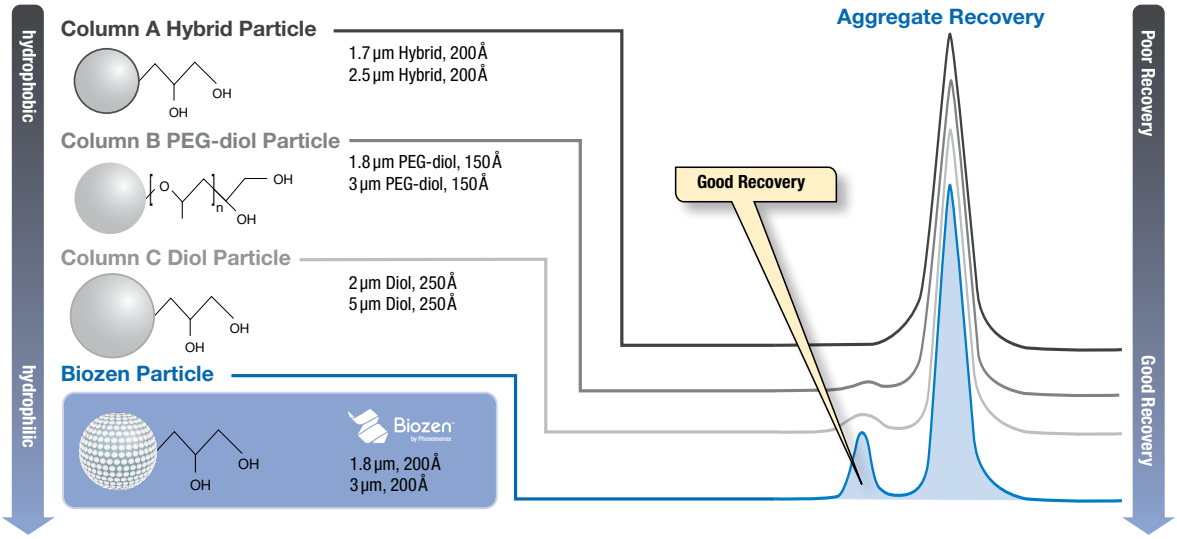
The Biozen dSEC-2 columns are packed with low pore volume silica coupled with a proprietary hydrophilic diol-type bonded surface chemistry that prevents the silica surface from interacting with protein samples.

- **Exceptionally Robust, Pore Controlled SEC Particle**
- **Extreme Stability and Improved Lifetime**
- **Reproducible Separations**





Biozen dSEC-2 Hydrophilic Surface Chemistry Improves Aggregate Analysis

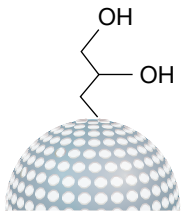


Comparative separations may not be representative of all applications.

Aggregate Analysis

Robust & Reliable for AAV & Large Biomolecules

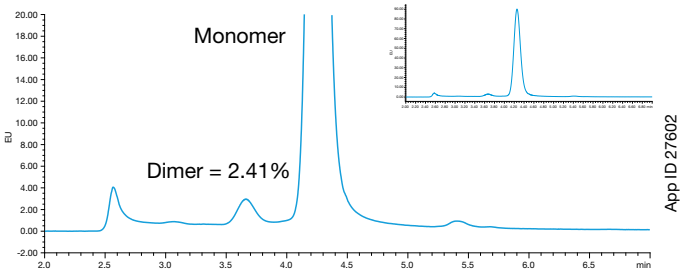
Biozen dSEC-7 was designed with a 700 Å pore size optimized for AAVs and other large biomolecules. Utilizing a hydrophilic diol-type surface chemistry packed in optimized column dimensions, unwanted surface interactions are mitigated while conserving sample consumption by up to 90% compared to traditional SEC columns.



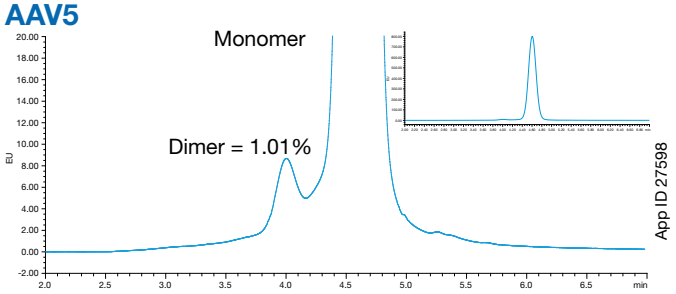
Biozen dSEC-7

Biozen dSEC-7 Hydrophilic Surface Chemistry Improves Resolution of Monomer and Aggregate Peaks

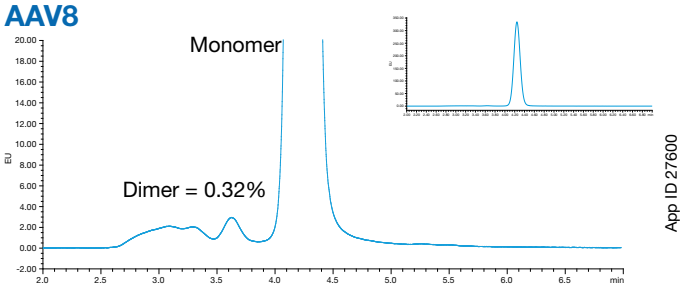
AAV2



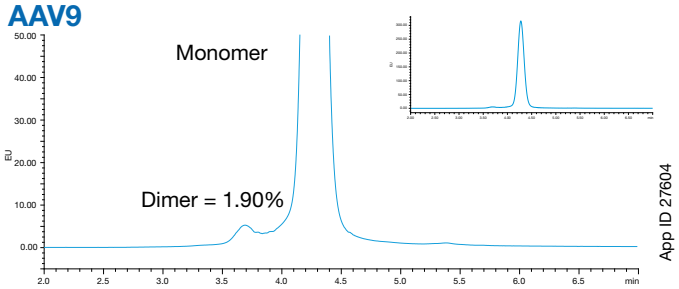
AAV5



AAV8



AAV9



Serotype	Peak	Retention Time (min)	%Area	Resolution
AAV2	Monomer	4.26	94.05	2.20
	Dimer	3.68	2.57	
AAV5	Monomer	4.60	99.05	1.60
	Dimer	4.00	0.95	
AAV8	Monomer	4.25	98.39	2.20
	Dimer	3.64	0.50	
AAV9	Monomer	4.28	98.51	2.00
	Dimer	3.67	1.59	

LC Conditions

Column: Biozen 3 µm dSEC-7
Dimension: 150 x 4.6 mm
Part No.: 00F-4789-E0
Mobile Phase: 20 mM Sodium Phosphate, pH 6.6 + 350 mM Potassium Chloride
Flow Rate: 350 µL/min (Isocratic)
Temperature: 25 °C
Injection: 2 µL
Instrument Waters® ACQUITY® H-Class
Detection: FLR - Ex 280 nm, Em 350 nm Sampling Rate: 40 Hz
Sample: 1. AAV2-CAG-GFP, 2E13 vg/mL (AAV2)
2. AAV5-CMV-GFP, 2E13 vg/mL (AAV5)
3. AAV8-CMV-GFP, 2E13 vg/mL (AAV8)
4. AAV9-CMV-GFP, 2E13 vg/mL (AAV9)

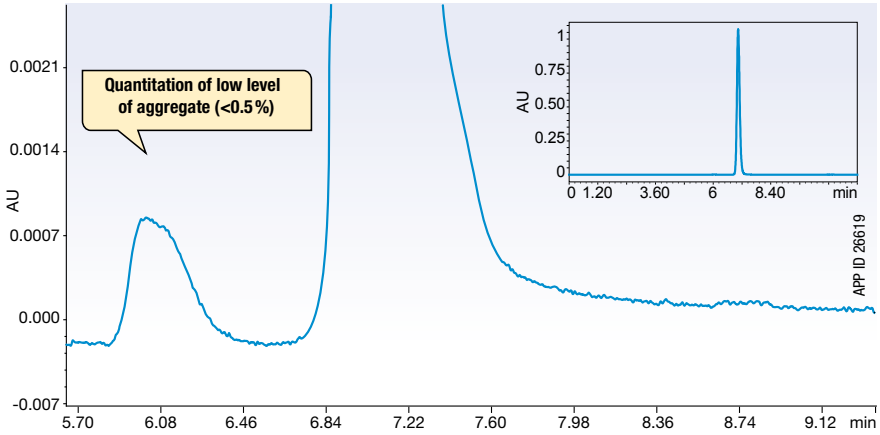
Find more size exclusion applications such as improving lifetime and the ability to use organic solvents without compromising results see: **www.phenomenex.com/dSEC**

Aggregate Analysis

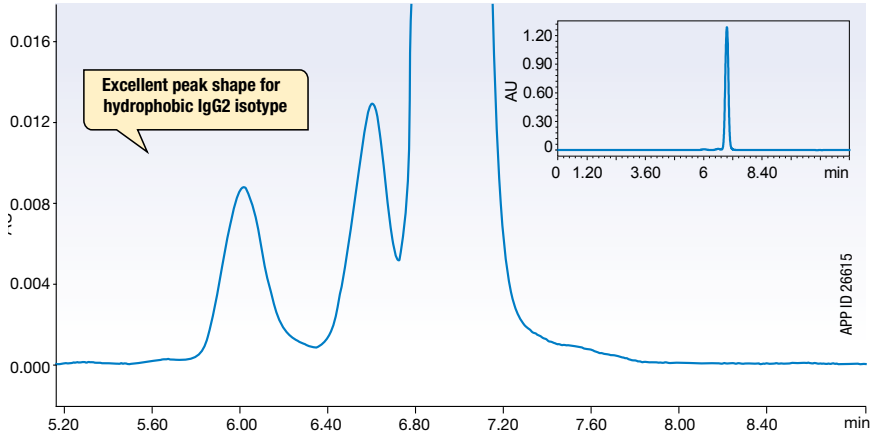
New Standard for Platform SEC Methods

Whether IgG2 or IgG4 isotypes, bispecifics, or Fc-Fusions, dSEC-2 columns provide the optimum pore volume and surface chemistry finely tuned to maximize separation and sample recovery for many different classes of biotherapeutics.

Bispecific Emicizumab



IgG2 Panitumumab



Conditions for both columns:

Column: Biozen 1.8 µm dSEC-2, 200Å
Dimensions: 300 x 4.6 mm
Part No.: 00H-4787-E0
Mobile Phase: 200 Potassium Phosphate + 250 mM KCl, pH 6.2
Flow Rate: 0.35 mL/min
Injection Volume: 10 µL
Temperature: 25 ˚C
Detector: UV @ 280 nm
Sample: Various, 10 mg/mL

Ordering Information

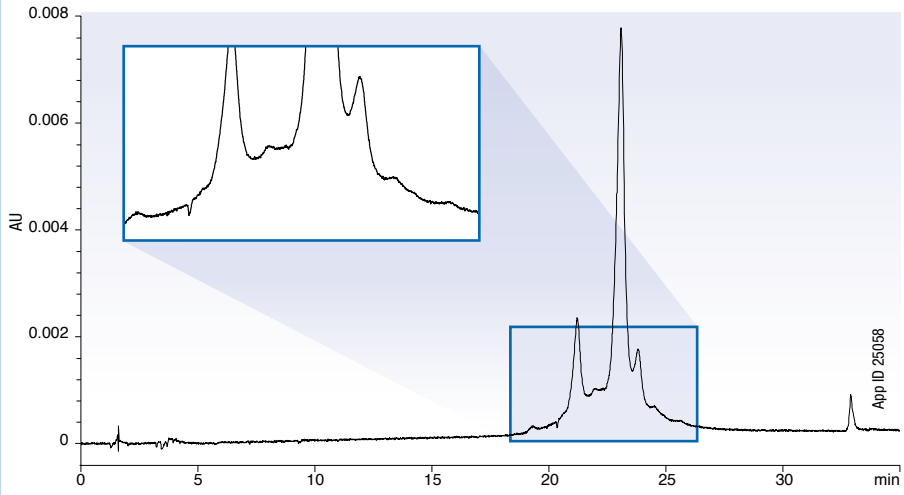
Biozen Columns (mm)									
	50 x 2.1	150 x 2.1	100 x 4.6	150 x 4.6	300 x 4.6	150 x 7.8	300 x 7.8	for 4.6 mm /3pk	Holder ea
Biozen 1.8 µm dSEC-2	00B-4787-AN	00F-4787-AN	—	00F-4787-E0	00H-4787-E0	—	—	—	—
Biozen 3 µm dSEC-2	—	—	—	00F-4788-E0	00H-4788-E0	00F-4788-K0	00H-4788-K0	—	—
Biozen 1.8 µm SEC-3	00B-4772-AN	—	00D-4772-E0	00F-4772-E0	00H-4772-E0	—	—	AJ0-9851	AJ0-9000
Biozen 3 µm dSEC-7	—	00F-4789-AN	—	00F-4789-E0	00H-4789-E0	—	—		

Guard Columns			
	30 x 2.1	30 x 4.6	40 x 7.8
Biozen 3 µm dSEC-2 Guard	03A-4788-E0	03A-4788-E0	03Q-4788-K0
Biozen 3 µm dSEC-7 Guard	03A-4789-AN	03A-4789-E0	—

Charge Variant Analysis

Biozen WCX was crafted to consistently differentiate between native protein charge variants that arise from PTMs within biotherapeutics throughout discovery, development and manufacturing. The linear polycarboxylate chains grafted to monosized non-porous polymeric particles envelop and separate proteins from acidic and basic variants in both ionic strength and pH-based method extremes. Biozen WCX media enables scientists to reproducibly characterize charge heterogeneity while ensuring excellent recovery through both particle inertness and bioinert titanium BioTi™ column hardware.

Trastuzumab (MES Salt Gradient)

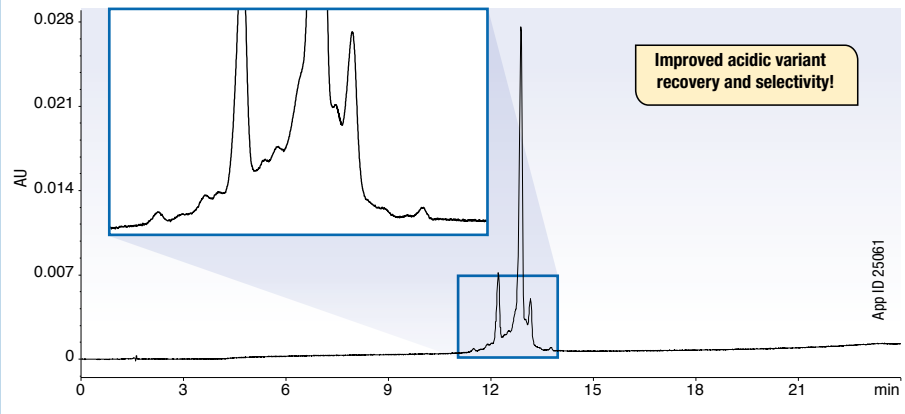


Column: Biozen 6 µm WCX
Dimensions: 250 x 4.6 mm
Part No.: 00G-4777-E0
Mobile Phase: A: 20 mM MES (pH 5.6)
B: 20 mM MES + 300 mM NaCl (pH 5.6)

Gradient: Time (min)	% B
0	15
1	15
31	45
31.1	100
34	100
35	15

Flow Rate: 1 mL/min
Temperature: 30 °C
Detection: UV @ 280 nm
Sample: Trastuzumab

Trastuzumab (pH Gradient Buffer)



Column: Biozen 6 µm WCX
Dimensions: 250 x 4.6 mm
Part No.: 00G-4777-E0
Mobile Phase: A: CX -1 (pH 5.6) pH Gradient Buffer*
B: CX -1 (pH 10.2) pH Gradient Buffer*

Gradient: Time (min)	% B
0	0
1	0
21	100
23	100
24	0

Flow Rate: 1 mL/min
Temperature: 30 °C
Detection: UV @ 280 nm
Sample: Trastuzumab
* From Thermo Fisher Scientific® Inc.

Ordering Information

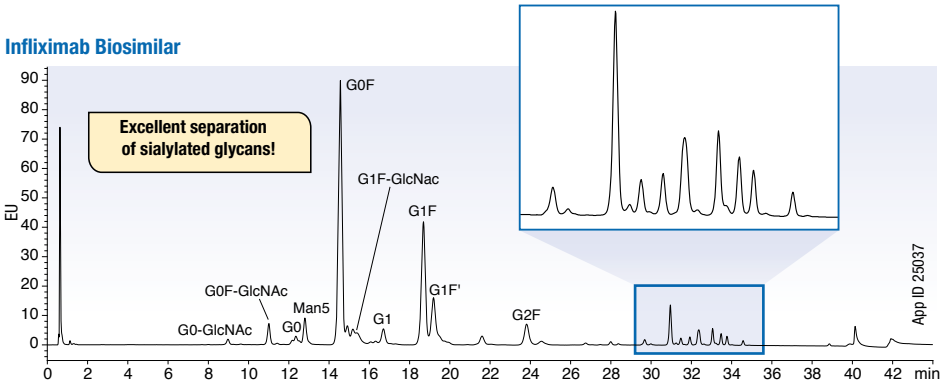
Biozen Columns (mm)					Biocompatible Guard Cartridges	
	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	for 2.1 mm	Holder
					/10pk	ea
Biozen 6 µm WCX	00B-4777-AN	00D-4777-AN	00F-4777-AN	00G-4777-AN	AJ0-9401	KJ0-4282

	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	AJ0-9400	KJ0-4282

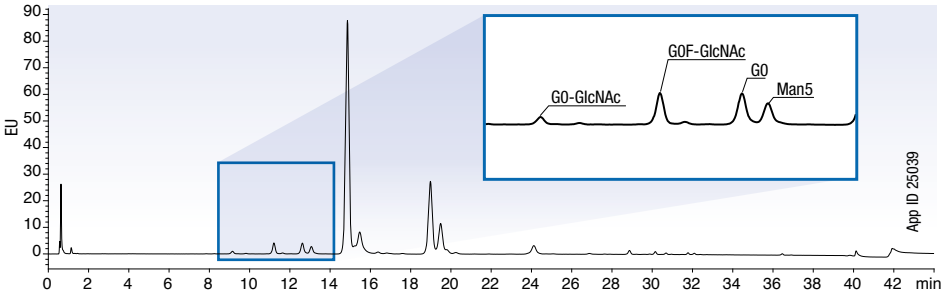
Glycan Analysis

The unique selectivity of Biozen Glycan was designed to resolve highly chemically similar sugar moieties of released and labeled N- and O-linked glycans. With a 2.6 µm core-shell particle, both HPLC or UHPLC systems can benefit from its high efficiency particle morphology to achieve sharper peak shapes with faster run times. Under HILIC-FLR or HILIC-MS conditions, the Biozen Glycan column excels with increased polar retention and selectivity to enable fast reproducible characterization of your biotherapeutic's glycosylation profile.

Infliximab Biosimilar



Trastuzumab



Conditions for both separations:

Column: Biozen 2.6 µm 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

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
				/3pk	ea
Biozen 2.6 µm Glycan	00B-4773-AN	00D-4773-AN	00F-4773-AN	AJ0-9800	AJ0-9000

Sample Preparation

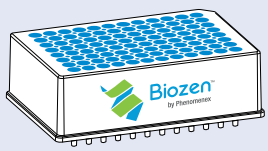
Ordering Information

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.

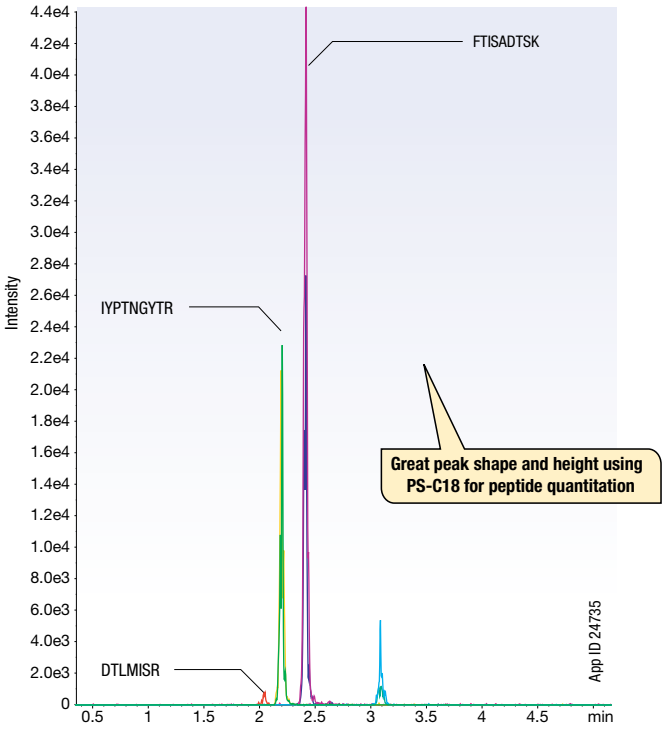
www.phenomenex.com/GlycanSPE



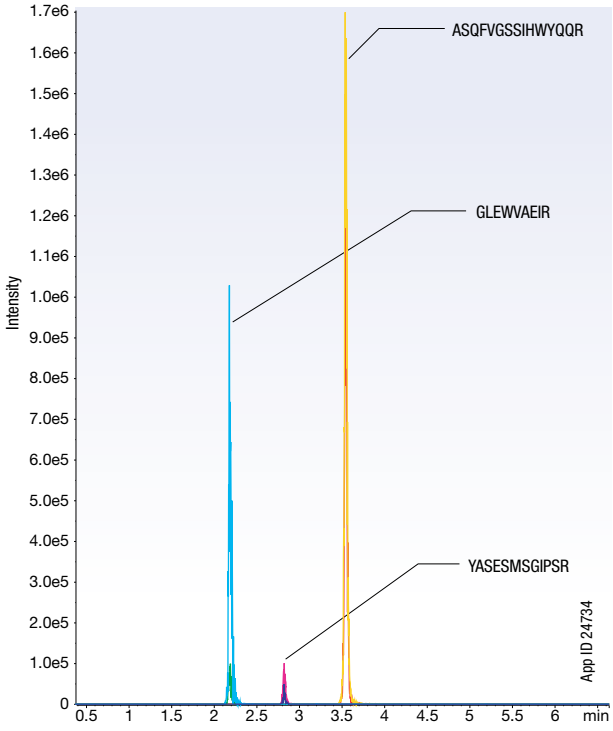
Peptide Quantitation

When quantifying signature peptides, sharp peak shape and sufficient retention of hydrophilic and hydrophobic peptides are pivotal. Both Biozen Peptide columns are developed to deliver orthogonal selectivities for highly chemically similar peptides. In addition to providing excellent peak capacity and higher sample loads for improved detection of low-level analytes, both peptide columns improve overall peak shape by minimizing unwanted secondary interactions of basic peptides. Biozen Peptide XB-C18 blocks secondary interactions via isobutyl side chains, while the Biozen Peptide PS-C18 contains a positively charged weak base that improves peak shapes, especially for basic peptides.

Kadcyla
(4 Signature Peptides)



Infliximab
(3 Signature Peptides)



Conditions 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

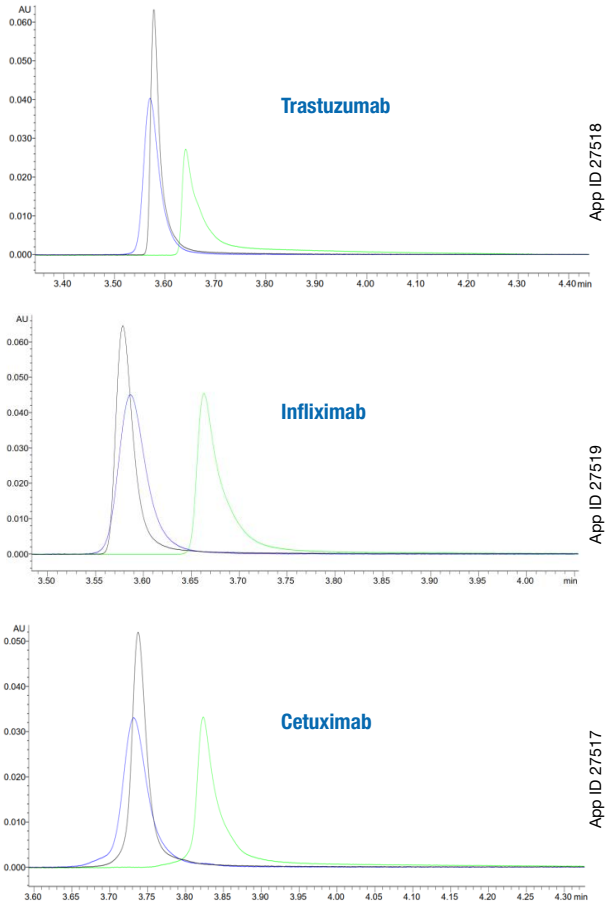
Ordering Information

Biozen Columns (mm)							Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
							/3pk	—	ea
Biozen 1.6 µm Peptide PS-C18	00B-4770-AN	00D-4770-AN	00F-4770-AN		—	—	AJ0-9803	—	AJ0-9000
							/10pk	/10pk	ea
Biozen 3 µm Peptide PS-C18	00B-4771-AN	—	00F-4771-AN	—	00B-4771-E0	00F-4771-E0	AJ0-7605	AJ0-7606	KJ0-4282
							/3pk	—	ea
Biozen 1.7 µm Peptide XB-C18	00B-4774-AN	00D-4774-AN	00F-4774-AN	—	—	—	AJ0-9806	—	AJ0-9000
							/3pk	/3pk	ea
Biozen 2.6 µm Peptide XB-C18	00B-4768-AN	00D-4768-AN	00F-4768-AN	00G-4768-AN	00B-4768-E0	00F-4768-E0	AJ0-9806	AJ0-9808	AJ0-9000

Intact and Subunit Analysis

Impurity profiling and characterization of intact proteins and their subunits are challenging because of the need to identify small differences between variants. Both Biozen intact columns are designed to offer faster mass transfer kinetics of large biomolecules through a large pore core-shell particle that facilitates narrower, taller peaks to achieve higher resolution between target HC/LC, Fc/Fab, and chemically similar isoforms.

Improved Peak Shape of Intact Trastuzumab, Cetuximab and Infliximab vs. Fully Porous Equivalents



Method Conditions for Intact (top) and Reduced (bottom) Data:

Column: Biozen 2.6 µm Widepore C4
XBridge® 2.5 µm Protein BEH C4
AdvanceBio® 3.5 µm RP-mAb C4
Dimension: 100 x 2.1 mm
Part No.: 00D-4786-AN
Mobile Phase: A: 0.1 % Trifluoroacetic Acid in Water
B: 0.1 % Trifluoroacetic Acid in Acetonitrile

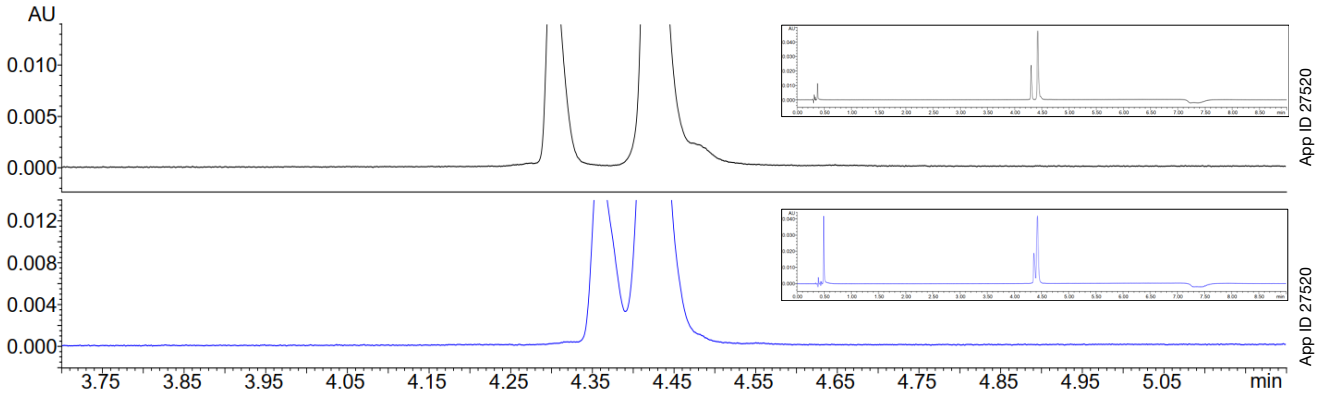
Gradient	Intact Time (min)	Intact % B	Reduced Time (min)	Reduced % B
	0	20	0	5
	1	20	0.5	5
	6	70	5.5	50
	7	70	6.5	50
	7.1	20	6.6	5
	10	20	9	5

Flow Rate: 0.5 mL/min (Intact) 0.8 mL/min (Reduced)
Injection Volume: 1 µL
Temperature: 70 °C (Intact)
80 °C (Reduced)
Instrument: Waters® ACQUITY® H-Class
Detection: UV @ 280 nm
Sample: 1. Cetuximab
2. Infliximab
3. Trastuzumab

- Biozen 2.6 um Widepore C4
- XBridge 2.5 um Protein BEH C4
- AdvanceBio 3.5 um RP-mAb C4

Comparative separations may not be representative of all applications.

Improved Resolution of Reduced Infliximab vs Fully Porous Equivalents



Ordering Information

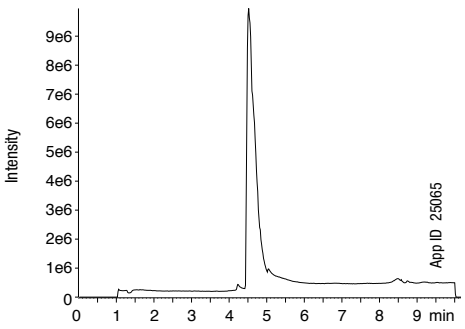
Biozen Columns (mm)								Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	for 2.1 mm	for 4.6 mm	Holder
								/3pk	/3pk	ea
Biozen 2.6 µm WidePore C4	00B-4786-AN	00D-4786-AN	00F-4786-AN	00B-4786-E0	00D-4786-E0	00F-4786-E0	00G-4786-E0	AJ0-9816	AJ0-9818	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

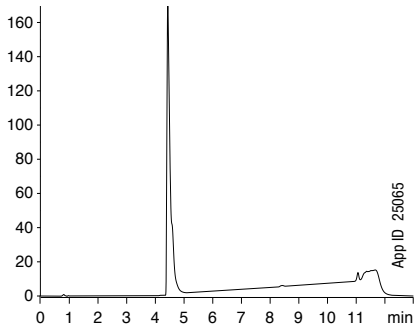
Mass spectrometric analysis of intact proteins provides pivotal information required by regulatory agencies to ensure protein drug efficacy. Analysis offers accurate molecular weight information about the protein as well as relative abundance of its isoforms. This information often serves as a benchmark for characterizing further variabilities in PTMs, protein sequence, impurities and degradation products. Biozen WidePore C4 and Intact XB-C8 offer orthogonal selecitivies for robust intact mass method development to facilitate fast run times and sharp peak shapes to maximize the information collected from MS characterization.

Intact Mass of Trastuzumab Biosimilar using a Biozen Intact XB-C8 and SCIEX® X500B

TIC



UV

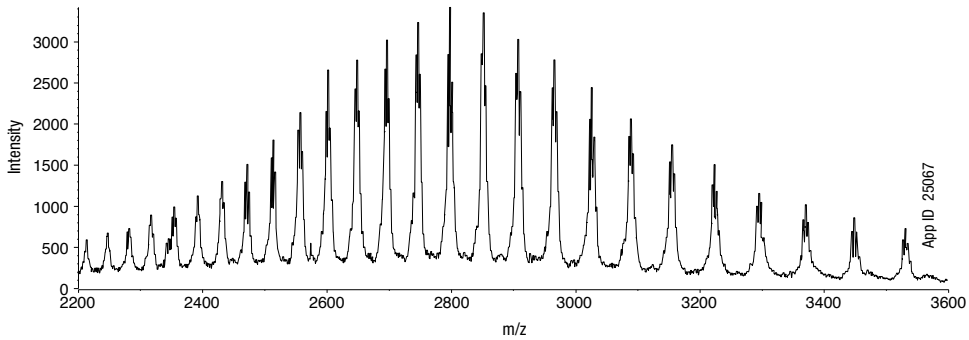


Columns: Biozen 3.6 µm Intact XB-C8
Dimensions: 150 x 2.1 mm
Part No.: 00F-4766-AN
Mobile Phase: A: 0.1 % Formic Acid in Water
B: 0.1 % Formic Acid in Acetonitrile / Isopropyl alcohol (50:50)

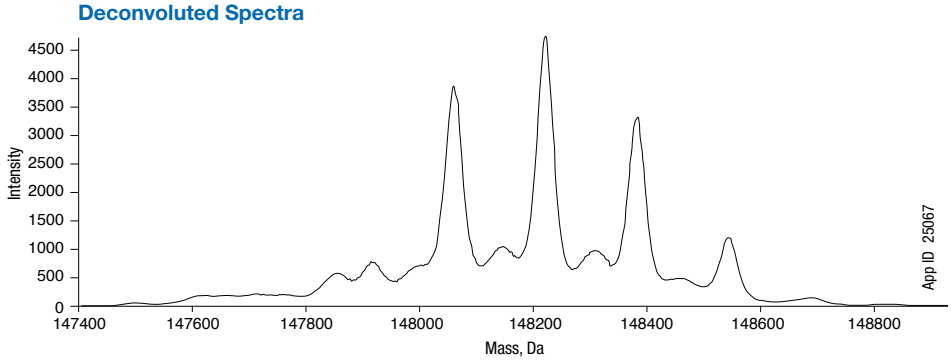
Gradient:	**Time (min)**	**% B**
	2.5	20
	10	65
	10.1	95

Flow Rate: 0.3 mL/min
Temperature: 90 °C
Detection: QTOF (SCIEX X500B)
Sample: Trastuzumab

Spectra



Deconvoluted Spectra



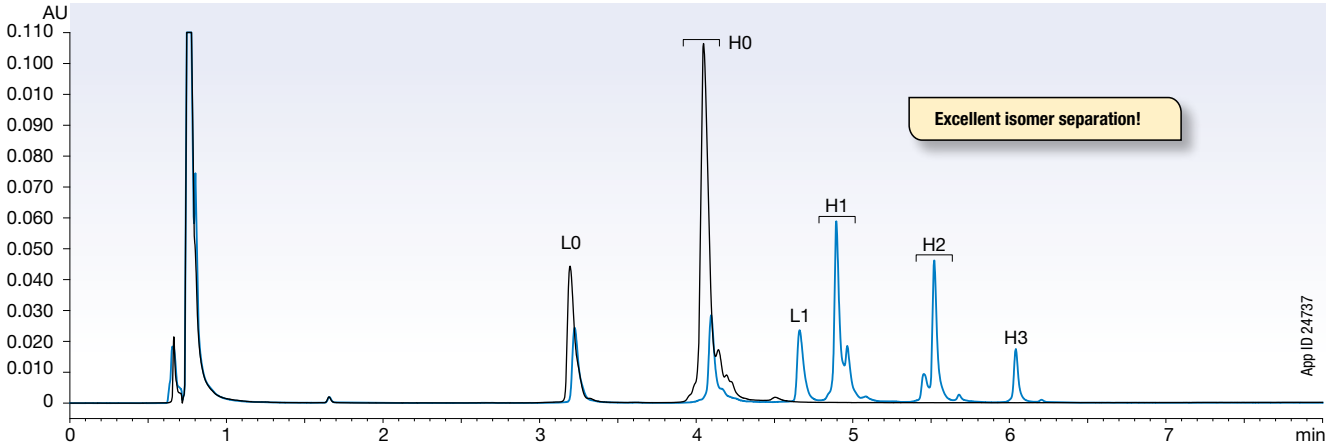
Ordering Information

Biozen Columns (mm)								Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	for 2.1 mm	for 4.6 mm	Holder
								/3pk	/3pk	ea
Biozen 2.6 µm WidePore C4	00B-4786-AN	00D-4786-AN	00F-4786-AN	00B-4786-E0	00D-4786-E0	00F-4786-E0	00G-4786-E0	AJ0-9816	AJ0-9818	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

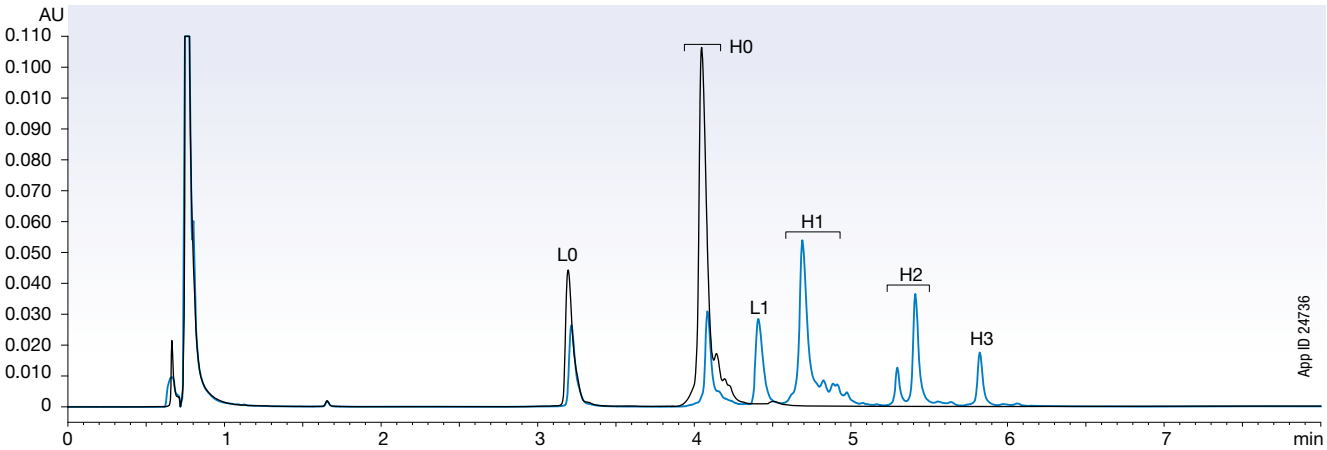
Drug Antibody Ratio (DAR)

The drug-to-antibody ratio of ADCs must be well understood to determine drug efficacy and safety. The Biozen Intact XB-C8 is an excellent solution for determining drug load distribution and DAR for cysteine conjugated mAbs. Its large pore size allows intact ADCs to interact with a moderately retentive stationary phase while the core-shell particle supplies increased efficiency. With the ease of reverse phase method development combined with the resolving power of a moderately retentive, core-shell particle stationary phase, Biozen Intact XB-C8 offers optimum separation and recovery between DAR species.

Herceptin—vcMMAE using Biozen 3.6 µm Intact XB-C8



Herceptin—mcMMAF using Biozen 3.6 µm Intact XB-C8



Column: Biozen 3.6 µm Intact XB-C8
Dimension: 150 x 2.1 mm
Part No.: 00F-4766-AN
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in ACN

Gradient:

Time (min)	% B
0	71
1	71
3	68
4	68
6	66
10	55
10.1	5
10.5	85
10.6	5

Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: UV-Vis Abs.-Variable Wave. (UV) @ 280 nm (22°C)

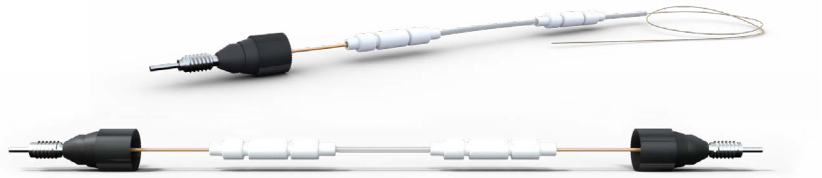
Ordering Information

Biozen Columns (mm)								Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	for 2.1 mm	for 4.6 mm	Holder
								/3pk	/3pk	ea
Biozen 2.6 µm WidePore C4	00B-4786-AN	00D-4786-AN	00F-4786-AN	00B-4786-E0	00D-4786-E0	00F-4786-E0	00G-4786-E0	AJ0-9816	AJ0-9818	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

Biozen Nano LC Columns

Biozen Nano Columns offer a powerful combination of an advanced particle platform, three unique column chemistries, and fully integrated SecurityLINK™ Fitting Technology for a zero dead-volume connection.

- **Integrated SecurityLINK fittings for easy installation and leak-free connections (now with double-ended SecurityLINK)**
- **Maximized resolution for improved protein/peptide identification**
- **Increased robustness and sensitivity**

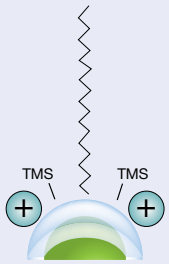


Core Shell Technology

- **High Efficiency**
- **Excellent Inertness**
- **Increased Sensitivity**
- **Exceptional Quality and Robustness**

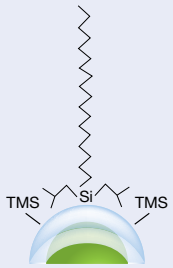
3 Unique Nano Chemistries and Growing!

Peptide



Biozen Peptide PS-C18

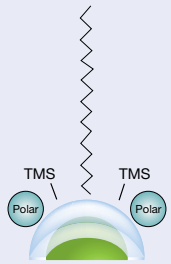
Excellent retention by combined positively charged surface ligand and C18 ligand.



Biozen Peptide XB-C18

Overall retention of both acidic and basic peptides through C18 stationary phase with di-isobutyl side chains.

Polar



Biozen Polar C18

Enhanced selectivity / retention for polar analytes without diminishing useful non-polar retention

High Efficiency Core-Shell Particle

Using a rigorous core construction process, a uniform porous silica layer is grown around the spherical solid silica core. This unique combination of precise particle architecture and particle size provides dramatic leaps in performance.

Fully Porous		Biozen Nano Core-Shell	Average Efficiency Gain with Biozen Nano Core-Shell
5 µm	vs	5 µm	90 % Higher
3 µm	vs	2.6 µm	85 % Higher
1.7 µm	vs	2.6 µm	Equivalent Efficiency

Material Characteristics

Biozen Nano Phases	Particle Size (µm)	Pore Size (Å)	Effective Surface Area (m^2/g)	pH Stability	Temp (°C)	Pressure (psi)
Peptide XB-C18	2.6, 5	100	200	1.5-9	90	15,000
Peptide PS-C18	2.6	100	200	1.5-8.5	60	15,000
Polar C18	2.6	100	200	1.5-8.5	60	15,000

Zero Dead-Volume Nano LC Connections in a CLICK

Biozen Nano's fully integrated SecurityLINK™ fingertight fitting system simplifies your system connections while providing consistent performance through Torque Limiting Technology that prevents overtightening or undertightening making every connection leak-free.

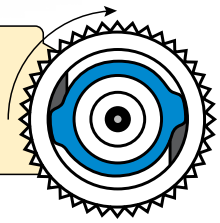
Click n' Done
Torque Limiting Technology prevents overtightening or undertightening

Zero Dead-Volume
Sealing technology eliminates extra internal volume

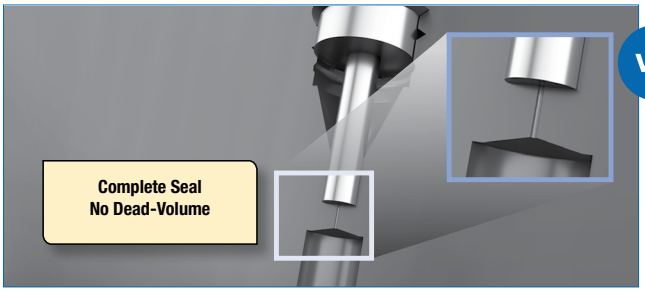
Fingertight
Easy fingertight installation, the "CLICK" feedback confirms connection is secure

What is Torque Limiting Technology?

Once the perfect connection has been made through fingertightening, the SecurityLINK fitting offers a haptic "CLICK" to confirm that optimum torque has been reached. This ensures a consistent connection each and every time and prevents over or undertightening that may cause column performance issues.

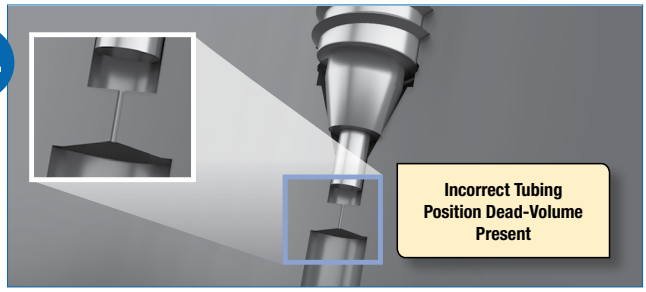


Biozen Nano Column with Integrated SecurityLINK Fingertight Fittings



vs.

Nano Columns using Standard Nut Ferrule Fittings



Biozen Nano LC Columns with Integrated SecurityLINK™ Fitting

Ordering Information

Biozen Nano LC Columns (mm)			
Phases	**150 x 0.075 mm**	**250 x 0.075 mm**	**500 x 0.075 mm**
Biozen 2.6 µm Peptide PS-C18	00F-4797-AW-21	00G-4797-AW-21	—
Biozen 2.6 µm Peptide XB-C18	00F-4768-AW-21	00G-4768-AW-21	00J-4768-AW-21
Biozen 2.6 µm Polar-C18	00F-4796-AW-21	00G-4796-AW-21	—
Biozen 5 µm Peptide XB-C18	—	—	00J-4792-AW-21

Biozen Nano LC Columns with Double SecurityLINK™ Fitting

Ordering Information

Biozen Nano LC Columns (mm)			
Phases	**150 x 0.075 mm**	**250 x 0.075 mm**	**500 x 0.075 mm**
Biozen 2.6 µm Peptide PS-C18	00F-4797-AW-22	00G-4797-AW-22	—
Biozen 2.6 µm Peptide XB-C18	00F-4768-AW-22	00G-4768-AW-22	00J-4768-AW-22
Biozen 2.6 µm Polar-C18	00F-4796-AW-22	00G-4796-AW-22	—
Biozen 5 µm Peptide XB-C18	—	—	00J-4792-AW-22

Biozen Nano LC Columns with Open Fused-Silica Inlet Fitting

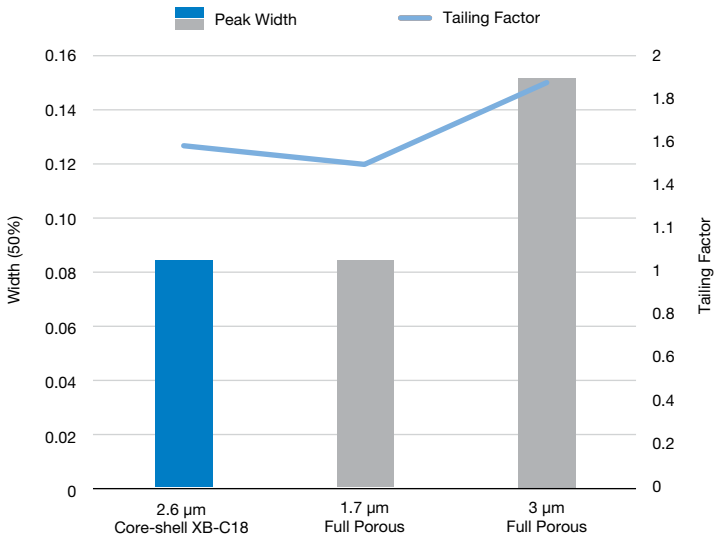
Ordering Information

Biozen Nano LC Columns (mm)			
Phases	**150 x 0.075 mm**	**250 x 0.075 mm**	**500 x 0.075 mm**
Biozen 2.6 µm Peptide PS-C18	00F-4797-AW-11	00G-4797-AW-11	—
Biozen 2.6 µm Peptide XB-C18	00F-4768-AW-11	00G-4768-AW-11	—
Biozen 2.6 µm Polar-C18	00F-4796-AW-11	00G-4796-AW-11	—
Biozen 5 µm Peptide XB-C18	—	—	00J-4792-AW-11

Robust Performance for Low-Flow Analysis

Peak widths and tailing factors obtained from a mixture of 20 isotopically labeled peptides injected on columns packed with Biozen 2.6 µm core-shell Peptide XB-C18, Thermo Fisher® Acclaim™ PepMap™ 100 nanoViper™ 3 µm fully porous C18, and Waters® nanoEase® M/Z Peptide BEH 1.7 µm fully porous C18 particles, respectively.

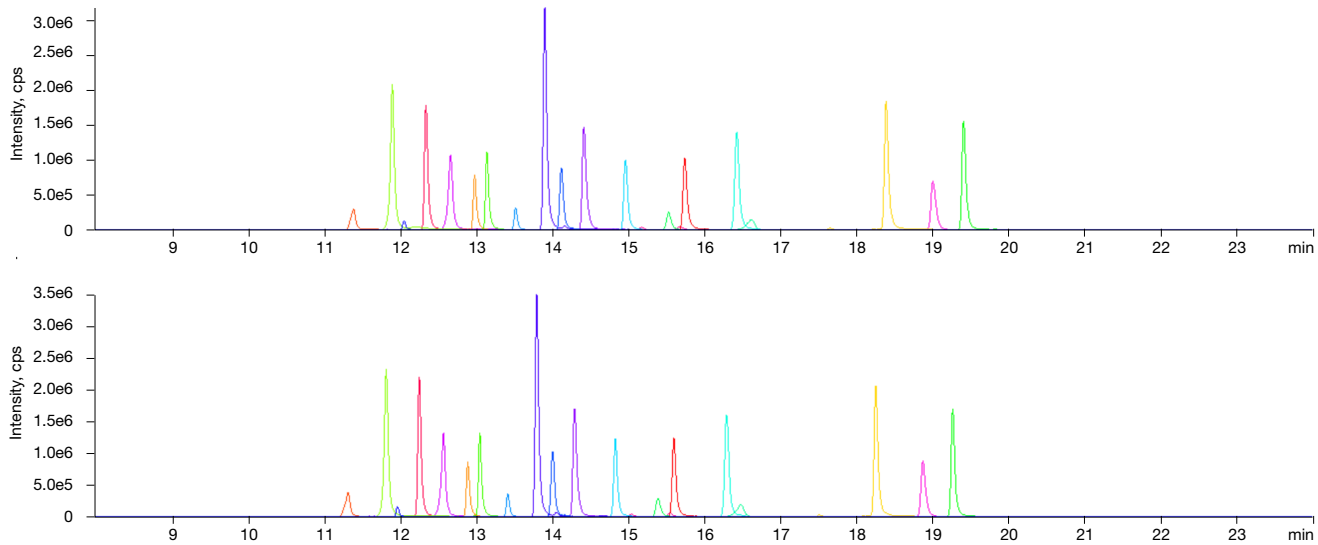
Minimum Peak Widths with Nano Core-Shell



For more information on Biozen Nano HPLC Columns, visit:
www.phenomenex.com/biozenNano

Reproducible Performance

Extracted Ion chromatograms of injection 1 and 100 from a mixture of 20 isotopically labeled peptides run on a Biozen 2.6 µm Peptide XB-C18 150 x 0.075 mm column.

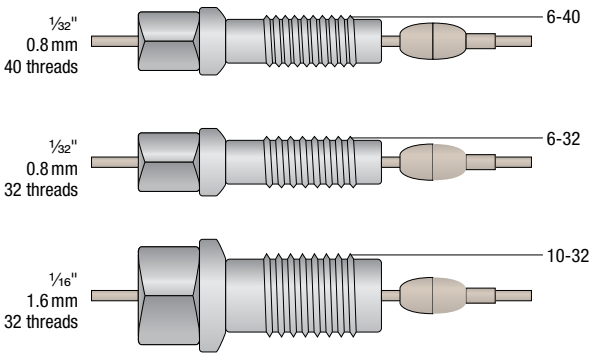


Complementary Nano LC Column and Trap Selectivity

Similar to analytical scale LC, the performance and optimization of your separation is directly affected by the chosen stationary phase. By utilizing different combinations of column and trap selectivities you can positively alter relative recovery and separation performance.

Trap Fitting Guide

Threads per Inch	Pitch (inches)	Pitch (mm)
32	0.0313	0.794
40	0.025	0.635



The installation of an improper nut could potentially cause cross-threading or damage to the port and fitting

Verify fit: Traps are available for 1/16" connections (10–32 thread) or with 1/32" connections (6–40 or 6-32 thread).

Nano Trap Columns

Ordering Information

Trap Fittings			
Part No.	Description	Dimensions (length x ID mm)	Unit
06N-4252-AW	Nano Trap Column RP-1 (General RP)	10 x 0.075 mm	2/pk
06N-4754-AW	Nano Trap Column RP-2 (Aqueous Stable RP)	10 x 0.075 mm	2/pk
06N-4252-AG	Micro Trap Column C18	10 x 0.150 mm	2/pk
06N-4753-AG	Micro Trap Column PS	10 x 0.150 mm	2/pk
06N-4754-AG	Micro Trap Column Polar	10 x 0.150 mm	2/pk
06N-4252-AC	Micro Trap Column C18	10 x 0.30 mm	2/pk
06N-4753-AC	Micro Trap Column PS	10 x 0.30 mm	2/pk
06N-4754-AC	Micro Trap Column Polar	10 x 0.30 mm	2/pk
06N-4167-AC	Micro Trap Column Widepore C4	10 x 0.30 mm	2/pk
06N-4252-AF	Micro Trap Column C18	10 x 0.50 mm	2/pk
06N-4754-AF	Micro Trap Column Polar	10 x 0.50 mm	2/pk

Part No.	Description	Unit
AJ2-9000	SecurityLINK ET Tightening Tool	Ea

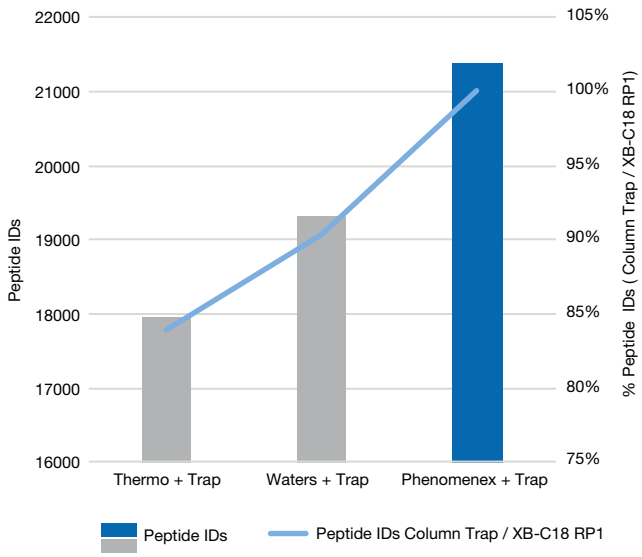
Fittings

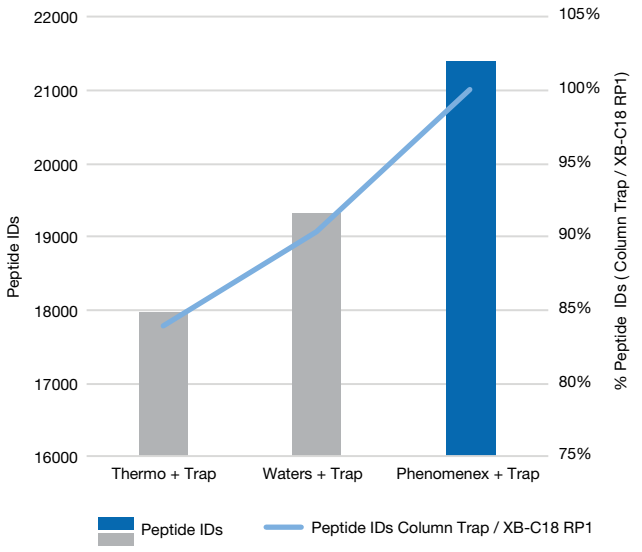
Ordering Information

Trap Fittings		
Part No.	Description	Unit
AQ0-7602	PEEKLok™ fittings with 6-40 thread for 1/32" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQ0-7603	PEEKLok fittings with 6-32 thread for 1/32" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQ0-7600	PEEKLok fittings with 10-32 thread for 1/32" OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea

Robust Column Performance

Number of proteins and peptides that were identified on a nano LC-MS analysis of a digested HeLa sample using a Thermo Fisher® Acclaim™ PepMap™ 100 nanoViper™ 3 µm C18, Waters® nanoEase® M/Z Peptide BEH 1.7 µm C18, and Biozen 2.6 µm Peptide XB-C18, in trap and elute mode with Thermo Fisher Acclaim PepMap nanoViper, Waters nanoEase M/Z Symmetry C18, and Nano Trap RP-1 (General RP) traps, respectively.





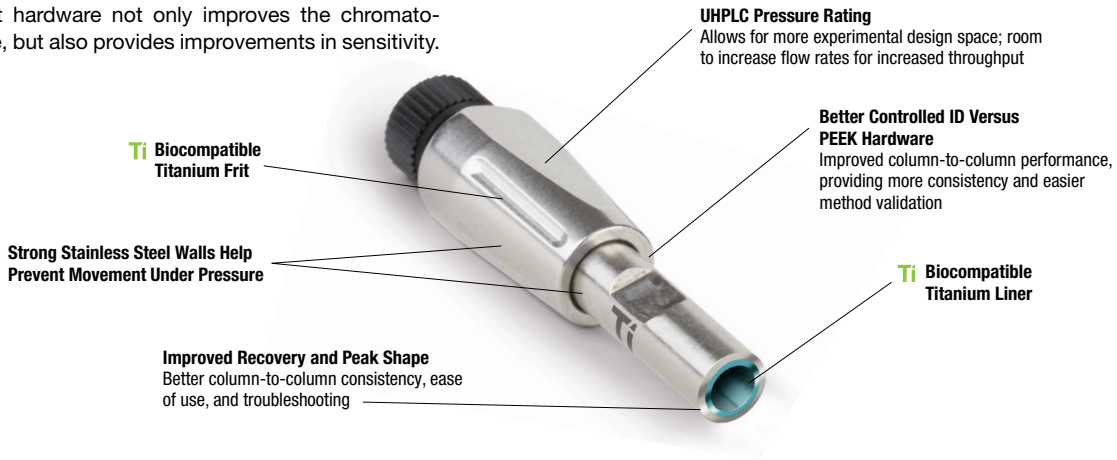
Biozen High pH Fractionation Column

Bio-Inert Hardware

The Biozen High pH Fractionation HPLC Column provides superior performance with its titanium hardware which minimizes nonspecific adsorption resulting in increased confidence in your peptide identifications.

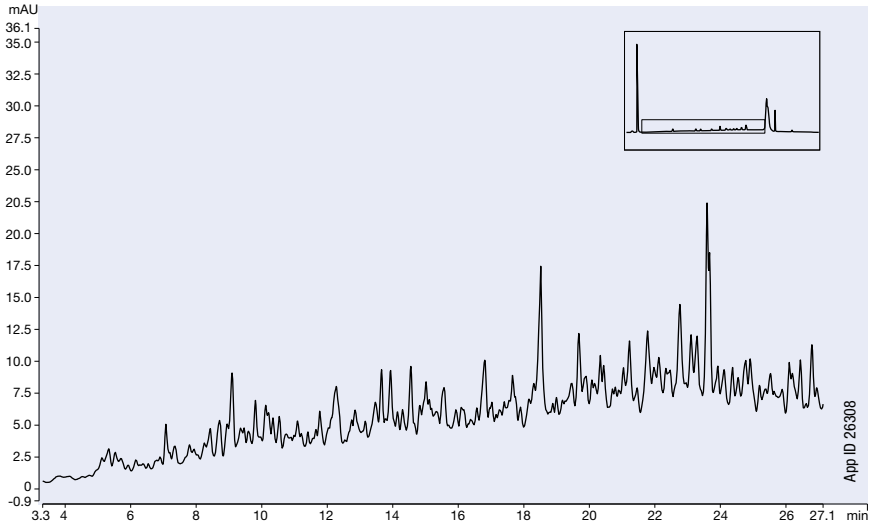
Inside the Biozen Biocompatible Hardware Difference

The use of bio-inert hardware not only improves the chromatographic performance, but also provides improvements in sensitivity.



Deep Proteome Coverage on HeLa Lysate using a Biozen Fractionation Column for High pH

UV trace of a 30 minute basic pH reversed phase separation using 100 µg of HeLa tryptic digest.



Fractionation LC Conditions

Column:	Biozen 3 µm High pH Fractionation Column
Dimensions:	150 x 2.1 mm
Part No.:	00F-4793-AN
Pressure (bar):	150 bar
Mobile Phase:	A: 10 mM Ammonium formate in Water B: 10 mM Ammonium formate in 90 % Acetonitrile and 10 % Water

Gradient:	**Time (min)**	**% B**
	0	1
	1	1
	25	25
	27	60
	28	70
	33	70
	34	1

Flow Rate:	300 µL/min
Injection Volume:	100 µL
Temperature:	50 °C
LC System:	Vanquish™ Flex UHPLC
Detection:	UV @ 280 nm
µg on Column:	100 µg

High pH Fractionation Column

Ordering Information

Fractionation Column		
Part Number	**Description**	**Dimension**
00F-4793-AN	Biozen 3 µm High pH Fractionation Column	150 x 2.1 mm

Fit-for-Purpose Bio Chemistries to Address Your Every Need

This rapidly-growing industry necessitates fit for purpose technologies to meet the expanding analytical challenges of the field. Phenomenex columns and sample preparation solutions are designed to tackle the multi-faceted analytical needs of large molecule biopharmaceutical analysis.

www.phenomenex.com/biopharmaceutical

Biozen™ by Phenomenex

Clarity™ Biosolutions

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

Waters		Phenomenex		SecurityGuard™ Cartridges (mm) 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	
30 x 3.9	03A-2117-C0

Chirex Chiral LC Columns

- **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 phamaceutical 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 7 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	
Group 2	Y	Y		Y			3022 or 3020	3014
Group 3	Y	Y			Y		3014 or 3020	3022
Group 4	Y		Y					
Group 5	Y			Y			3014	3020 or 3022
Group 6	Y				Y		3020	
Group 7		Y	Y			Aliphatic α-amino acids, α-hydroxy acids and their derivatives	3126	
Group 8			Y				3126	
Group 9					Y		3014	3020
Group 10					Y	Asymmetric other than carbon. Chiral center at N,S,P,B, etc	3014	

For broader enantioselectivity, see Lux on page 120.

Ordering Information

5 µm Analytical and Guard Columns (mm)							Guards
Phase	Chirex Phase Description	Bond Type	Linkage Type	50 x 4.6	150 x 4.6	250 x 4.6	30 x 4.6
3011	(S)-LEU and DNAn	Covalent	Urea	—	00F-3011-E0	00G-3011-E0	—
3014	(S)-VAL and (R)-NEA	Covalent	Urea	00B-3014-E0	—	00G-3014-E0	—
3020	(S)-LEU and (R)-NEA	Covalent	Urea	—	—	00B-3020-E0	—
3022	(S)-ICA and (R)-NEA	Covalent	Urea	—	—	00G-3022-E0	—
3126	(D)-Penicillamine	Ion-Metal	Lig Ex	00B-3126-E0	00F-3126-E0	00G-3126-E0	03A-3126-E0

For Chiral Column Performance Check Standards, see page 209.

For more information on Chirex chiral stationary phase descriptions, contact your Phenomenex technical consultant.

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-Fluorenylmethyloxycarbonyl*)			
N-FMOC-Leucine	3011	1.20	13800
N-FMOC-Phenylalanine	3011	1.10	13796
N-FMOC-Valine	3011	1.12	13798
Z-Derivatives (*Benzyloxycarbonyl*)			
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

Separation potential of some other amino acid derivatives:
(Recommended columns: Chirex 3011, 3014)
CBZ-Derivatives (carbobenzoxy; benzyloxycarbonyl);
IC-Derivatives (phenylisocyanate);
Dabsyl Derivatives (4-4-dimethylaminoazobenzene-4'-sulfonyl)

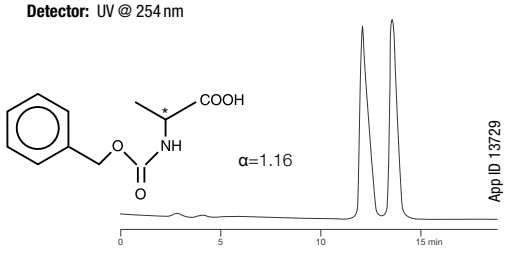
Separations of Underivatized "Free" Amino Acids

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
a-Methyl Leucine	3126	1.59	14457
a-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

Alpha (α)= Separation Factor = k_2/k_1

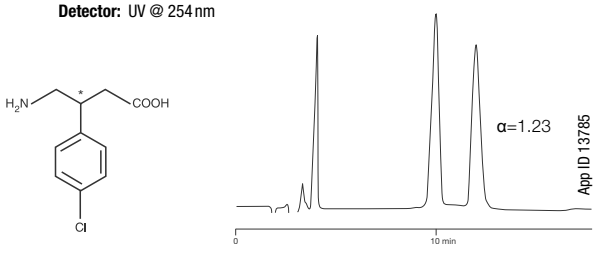
Z-Alanine

Column: Chirex 3011
Dimensions: 250 x 4.0 mm
Part No.: 00G-3011-D0
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



Optimized Oligo Purification and Analysis

- **HPLC, prep LC, desalting, and solid phase extraction (SPE) solutions**
- **DNA, RNA/RNAi, aptamers, 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 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.

Clarity BioSolutions Product Selection

Purification

	Clarity QSP™ SPE	Clarity Oligo-RP™ Columns Clarity Oligo-XT Columns	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™ Columns	Clarity Oligo-MS™ Columns Clarity Oligo-XT Columns	Clarity OTX™ SPE
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

Material Characteristics

Clarity Products	Particle Support	Bonded Phase	Particle Shape/Size (µm)	Pore Size (Å)	Surface Area (m^2/g)
Clarity QSP SPE Products	Polymer (PSDVB)	Hydrophilic polymer coating	30, 70	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 SPE Products	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

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Clarity Oligo-XT Core-Shell LC Columns

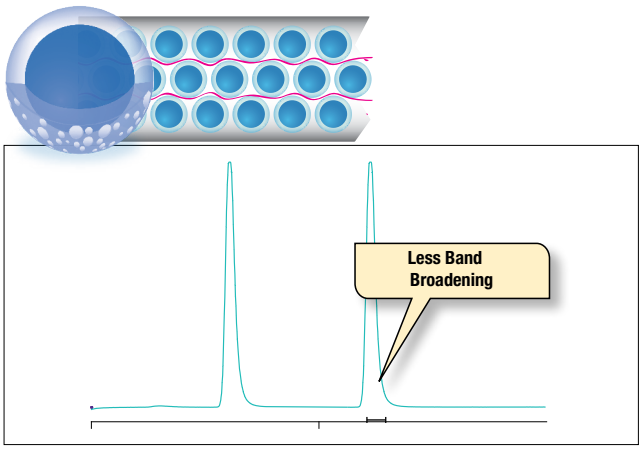
A Sensitive Solution for Oligo Characterization and Bioanalysis

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 and 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.

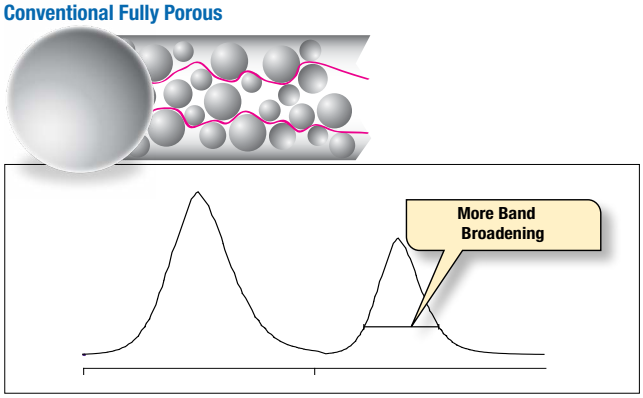
First Choice for Analytical to Preparative Scale Chromatography

- **pH stable 1-12**
- **100% aqueous mobile phase stable**
- **Core-shell particle technology provides improved speed, resolution, and sensitivity**
- **Easily scale analytical LC-MS methods to preparative scale for isolation/purification**
- **1.7 µm particles offer increased performance over existing sub-2 µm methods**

Clarity Core-Shell

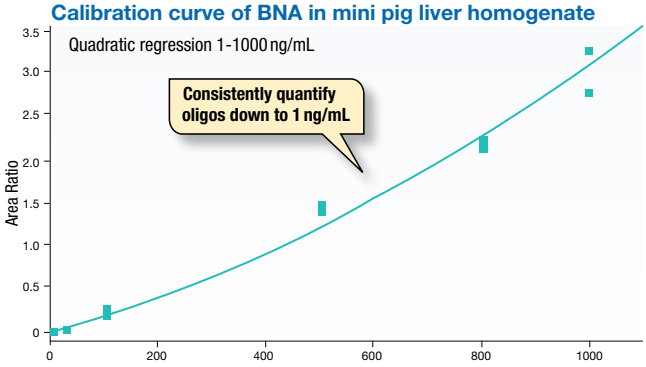


Conventional Fully Porous



Sensitive, Reliable Analysis

Calibration curve of BNA in mini pig liver homogenate



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 µL/min
Inj. Volume: 10 µL
Temperature: 40 °C
Detection: Thermo Q Exactive™ Hybrid Quadrupole-Orbitrap™ Mass Spectrometer, HESI, negative polarity

Clarity Core-Shell		Fully Porous	Average Efficiency Gain with Clarity*
5 µm	VS	5 µm	90 % Higher
2.6 µm	VS	3 µm	85 % Higher
1.7 µm	VS	1.7 µm	20 % Higher

* May not be representative of all applications

Clarity Oligo-MS™ LC Columns

Rapid and Efficient LC-MS Separation for QC and Characterization

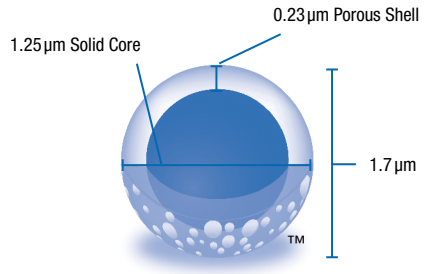
- **Core-shell particle technology provides improved speed, resolution, and sensitivity**
- **2.6 µm particles deliver increased efficiency at reduced backpressures**
- **Easily transfer quantitative LC-MS methods to any system with 2.6 µm particles**
- **1.7 µm particles boost performance of existing sub-2 µm methods**

Core-Shell Technology for Synthetic DNA/RNA Analysis

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.

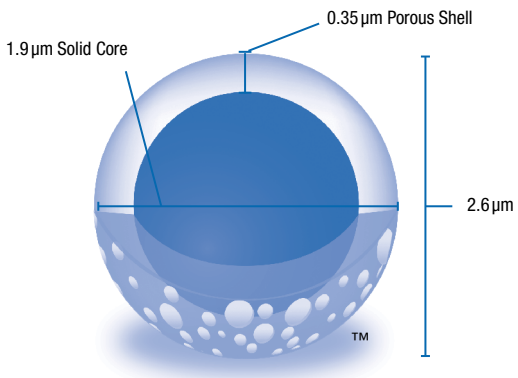
1.7 µm Core-Shell Particle

- **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**

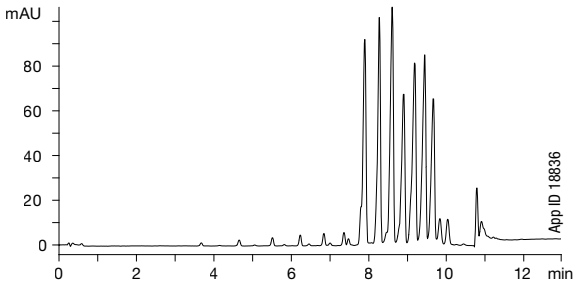


Achieve Baseline Resolution of N-1 and N+1 Oligo from Target

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)

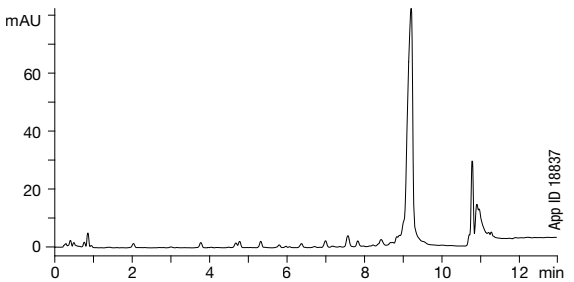


Rapid Separation of Complex Oligo Samples

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**

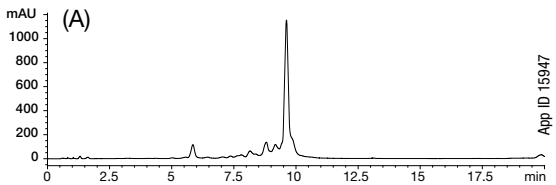
Clarity Oligo-RP has been specifically designed for the reversed phase purification of oligonucleotides with balanced hydrophobicity and polar selectivity. The media is based on composite particle TWIN™ technology. This technology gives improved selectivity and efficiency for oligonucleotides when compared 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

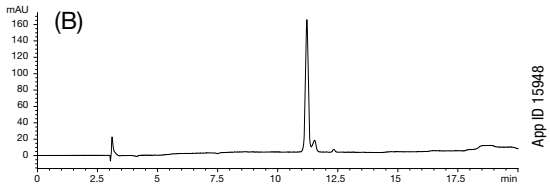
Reversed phase separation of oligonucleotides has advantages over other modes of separation such as ion-exchange. The Oligo-RP phase allows high loadability and delivers high recovery and purity, eliminating the need for extra purification steps. This is achieved through an ion-pair separation of the 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-N0
(B) 00B-4441-E0
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.



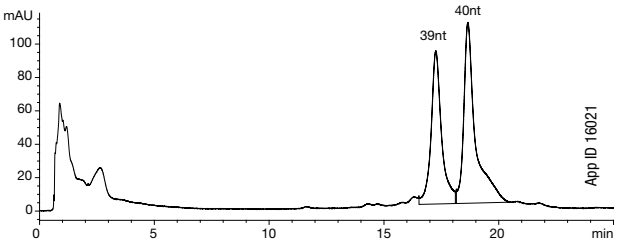
A Clarity Oligo-RP analytical column was used to verify the purity of the preparative purification. A purity of 92 % with a yield of 85 % was determined.

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

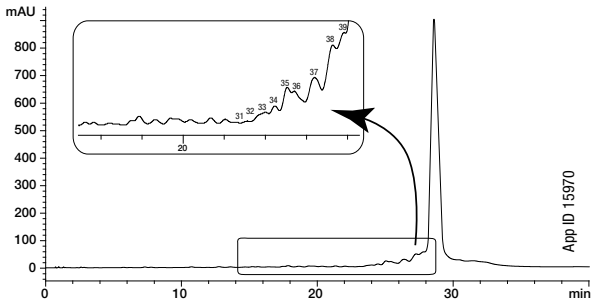
Column: Clarity 3 µm Oligo-RP C18
Dimensions: 50 x 4.6 mm
Part No.: 00B-4441-E0
Mobile Phase: A: 50 mM TEAA pH 7.5
B: Methanol
Gradient: 10 % to 45 % B in 30 minutes
Flow Rate: 1 mL/ min
Detection: UV @ 260 nm
Sample: 1. 40nt DNA with sequence
CTTCTGAACAGTTGATCTATGCACTTCAGACTTATGATCA (2.5 µg)
2. 39nt 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-E0
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-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***	**—**
				/10pk	—
3 µm Oligo-RP C18	00B-4441-B0	00D-4441-B0	00F-4441-B0	AJ0-8134	—
				/10pk	—
5 µm Oligo-RP C18	—	—	00F-4442-B0	AJ0-8134	—
Phase	**50 x 2.1**	**100 x 2.1**	**150 x 2.1**	**—**	**2.1**
				—	/3pk
1.7 µm Oligo-MS C18	00B-4480-AN	00D-4480-AN	—	—	AJ0-9068
				—	/3pk
2.6 µm Oligo-MS C18	00B-4479-AN	00D-4479-AN	—	—	AJ0-9068
				—	/3pk
1.7 µm Oligo-XT	00B-4747-AN	00D-4747-AN	—	—	AJ0-9515
				—	/3pk
2.6 µm Oligo-XT	00B-4746-AN	00D-4746-AN	—	—	AJ0-9515
				—	/3pk
5 µm Oligo-XT	00B-4745-AN	—	—	—	AJ0-9515
				for ID: 2.0-3.0 mm	for 2.1 mm ID

Find additional LC columns for oligonucleotide analysis in our Biozen portfolio

See pages 24-41.

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**
					—	/3pk
2.6 µm Oligo-MS C18	00B-4479-E0	00D-4479-E0	—	—	—	AJ0-9066
					—	/3pk
2.6 µm Oligo-XT	00B-4746-E0	00D-4746-E0	—	—	—	AJ0-9514
					/10pk	—
3 µm Oligo-RP C18	00B-4441-E0	00D-4441-E0	00F-4441-E0	—	AJ0-8135	—
					/10pk	—
5 µm Oligo-RP C18	00B-4442-E0	—	00F-4442-E0	00G-4442-E0	AJ0-8135	—
					—	/3pk
5 µm Oligo-XT	—	—	00F-4745-E0	—	—	AJ0-9514
					/10pk	—
10 µm Oligo-RP C18	—	—	00F-4445-E0	00G-4445-E0	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‡**
					/3pk
3 µm Oligo-RP C18	00B-4441-N0	—	—	—	AJ0-8136
					/3pk
5 µm Oligo-RP C18	00B-4442-N0	00D-4442-N0	00F-4442-N0	00G-4442-N0	AJ0-8136
					/3pk
5 µm Oligo-XT	00B-4745-N0	00D-4745-N0	00F-4745-N0	—	AJ0-9516
					/3pk
10 µm Oligo-RP C18	—	—	00F-4445-N0	00G-4445-N0	AJ0-8136
					for ID: 9-16 mm

For more about SecurityGuard ULTRA and cartridge holder ordering information, see page 155.

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pages 206-207.

For Column Heater, see page 205.

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♦**
					/ea	/ea
5 µm Oligo-RP C18	00D-4442-P0-AX	00F-4442-P0-AX	00G-4442-P0-AX	—	AJ0-8210	AJ0-8310
					/ea	/ea
5 µm Oligo-XT	00D-4745-P0-AX	00F-4745-P0-AX	00G-4745-P0-AX	00F-4745-U0-AX	AJ0-9517	AJ0-9518
					/ea	/ea
10 µm Oligo-RP C18	—	00F-4445-P0-AX	00G-4445-P0-AX	00F-4445-U0-AX	AJ0-8210	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

Pharmaceutical Analysis – We Have You Covered

Find guides, webinars and tools for the following:

Originator Pharmaceuticals

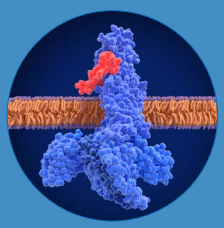
- Method development
- Chiral separations
- Sample preparation for ADME/DMPK

Generic Pharmaceuticals

- Allowable adjustments
- Listings of pharmacopeia columns
- USP/Ph.Eur. calculator

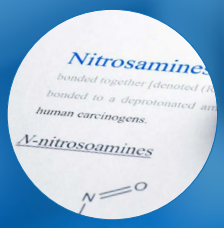
API Manufacturers

- Method development support
- Scalable fully porous and core-shell columns
- Chromatographic library



Therapeutic Peptides

- Applications guides
- Technical notes
- Bio-inert columns



General Topics

- Nitrosamine/NDSRI analysis
- Residual solvents
- Column selection

Visit our resource center at:
www.Phenomenex.com/pharmaceutical

Gemini pH Flexible LC Columns

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.

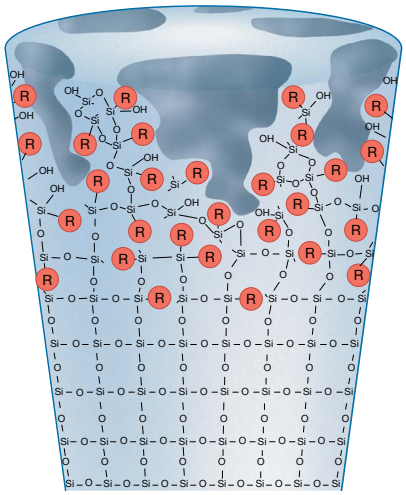
- **Take full advantage of high and low pH conditions (pH 1-12) to manipulate selectivity**
- **Expect longer column lifetime with patented TWIN-NX™ technology**
- **For analytical and preparative separations of basic and acidic compounds**

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

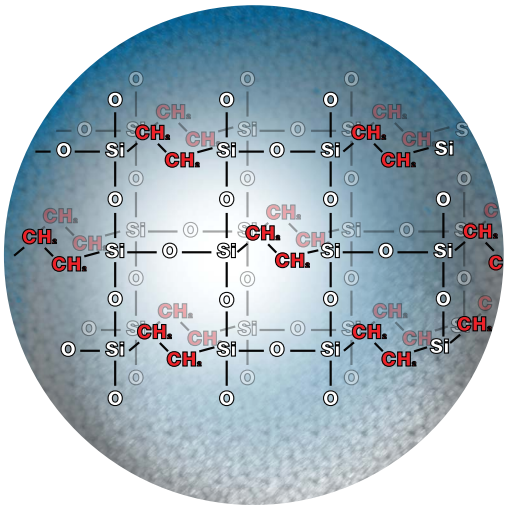
During the final stage of silica manufacturing a unique silica-organic layer is grafted to create a completely new composite particle. Since the internal base silica is unaltered by this manufacturing process, the particle retains its mechanical strength and rigidity along with excellent efficiency, 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.



Gemini pH Flexible LC Columns *(cont'd)*

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**

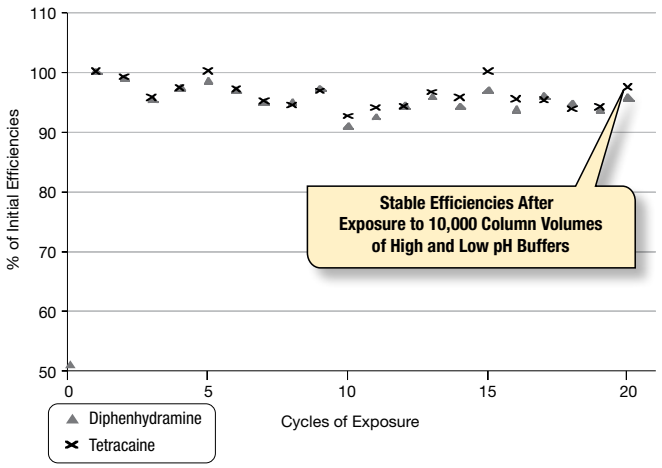
Gemini NX-C18

USP: L1 | LC-MS Certified

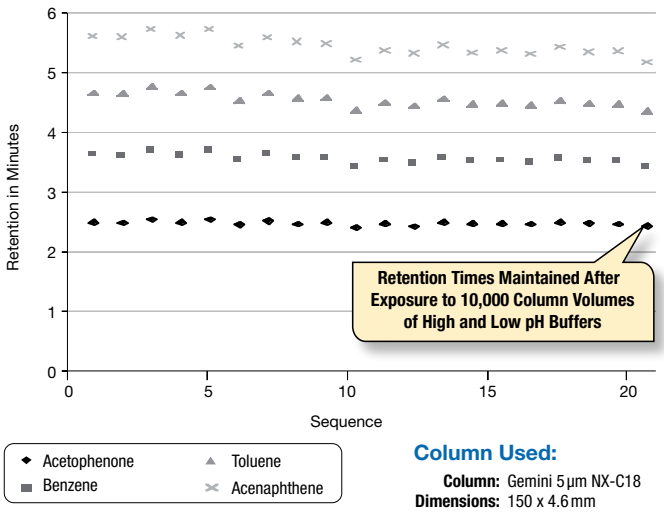
pH Stability:	**1.0 – 12.0**
Particle Size:	3 µm, 5 µm, and 10 µm
Phase:	C18
Application:	Small molecules, basic compounds
Strength:	Extremely durable pH stable particle
Pore Size (Å):	110
Surface Area (m^2/g):	375
Carbon Load %:	14
End Capping:	TMS

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

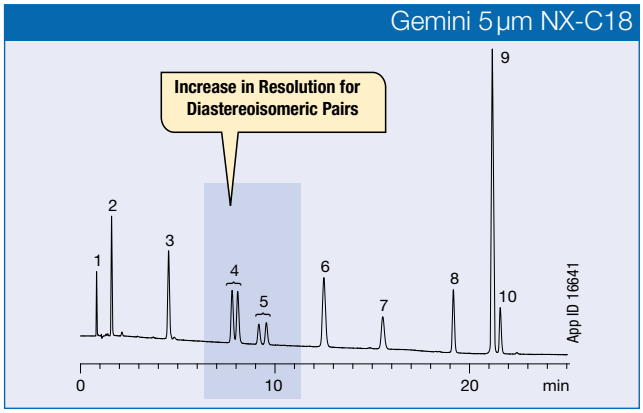
Repeats for 20 Cycles

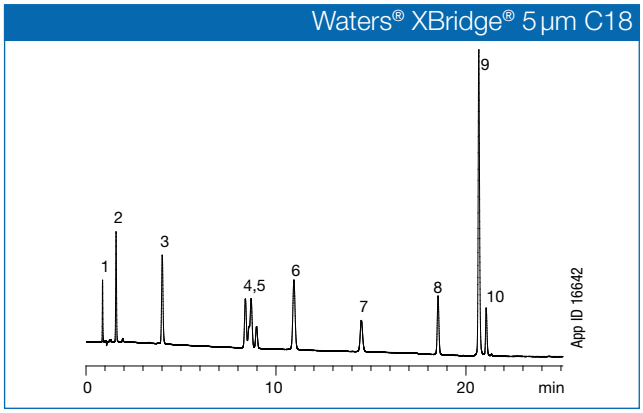
Gemini pH Flexible LC Columns *(cont'd)*

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.

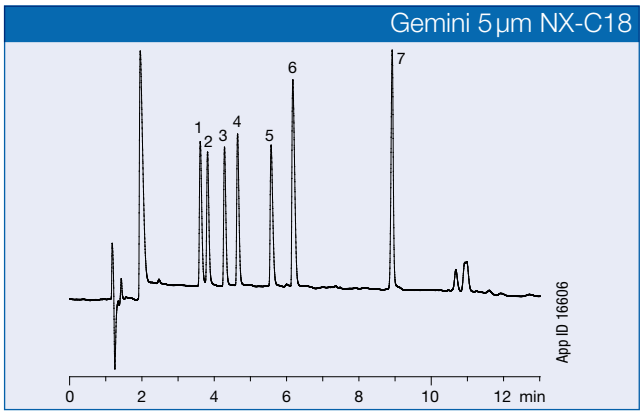
Polar Bases (Beta Blockers) at High pH

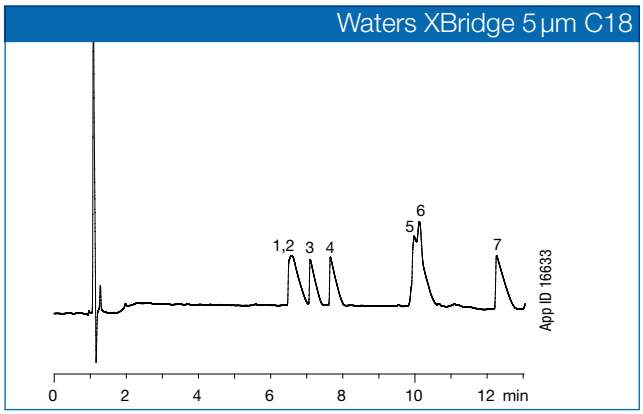
Conditions for all columns:

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. Tripelennamine
3. Chlorpheniramine
4. Brompheniramine
5. Chloropyramine
6. Diphenhydramine
7. Loratadine

Comparative chromatograms may not be representative of all applications.

Gemini pH Flexible LC Columns *(cont'd)*

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**

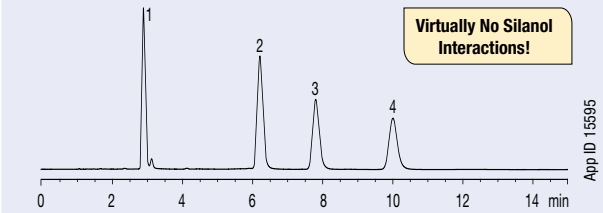
Gemini C18

USP: L1 | LC-MS Certified

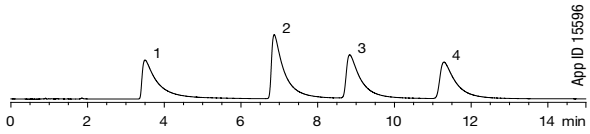
pH Stability:	**1.0 – 12.0**
Particle Size:	3 µm, 5 µm, and 10 µm
Phase:	C18
Application:	Small molecules, basic compounds
Strength:	Wide pH stability, high efficiency
Pore Size (Å):	110
Surface Area (m^2/g):	375
Carbon Load %:	14
End Capping:	TMS

Chromatographic Comparisons

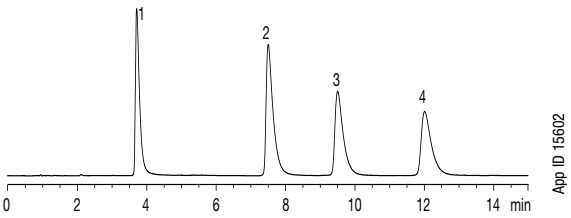
Gemini 5 µm C18 110 Å



Agilent Technologies® ZORBAX® 5 µm Extend-C18 80 Å



Advanced Chromotography Technologies ACE® 5 µm C18 100 Å

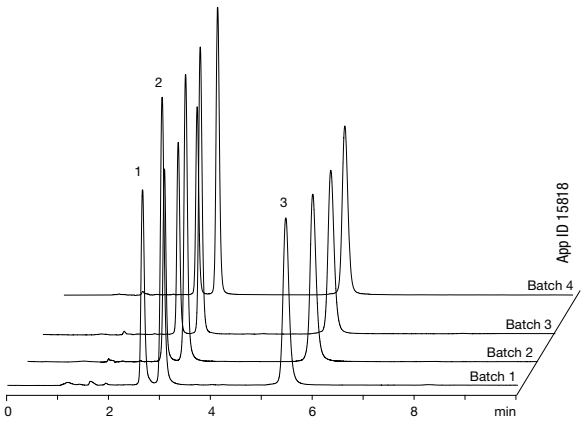


Tricyclic Antidepressants at Neutral pH

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

Batch-to-Batch Reproducibility



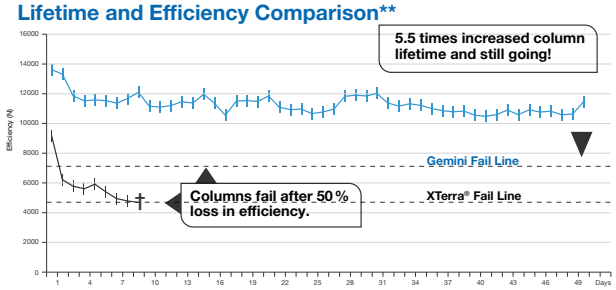
Conditions for all separations:

Column: Gemini 5 µm C18
Dimensions: 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

Comparative separations may not be representative of all applications.

Gemini pH Flexible LC Columns *(cont'd)*

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini C6-Phenyl

- **pH stabe 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 (m^2/g):	375
Carbon Load %:	12
End Capping:	TMS

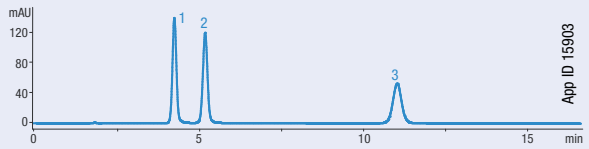
Enhanced Performance for Aromatic Compounds

Sulfa Drug Application

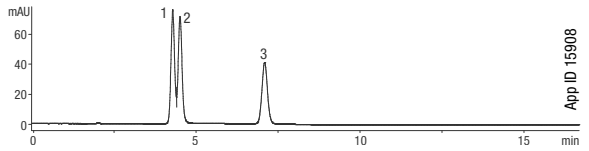
Resolution	Pursuit 5 µm DiPhenyl	Gemini 5 µm C6-Phenyl
$Rs_{1,2}$	1.0	4.0
$Rs_{2,3}$	9.8	16.0

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

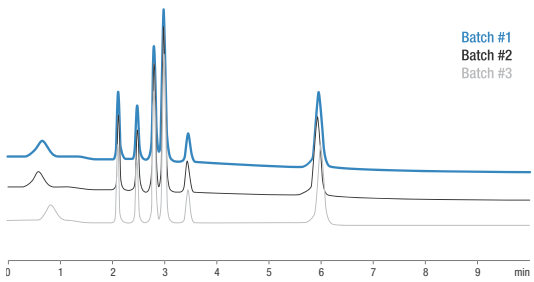


Agilent Technologies® Pursuit® 5 µm DiPhenyl



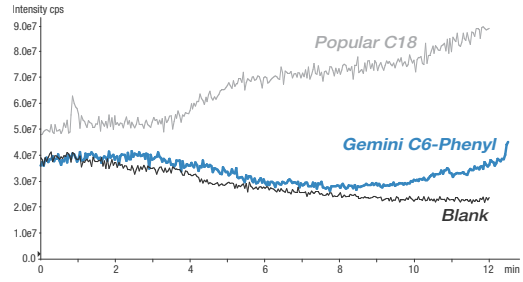
Reproducible Phenyl Phase

Aliphatic Acid Application



Conditions for all columns:
Column: Gemini 5 µm C6-Phenyl
Dimensions: 150 x 4.6 mm
Part No.: 00F-4444-E0
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
2. Malic Acid
3. Lactic Acid
4. Acetic Acid
5. Citric 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 separations may not be representative of all applications.

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini C8(3)

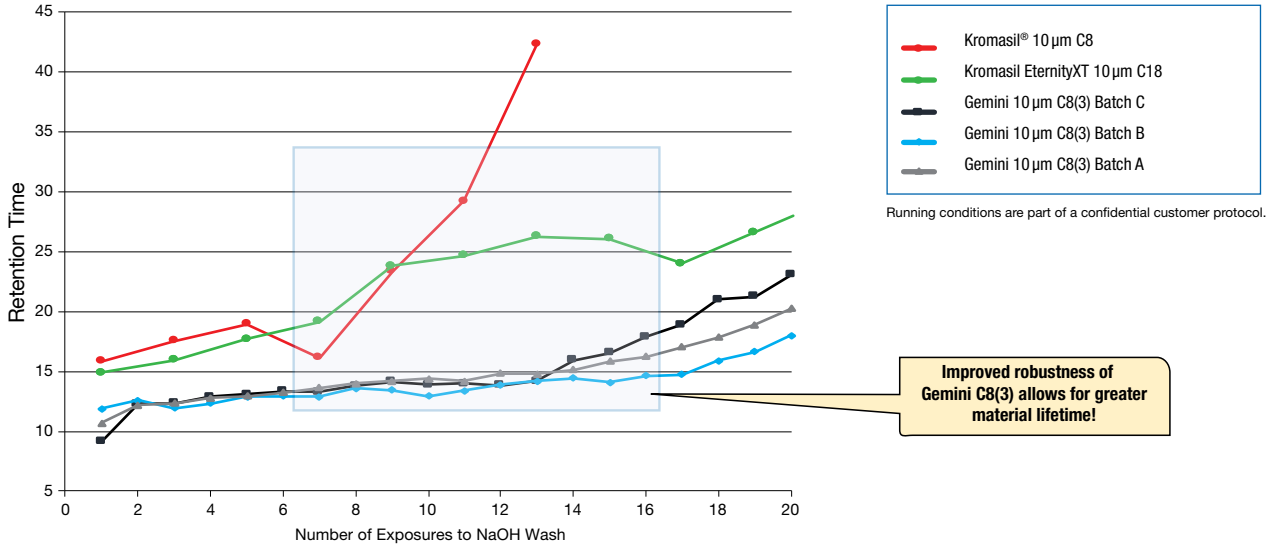
The Material Developed for High pH Insulin Purification

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 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)

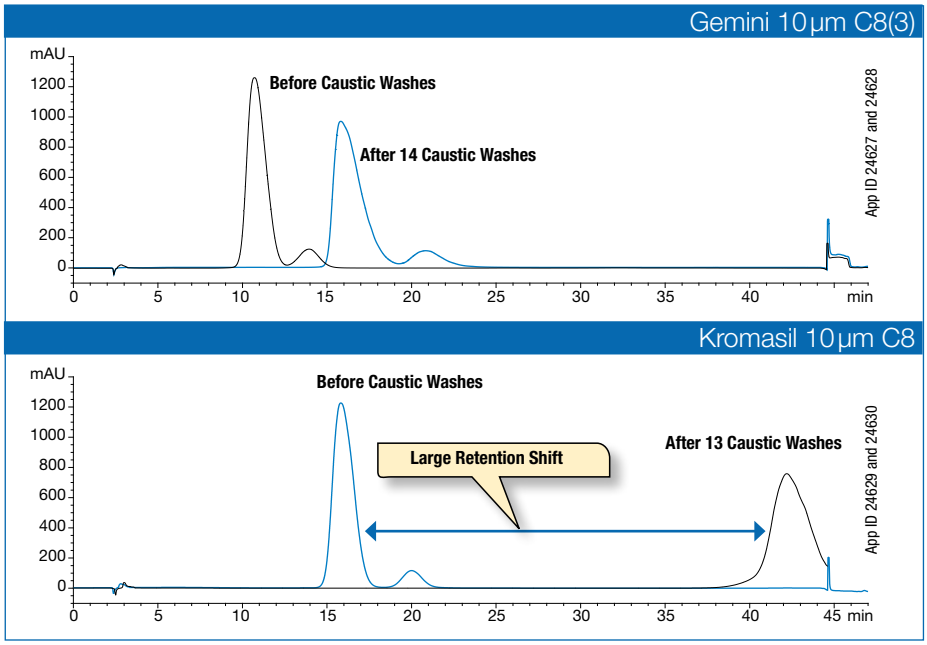
pH Stability:	**1.0 – 12.0**
Particle Size:	10 µm
Phase:	C8
Application:	Small molecules, peptides, proteins, oligonucleotides
Strength:	Elevated pH stability; Increased reproducibility; Enhanced robustness
Pore Size (Å):	100
Surface Area (m^2/g):	400
Carbon Load %:	13
End Capping:	TMS

Insulin Retention vs. Exposures to NaOH Wash



Running conditions are part of a confidential customer protocol.

Insulin Retention Comparison



Comparative separations may not be representative of all applications.

Gemini pH Flexible LC Columns *(cont'd)*

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Ordering Information

3µm Micro LC 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

For information on Micro LC Columns, Traps, and Fittings, see pages 223-225.

3µm 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

3µm 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

5µm 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

5µm 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

5µm Semi-Prep Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	**150 x 10**	**250 x 10**	**10 x 10‡ /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◆**
5µm							/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
10µm							/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◆**
5µm							/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
10µm							/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 pages 210-211.
For PREP Columns & Bulk Media, see pages 178-183.
For SecurityGuard Holders and Cartridges, see pages 150-154.
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**

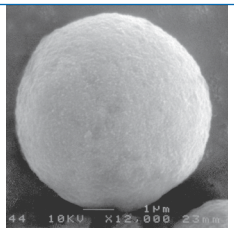
Phenomenex HyperClone columns have been developed to provide chromatographic behavior that mimics that of Thermo Hypersil columns. For comparative applications, please contact your local Phenomenex representative.

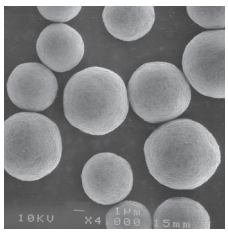
Comparisons of physical and chemical characteristics of HyperClone and Hypersil are listed below. As you can see, HyperClone and Hypersil compare very well for important specifications such as particle size, pore size, and carbon load.

HyperClone VS. Hypersil

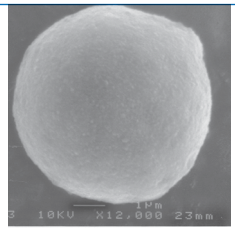
Material Characteristics

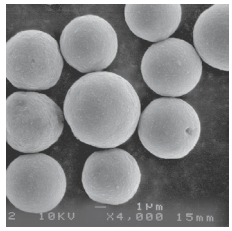
SEM of Base Silica





SEM of Base Silica





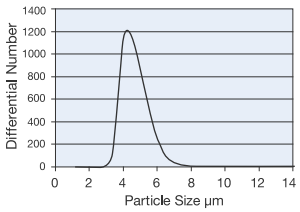
HyperClone (BDS silica)		Hypersil (BDS silica)‡
3, 5	Particle Size (µm)	3, 5
130	Pore Size (Å)	130
155	Surface Area (m^2/g)	170
0.6	Pore Volume (mL/g)	0.6

HyperClone (regular silica)		Hypersil† (regular silica)‡
3, 5	Particle Size (µm)	3, 5
120	Pore Size (Å)	120
155	Surface Area (m^2/g)	170
0.6	Pore Volume (mL/g)	0.6

HyperClone	Carbon Load %	Hypersil‡
7	BDS C8	7
11	BDS C18	11
6.5	MOS (C8)	6.5
10	ODS (C18)	10
4	CN (CPS)	4

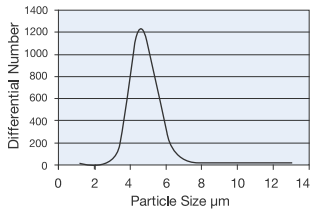
Particle Size Distribution‡

HyperClone

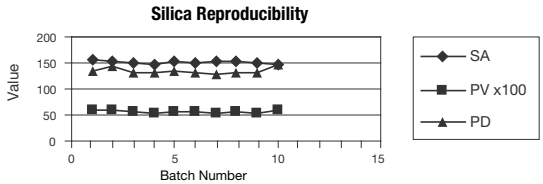


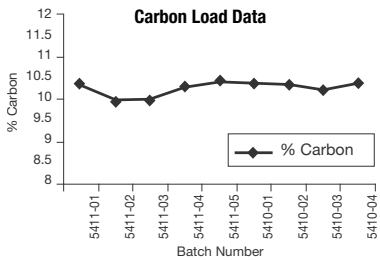
VS.

Hypersil



HyperClone Reproducibility





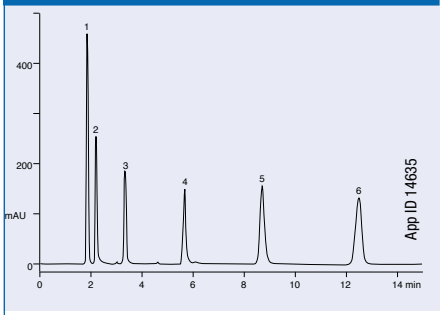
‡ All Hypersil information obtained from (then) Thermo Electron Corporaton 2006-2007 catalog and 2012-2013 Thermo Scientific Chromatography Columns catalog.

HyperClone Guaranteed Replacement to Hypersil *(cont'd)*

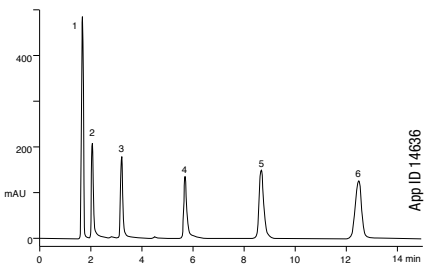
HyperClone™

VS.

HyperClone™ 5 µm BDS C18



Hypersil® 5 µm BDS C18



Non-Polar Basic Compounds

Conditions for Both Columns

Dimensions: 150 x 4.6 mm
Mobile Phase: Methanol/50 mM KH_2PO_4, pH 3.5 (60:40)
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Pyridine
3. Methylaniline
4. Dimethylaniline
5. Dichloronitroaniline
6. Toluene

Ordering Information

3 µm Minibore and Analytical Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phases	**100 x 4.6**	**125 x 4.0**	**150 x 4.6**	**4 x 2.0***	**4 x 3.0***
				/10pk	/10pk
ODS (C18)	00D-4356-E0	00E-4356-D0	00F-4356-E0	AJ0-4286	AJ0-4287
				/10pk	/10pk
BDS C8	—	—	00F-4417-E0	AJ0-4289	AJ0-4290
BDS C18	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**	**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***
								/10pk	/10pk
Silica	—	—	—	—	—	00F-4358-E0	00G-4358-E0	AJ0-4347	AJ0-4348
MOS (C8)	—	—	00E-4359-D0	—	00D-4359-E0	00F-4359-E0	00G-4359-E0	AJ0-4289	AJ0-4290
ODS (C18)	—	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
								/10pk	/10pk
BDS C8	—	—	—	—	—	00F-4418-E0	00G-4418-E0	AJ0-4289	AJ0-4290
BDS C18	00F-4420-B0	—	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 ‡**
		/3pk
ODS (C18)	00G-4361-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

Other dimensions available upon request.

For SecurityGuard Cartridge Holders and Cartridges, see pages 150-154.

Comparative separations may not be representative of all applications.

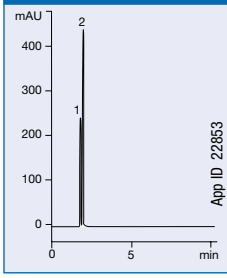
Guaranteed Replacement to Inertsil®

InertClone VS. Inertsil

Material Characteristics

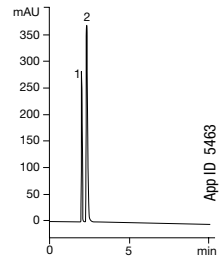
InertClone		Inertsil
Particle Size (µm) and Shape		
3, Spherical		3, Spherical
5, Spherical		5, Spherical
Pore Size (Å)		
150	C8, ODS-2	150
100	ODS-3	100
Surface Area (m^2/g)		
310	C8, ODS-2	320
450	ODS-3	450
Carbon Load %		
12.6	C8	10.5
18.5	ODS-2	18.5
15.5	ODS-3	15.0

InertClone 5 µm C8



VS.

Inertsil 5 µm C8

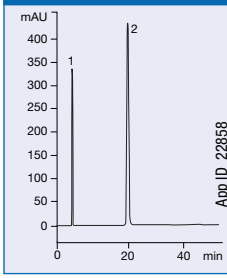


Inert Test 1

Conditions for both columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: Hexane
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Sample: 1. Benzene
2. o-Nitroanisole

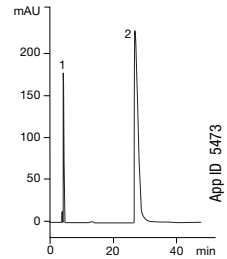
Note: Inertsil columns were manufactured by GL Sciences, Inc., Japan

InertClone 5 µm C8



VS.

Inertsil 5 µm C8



Amitriptyline

Conditions for both columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate, pH 7.0/ Acetonitrile (35:65)
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Amitriptyline

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***
				/10 pk
ODS-3	100Å	00D-4340-E0	00F-4340-E0	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***
					/10pk
ODS-2	150Å	00D-4342-E0	00F-4342-E0	00G-4342-E0	AJ0-4287
C8	150Å	—	00F-4391-E0	—	AJ0-4290
ODS-3	100Å	—	00F-4341-E0	00G-4341-E0	AJ0-4287
					for ID: 3.2-8.0 mm

*SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJ0-4282

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 C4, C5, C18 300 Å columns are 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 formats**

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**
- **Micro flow 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 factor is specified, tested, and reported in Materials Validation Document (MVD)**

pH 1.5 – 10 Stability

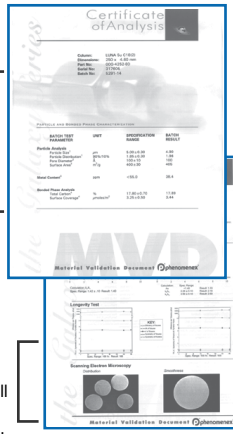
A wide pH range means flexibility for method development, in addition to longer column life. Jupiter columns are stable for over 2500 hours at pH extremes. Jupiter 300 and Jupiter Proteo provide excellent separations using various MS compatible buffers and provide good resolution down to 0.01 % TFA.

Quality Proven

A Materials Validation Document (MVD) is available online for 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.



Diagnostic chromatography tests

Monitoring chromatographic specifications for silanol activity, hydrogen bonding capacity, hydrophobicity and peptide standards.

SEM analysis

Scanning Electron Microscopy (SEM) photos show surface smoothness and particle consistency as well as a visual representation of particle size distribution.

pH stability

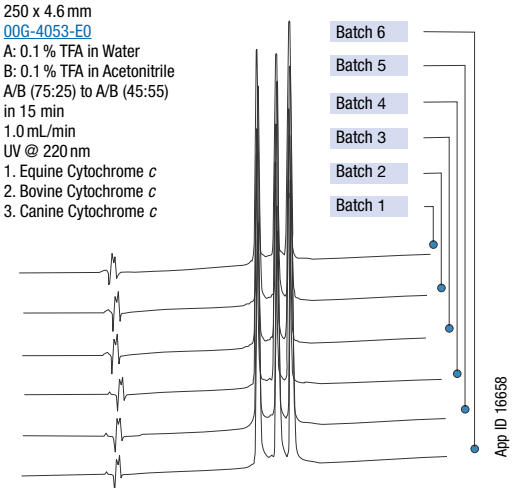
Every batch goes through 1.5 and 10.0 pH testing before release, the results of which are reported on each MVD.

Available digitally at:
www.phenomenex.com/QD

Reproducibility Assured

Batch-to-batch and column-to-column reproducibility 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. Equine Cytochrome *c*
2. Bovine Cytochrome *c*
3. Canine Cytochrome *c*



Jupiter LC Columns for Proteins & Peptides *(cont'd)*

Ordering Information

4 µm & 5 µm Micro Columns (mm)				Trap Column	Trap Column
Phases	**50 x 0.30**	**50 x 0.50**	**150 x 0.50**	**20 x 0.30**	**20 x 0.50**
5 µm C4 300Å	00B-4167-AC	00B-4167-AF	—	05M-4167-AC	05M-4167-AF
5 µm C18 300Å	00B-4053-AC	00B-4053-AF	—	—	—
4 µm Proteo 90Å	00B-4396-AC	—	00F-4396-AF	—	—

See page 177 for more Micro LC Part Numbers.

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 300Å	—	00F-4167-A0	00G-4167-A0	00B-4167-B0	00F-4167-B0	00G-4167-B0	AJ0-4329
5 µm C5 300Å	—	—	—	—	00F-4052-B0	—	AJ0-4326
5 µm C18 300Å	—	—	—	00B-4053-B0	00F-4053-B0	00G-4053-B0	AJ0-4320
4 µm Proteo 90Å	00B-4396-A0	—	—	00B-4396-B0	00F-4396-B0	00G-4396-B0	AJ0-6073
							/10pk
3 µm C18 300Å	—	—	—	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 300Å	00B-4167-E0	00F-4167-E0	00G-4167-E0	00G-4167-N0	00G-4167-P0	AJ0-4330	AJ0-7225	AJ0-7231
5 µm C5 300Å	00B-4052-E0	00F-4052-E0	00G-4052-E0	00G-4052-N0	00G-4052-P0	AJ0-4327	AJ0-7371	—
5 µm C18 300Å	00B-4053-E0	00F-4053-E0	00G-4053-E0	00G-4053-N0	00G-4053-P0	AJ0-4321	AJ0-7224	AJ0-7230
4 µm Proteo 90Å	—	00F-4396-E0	00G-4396-E0	00G-4396-N0	—	AJ0-6074	AJ0-7275	—
						/10pk	—	—
3 µm C18 300Å	—	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 300Å	00G-4168-E0	00G-4168-N0	—	AJ0-4330	AJ0-7225	AJ0-7231
C18 300Å	00G-4055-E0	00G-4055-N0	00G-4055-P0	AJ0-4321	AJ0-7224	AJ0-7230
Proteo 90Å	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 300Å	00G-4169-E0	00G-4169-N0	00G-4169-P0	—	00G-4169-V0	AJ0-4330	AJ0-7225	AJ0-7231	—
C18 300Å	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 page 20.

Ordering Information

*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

Bulk Material			
10 µm Bulk Packings			
Phases	**100 g**	**1 kg**	**10 kg**
C4 300Å	04G-4168	04K-4168	04M-4168
C5 300Å	—	04K-4054	—
C18 300Å	04G-4055	04K-4055	04M-4055
Proteo 90Å	04G-4397	04K-4397	—

15 µm Bulk Packings				
Phases	**100 g**	**1 kg**	**5 kg**	**10 kg**
C4 300Å	04G-4169	04K-4169	04L-4169	04M-4169
C18 300Å	04G-4057	04K-4057	—	04M-4057

For SecurityGuard Cartridge Holders and Cartridges, see pages 150-154.

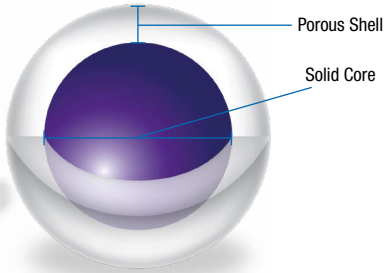
For Column Heater (25-90 °C), see page 205.

Kinetex™ Core-Shell Technology

Performance Gains on Any LC System

2010 R&D 100 Award Recipient

- **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	
1.3 µm	■			Incredible UHPLC efficiency and performance gains
1.7 µm	■			20 % higher efficiency than fully porous 1.7 µm columns
2.6 µm	■	■		Achieve sub-2 µm performance on HPLC and UHPLC systems
3.5 µm		■		Instantly improve your pharmacopoeia (Ph. Eur. & USP) monograph methods that require 3.5 µm particle size
5 µm		■	■	3 µm or better efficiencies at 5 µm pressures for HPLC and PREP LC methods

For more information on Kinetex PREP LC applications, see page 18.

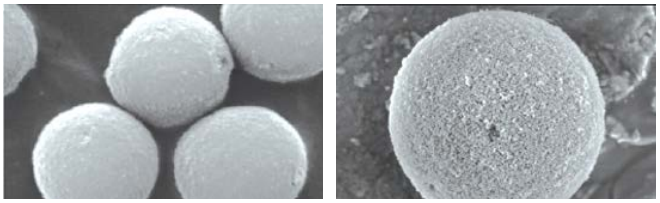
SelectScience® 2017 GOLD Seal of Quality

Kinetex has earned the SelectScience Gold Seal of Quality!

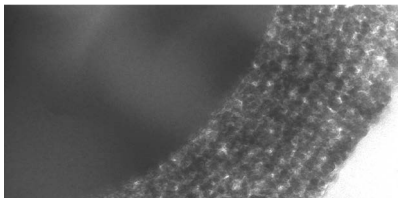
Innovation in Particle Technology

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



Kinetex™ Core-Shell Technology

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

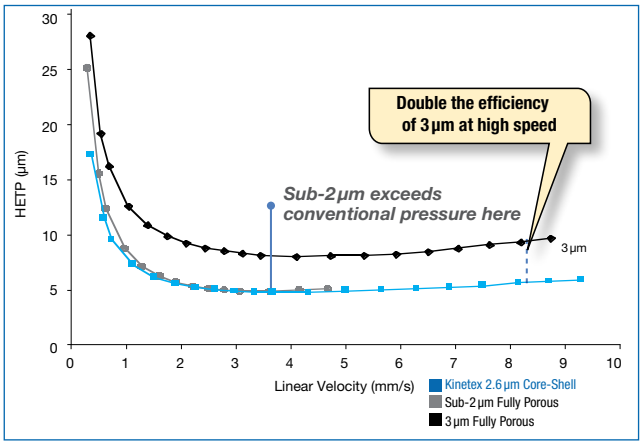


Illustration of Eddy Diffusion Effects

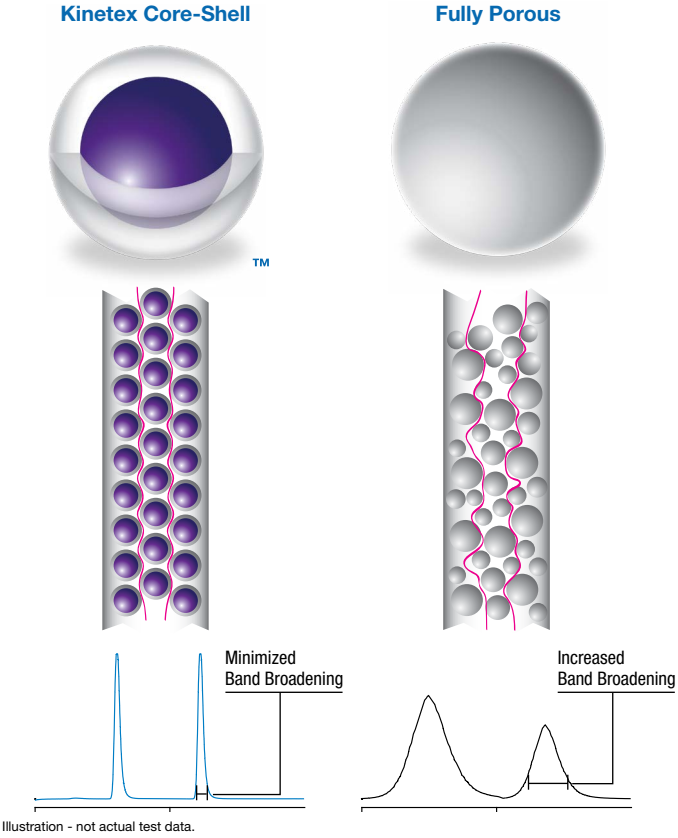
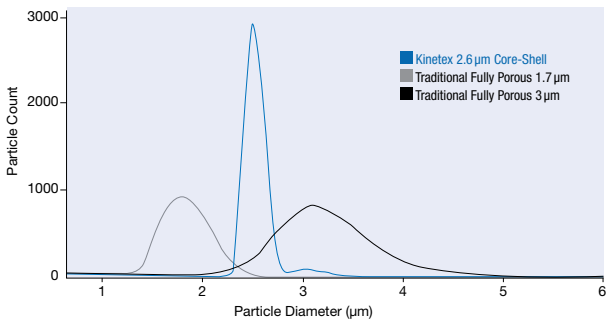


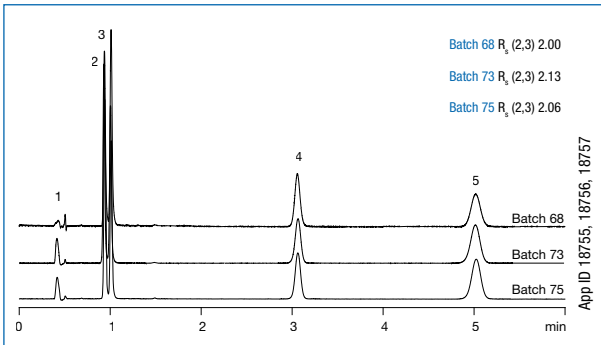
Illustration - not actual test data.

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

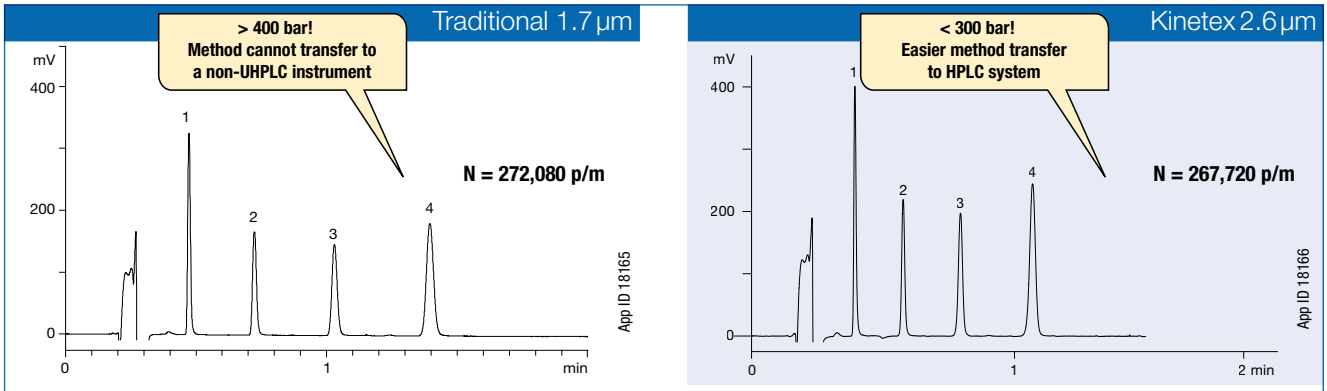


Conditions same for all batches:

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 µm Performance within HPLC Backpressure Limitations

With the efficiency of a sub-2 µm column and typical operating backpressure less than 400 bar†, you can achieve the promise of ultra-high performance on **any LC system**.



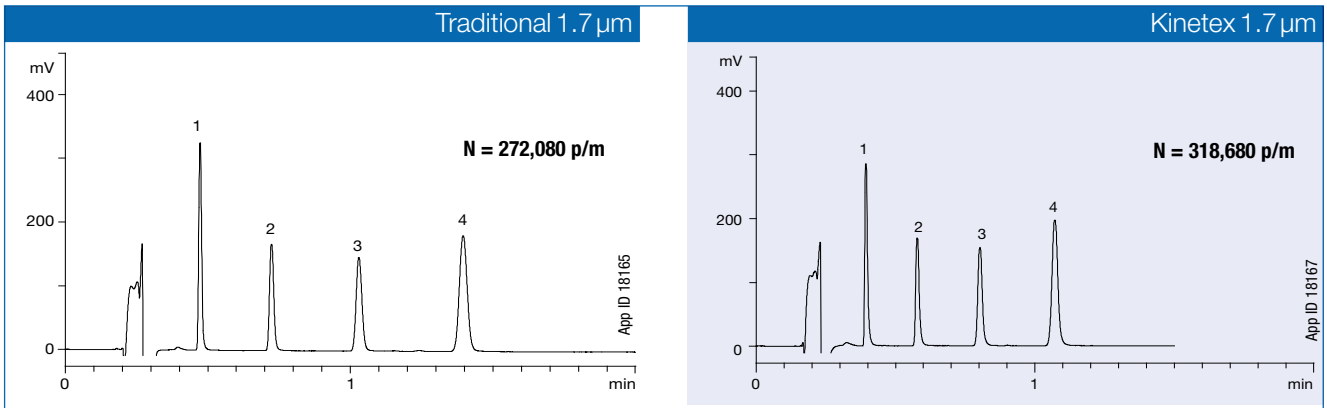
Conditions for both columns:

Column: Kinetex 2.6 µm C18
Traditional 1.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.6 mL/min
Temperature: 25 °C
Detection: UV @ 254 nm
Instrument: Waters® ACQUITY® UPLC®
Sample: 0.5 µL test mixture

1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene

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 µm column—the first sub-2 µm core-shell particle to be available on the market.



Conditions for both columns:

Column: Kinetex 1.7 µm C18
Traditional 1.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.6 mL/min
Temperature: 25 °C
Detection: UV @ 254 nm
Instrument: Waters® ACQUITY® UPLC®
Sample:

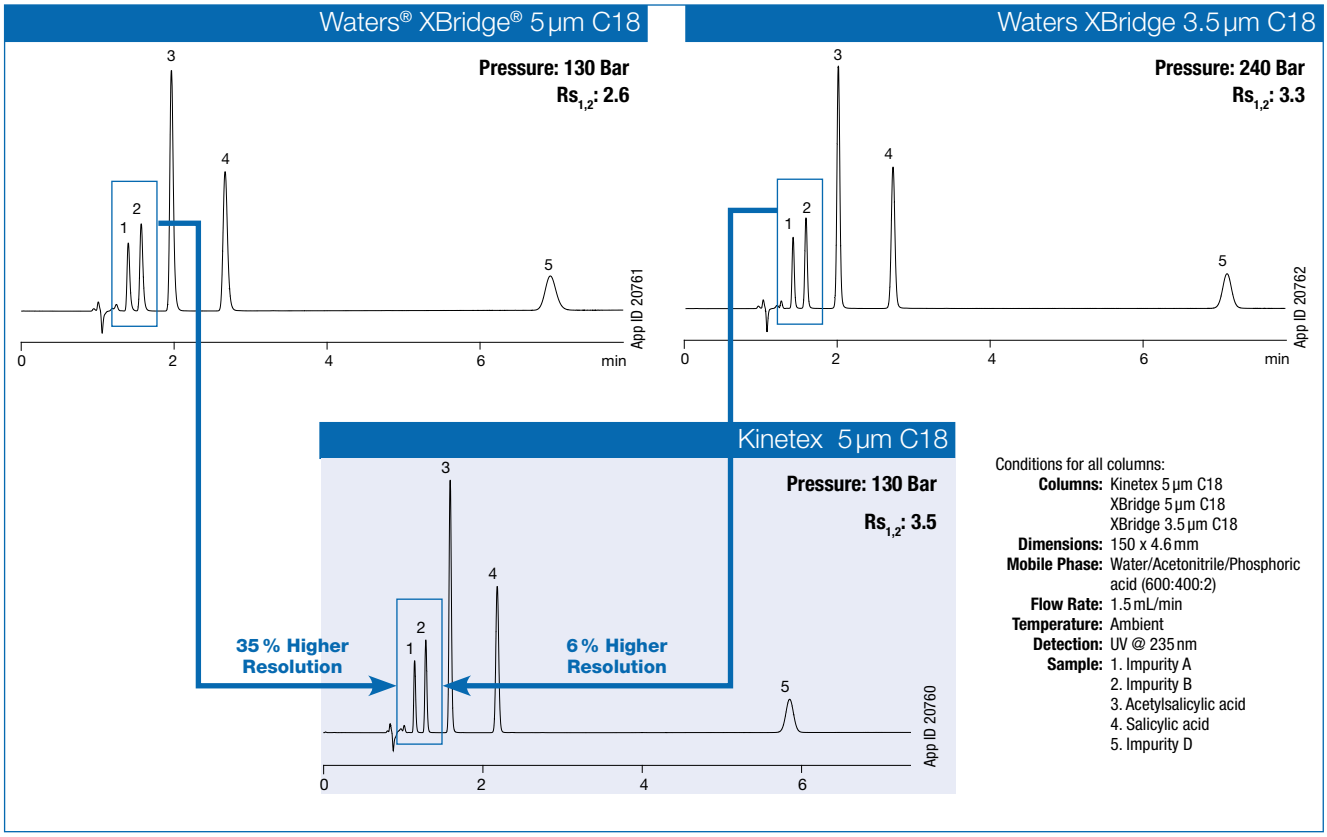
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene

† Kinetex 2.6 µm 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.

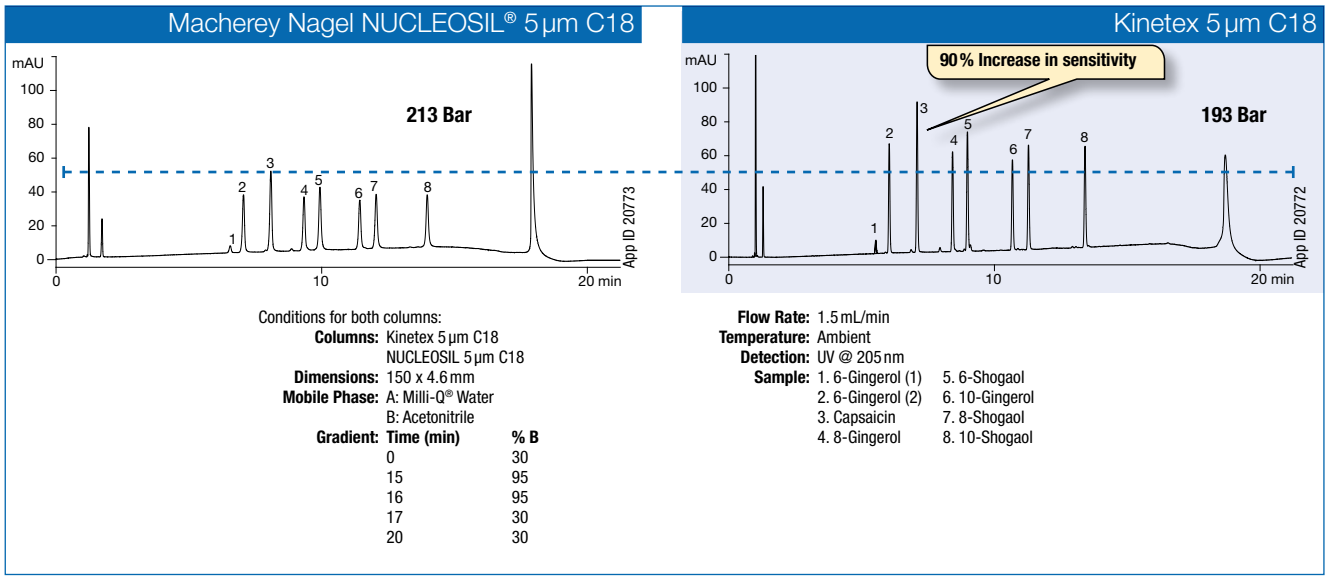


Conditions for all columns:

Columns: Kinetex 5 µm C18
XBridge 5 µm C18
XBridge 3.5 µm C18
Dimensions: 150 x 4.6 mm
Mobile Phase: Water/Acetonitrile/Phosphoric acid (600:400:2)
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV @ 235 nm
Sample: 1. Impurity A
2. Impurity B
3. Acetylsalicylic acid
4. Salicylic acid
5. Impurity D

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.



Conditions for both columns:

Columns: Kinetex 5 µm C18
NUCLEOSIL 5 µm C18
Dimensions: 150 x 4.6 mm
Mobile Phase: A: Milli-Q® Water
B: Acetonitrile
Gradient:

Time (min)	% B
0	30
15	95
16	95
17	30
20	30

Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV @ 205 nm
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.

Kinetex™ Core-Shell Technology

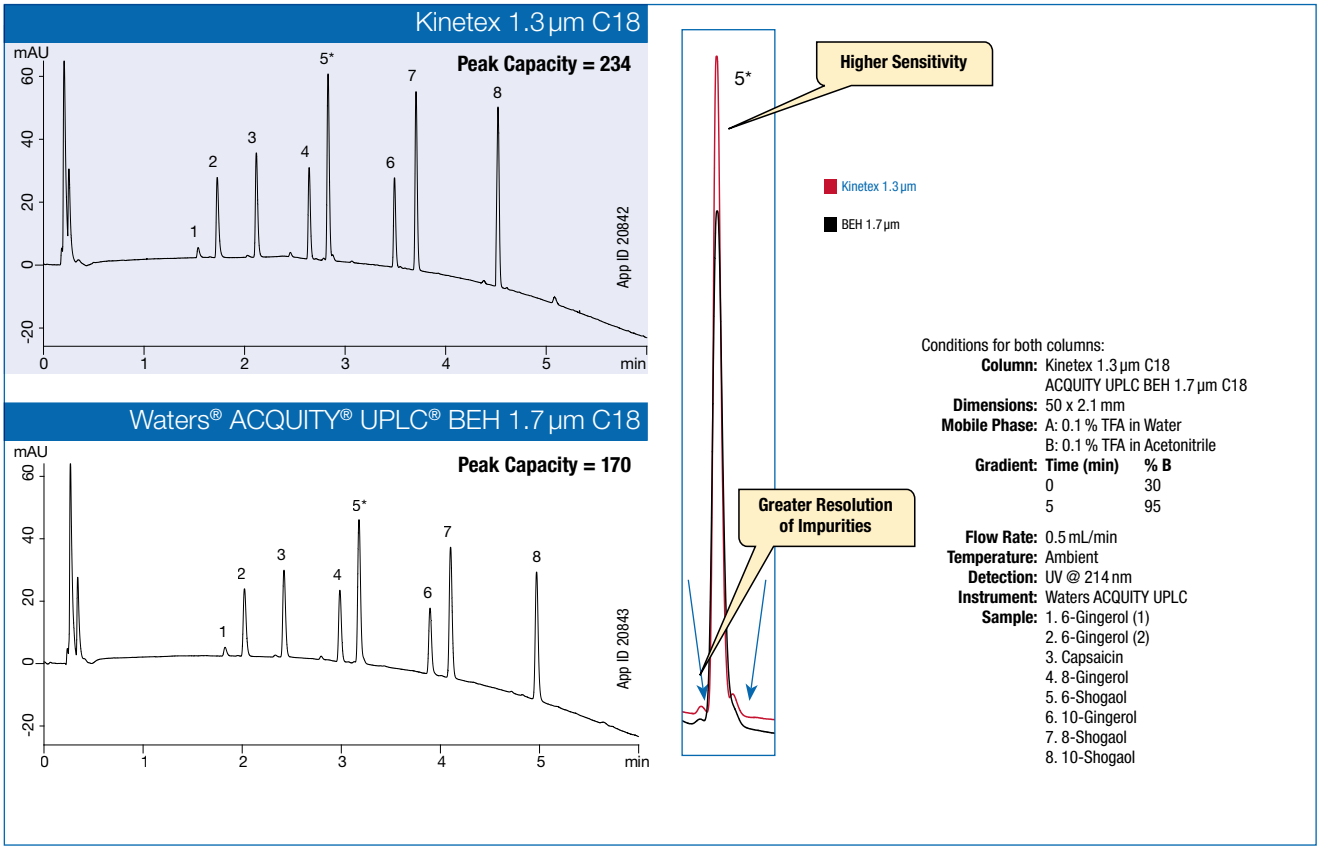
Get the Most Performance Out of Your UHPLC System

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.

2010 R&D 100 Award Recipient



Comparative separations may not be representative of all applications.

Kinetex™ Core-Shell Technology

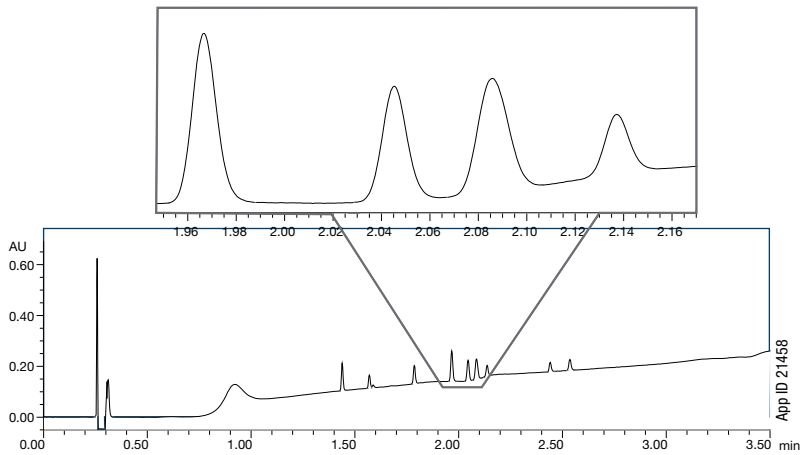
2014 Laboratory Equipment Readers' Choice WINNER
for Kinetex 1.3 µm UHPLC columns

R&D 100
2010 R&D 100 Award Recipient

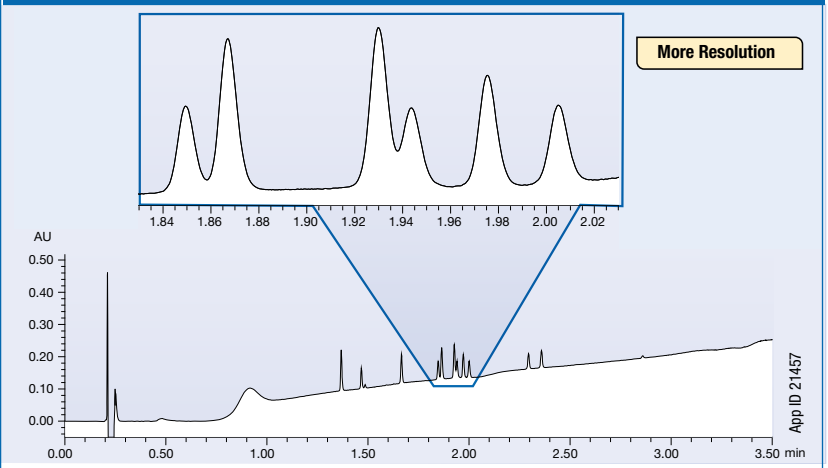
Our New Standard for UHPLC

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!

Waters® ACQUITY® BEH 1.7 µm C18



Kinetex 1.3 µm C18



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

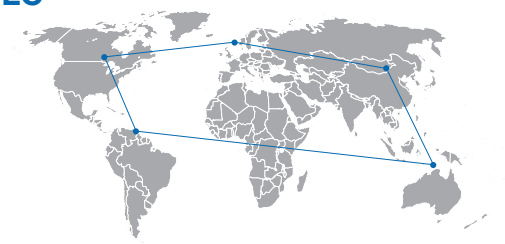
Sample:
1. Estriol
2. Hydrocortisone
3. Corticosterone
4. Cortisone acetate
5. 17-beta-estradiol
6. 17-alpha-estradiol
7. 21-OH-progesterone
8. 17-alpha-ethinylestradiol
9. Estrone
10. Deoxycorticosterone acetate
11. Progesterone

Comparative separations may not be representative of all applications.

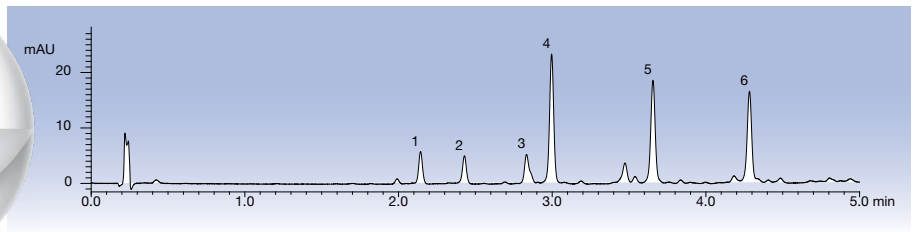
Kinetex™ Core-Shell Technology

Analytical Scalability and Portability HPLC to UHPLC

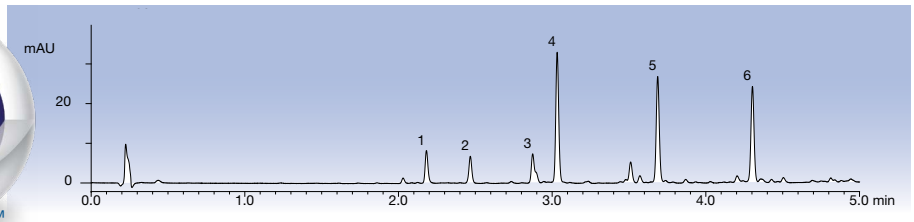
UHPLC methods developed with fully porous sub-2 µm columns often generate backpressure higher than HPLC system limitations. With Kinetex 5 µm, 2.6 µm, 1.7 µm, and 1.3 µm core-shell technology, you are no longer restricted from developing high performance LC methods and transferring them anywhere. These four scalable Kinetex particle sizes offer you the ability to develop and transfer your method effortlessly from system to system.



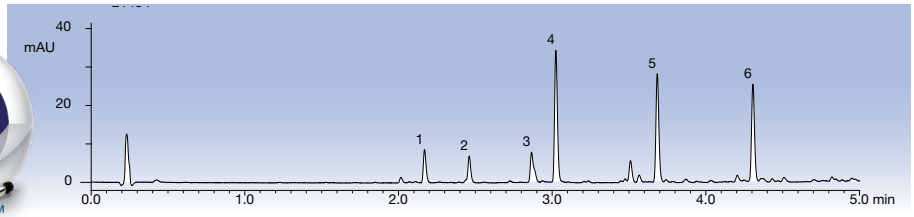
4 Kinetex particles give you full scalability HPLC ⟷ UHPLC



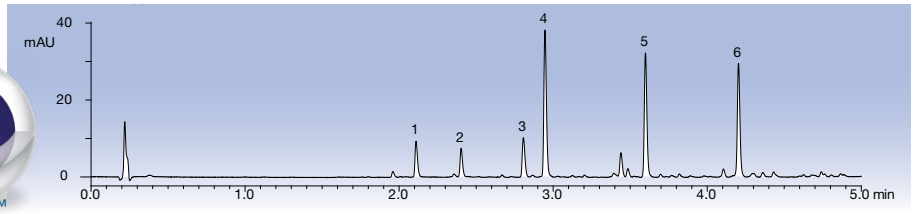
Kinetex 5 µm: 3 µm or better efficiencies at 5 µm pressures for HPLC and PREP LC methods



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



Kinetex 1.3 µm: Incredible UHPLC efficiency and performance gains

[1]Gingerols analyzed on 50 x 2.1 mm columns

2014 Laboratory Equipment Readers' Choice WINNER

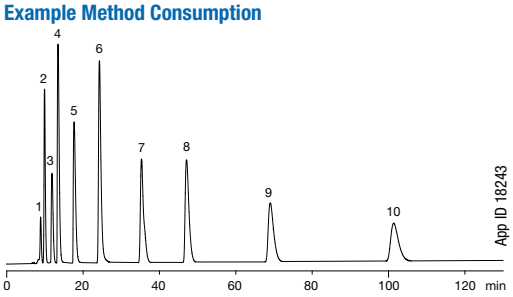
for Kinetex 1.3 µm UHPLC columns

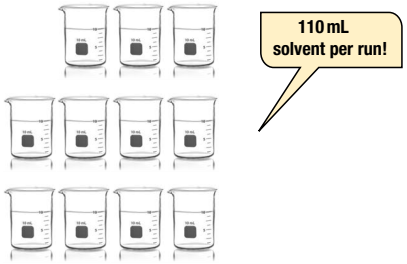
Improve Performance, Save Solvent

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

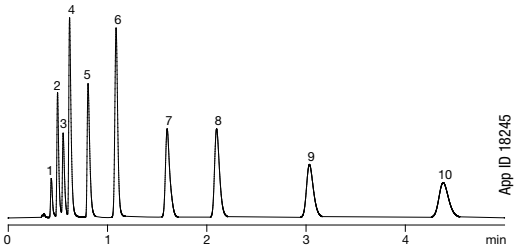
Example Method Consumption

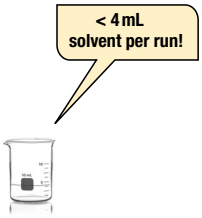




Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Flow Rate: 0.6 mL/min

Less Solvent Consumption with Kinetex Column





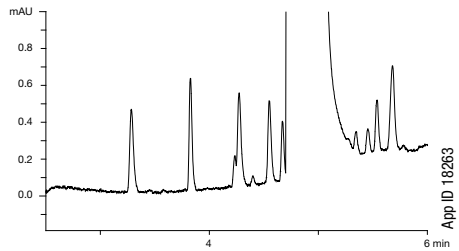
Conditions for both columns:
Mobile Phase: A: 20 mM Potassium phosphate pH 7
B: Methanol / Acetonitrile (50:50)
A/B (48:52)
Temperature: 40 ºC
Detection: UV @ 254 nm

Sample:
1. Tianeptine
2. Desmethyldoxepin
3. Protriptyline
4. Desipramine
5. Imipramine
6. Amoxapine
7. Doxepin
8. Nortriptyline
9. Amitriptyline
10. Clomipramine

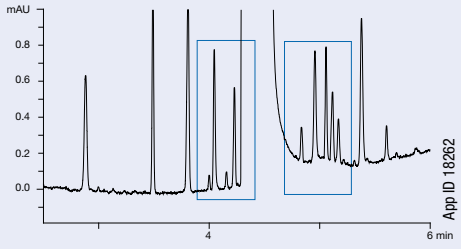
Reach Lower Levels of Detection and Quantitation

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



Kinetex 2.6 µm 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 ºC
Detection: UV @ 254 nm
Instrument: Agilent 1200

Sample:
1. Pyridine
2. Acetaminophen
3. Pindolol
4. Quinine
5. Acebutolol
6. Chlorpheniramine
7. Triprolidine
8. Prednisolone
9. Nortriptyline
10. 4-Chlorobenzoic acid
11. 5-Methyl-2-hydroxy benzaldehyde
12. 4-Chlorocinnamic acid
13. Diazepam
14. Diflunisal
15. Niflumic acid
16. Hexanophenone

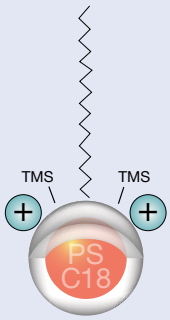
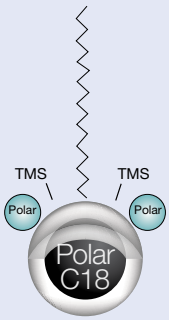
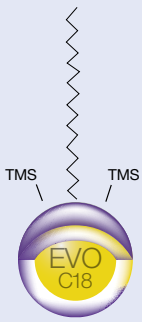
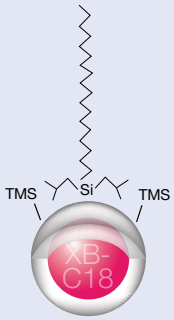
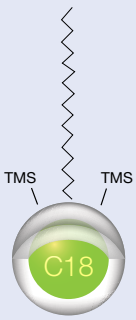
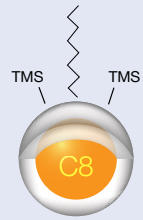
Comparative separations may not be representative of all applications.

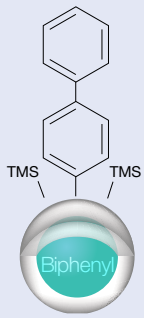
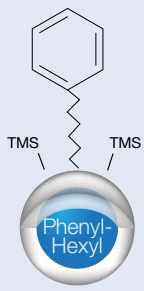
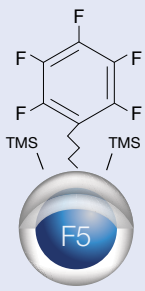
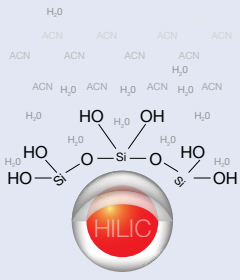
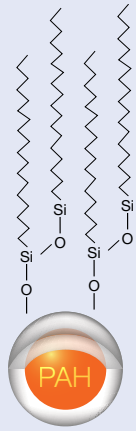
Kinetex™ Core-Shell Technology

Complementary and Orthogonal Selectivities

2010 R&D 100 Award Recipient

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 **Effective 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.

Kinetex™ Core-Shell Technology

Selecting The Right Chemistry

Use the charts below to determine the best Kinetex core-shell chemistry for your work.

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Recommended Selectivities By Compound Classes

Acids	Bases	Neutrals	Aromatics	Acids, Bases, and Neutrals	Highly Polar Compounds	High pH	Isomers
Polar C18	PS C18	C18	Biphenyl	EVO C18	Polar C18	EVO C18	F5
F5	XB-C18	C8	Phenyl-Hexyl	Polar C18	F5		
HILIC		Biphenyl	F5	PS C18	Biphenyl		
				XB-C18	HILIC		

Column Characteristics

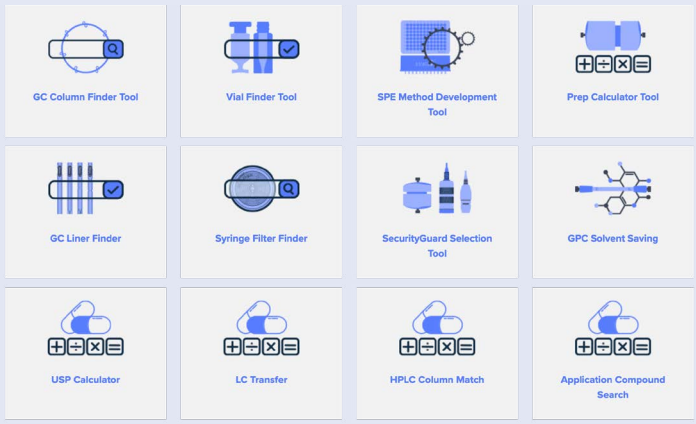
Kinetex Phases	Shipping Solvent†	Particle Sizes (µm)	Pore Size (Å)	Effective Surface Area (m^2/g)	Effective Carbon Load (%)	pH Stability	Reversed Phase	Normal Phase	HILIC	100% Aqueous Stable
Polar C18	Acetonitrile / Water (50:50)	2.6	100	200	9	1.5-8.5*	●			●
PS C18	Acetonitrile / Water (50:50)	2.6	100	200	9	1.5-8.5*	●			●
C18	Acetonitrile / Water (50:50)	1.3, 1.7, 2.6, 5	100	200	12	1.5-8.5*	●			
EVO C18	Acetonitrile / Water (45:55)	1.7, 2.6, 5	100	200	11	1-12	●			●
XB-C18	Acetonitrile / Water (50:50)	1.7, 2.6, 3.5, 5	100	200	10	1.5-8.5*	●			
C8	Acetonitrile / Water (45:55)	1.7, 2.6, 5	100	200	8	1.5-8.5*	●			
Biphenyl	Acetonitrile/Water w/ 0.1 % Formic Acid (50:50)	1.7, 2.6, 5	100	200	11	1.5-8.5*	●			●
Phenyl-Hexyl	Acetonitrile / Water (45:55)	1.7, 2.6, 5	100	200	11	1.5-8.5*	●			
F5	Acetonitrile / Water (40:60)	1.7, 2.6, 5	100	200	9	1.5-8.5*	●			●
HILIC	Acetonitrile / 100 mM Ammonium Formate (93:7)	1.7, 2.6, 5	100	200	0	2.0-7.5		●	●	
PAH	Acetonitrile / Water (65:35)	3.5	—	—	12	1.5-8.5*	●			

† 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.

Find Products and Develop Your Methods Faster

Develop an SPE method. Find the right HPLC column and guard system or the perfect vials and syringe filters for your application. Optimize your HPLC methods in minutes with our easy to use interactive tools, developed by scientists for scientists. So take a minute and try our tools for your chromatography methods. They are designed to help you do what you need to do faster so you can do the things that matter most, like walking your dog and spending time with your family.

www.phenomenex.com/tools

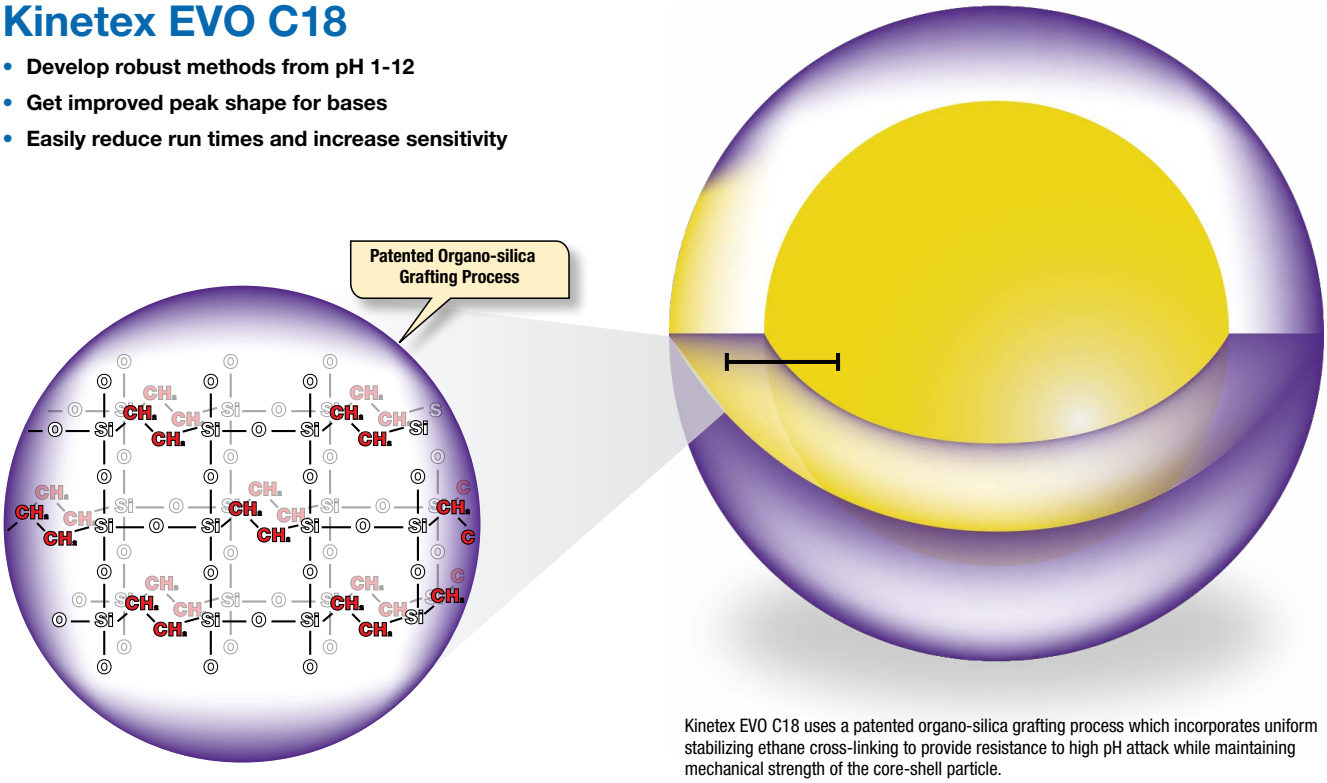


Kinetex Core-Shell LC Columns *(cont'd)*

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Kinetex EVO C18

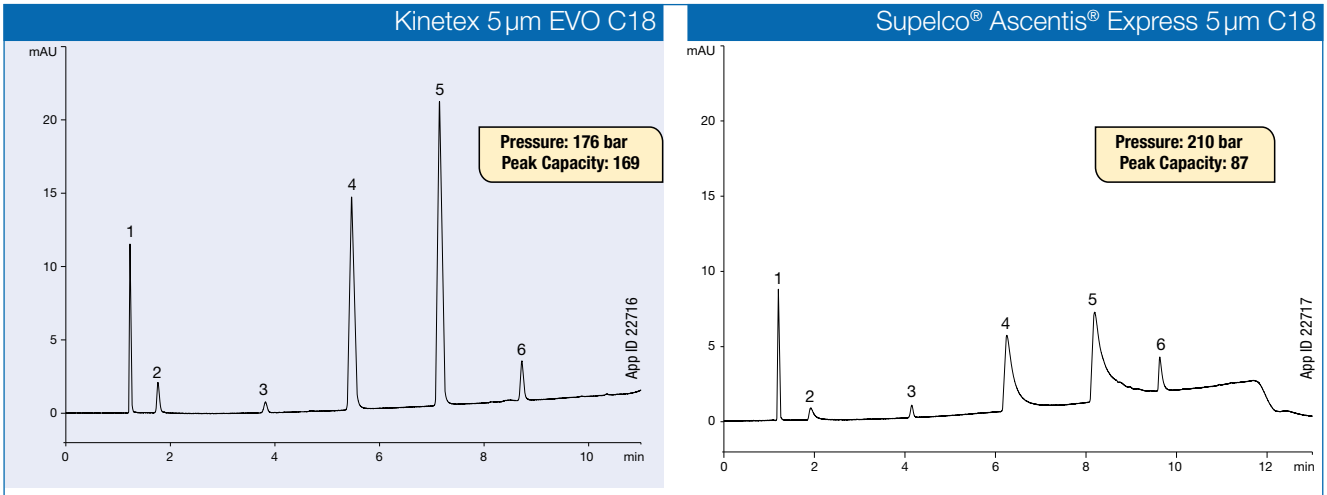
- **Develop robust methods from pH 1-12**
- **Get improved peak shape for bases**
- **Easily reduce run times and increase sensitivity**



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.



Conditions for both columns:

Column: Kinetex 5 µm EVO C18
Ascentis Express 5 µm C18
Dimensions: 150 x 4.6 mm
Mobile Phase: A: 20 mM Sodium phosphate dehydrate pH 7.0
B: Methanol
Gradient: 40 % to 90 % B over 10 minutes
Flow Rate: 1 mL/min

Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Maleate
2. Pseudoephedrine
3. Scopolamine
4. Doxylamine
5. Chlorpheniramine
6. Diphenhydramine

Comparative separations may not be representative of all applications.

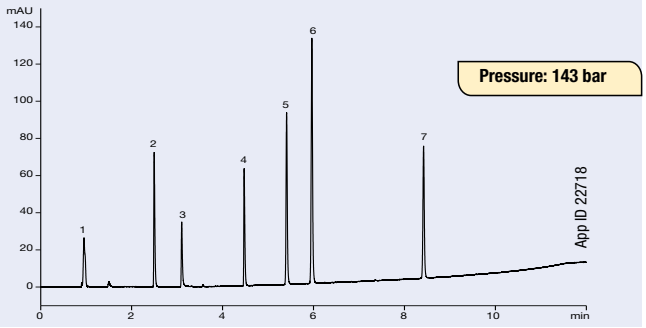
Kinetex Core-Shell LC Columns *(cont'd)*

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

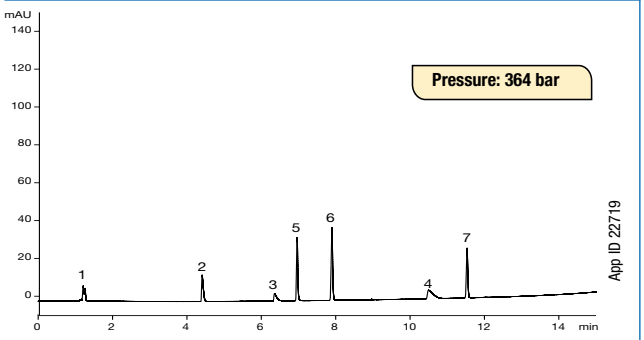
Drop in a Kinetex EVO 5 µm Column to Start Smiling

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.

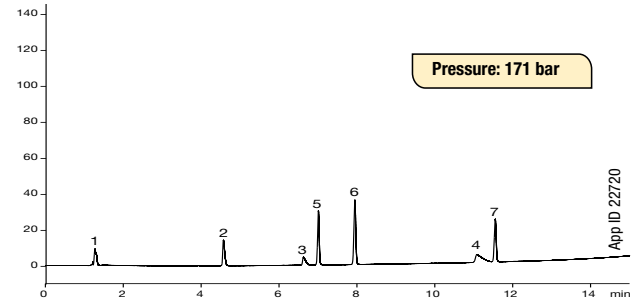
Kinetex 5 µm EVO C18



Waters® XBridge® 3.5 µm C18



Waters XBridge 5 µm C18



Conditions for both columns:

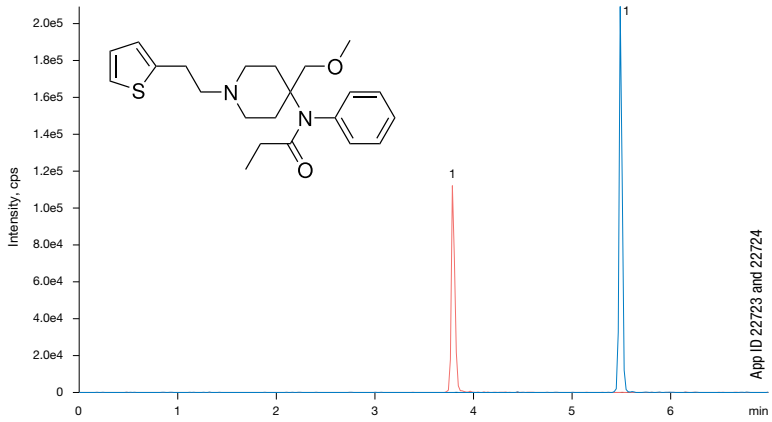
Column: Kinetex 5 µm EVO C18
XBridge 5 µm C18
XBridge 3.5 µm C18
Dimensions: 150 x 4.6 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile
Gradient: 5 % to 95 **% B** over 10 minutes
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV @ 254 nm

Sample: 1. Uracil
2. Pindolol
3. Chloropheniramine
4. Nortriptyline
5. 3-Methyl-4-Nitrobenzoic acid
6. 5-Methyl Salicyl Aldehyde
7. Hexaphenone

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 5 µm 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

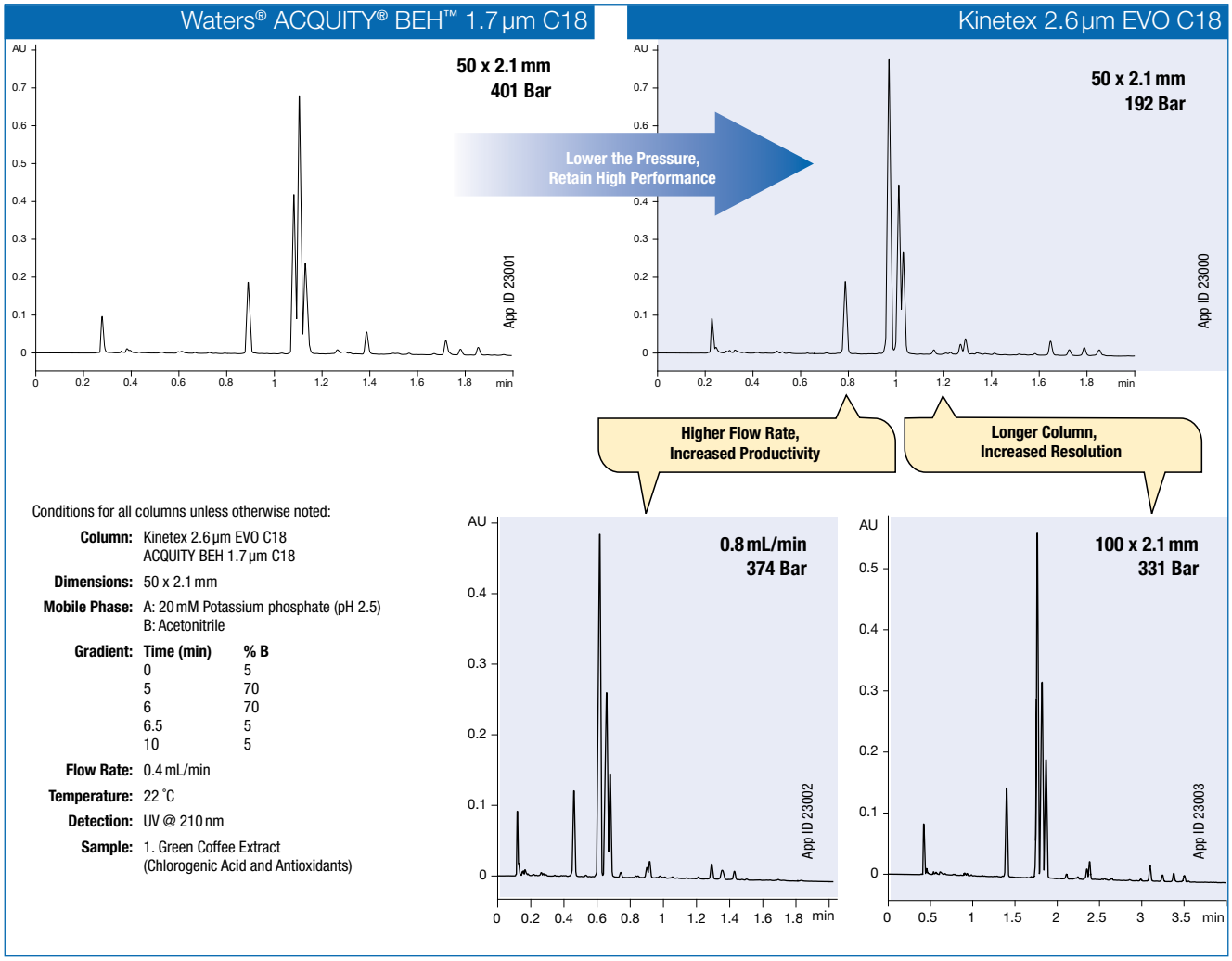
Flow Rate: 0.5 mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX®API 4000™)
Sample: 1. Sufentanil

Kinetex Core-Shell LC Columns *(cont'd)*

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 µm Kinetex EVO C18 columns are an amazing UHPLC solution. Start by matching a Kinetex 2.6 µm column to the sub-2 µm 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.



Conditions for all columns unless otherwise noted:

Column: Kinetex 2.6 µm EVO C18
ACQUITY BEH 1.7 µm C18

Dimensions: 50 x 2.1 mm

Mobile Phase: A: 20 mM Potassium phosphate (pH 2.5)
B: Acetonitrile

Gradient:

Time (min)	% B
0	5
5	70
6	70
6.5	5
10	5

Flow Rate: 0.4 mL/min

Temperature: 22 °C

Detection: UV @ 210 nm

Sample: 1. Green Coffee Extract
(Chlorogenic Acid and Antioxidants)

Comparative separations may not be representative of all applications.

Kinetex™ Core-Shell Technology

Kinetex PS C18

- **Enhanced polar retention**
- **Improved peak shape for bases**
- **Multi-modal interaction selectivity**

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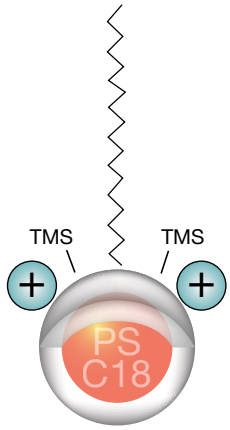
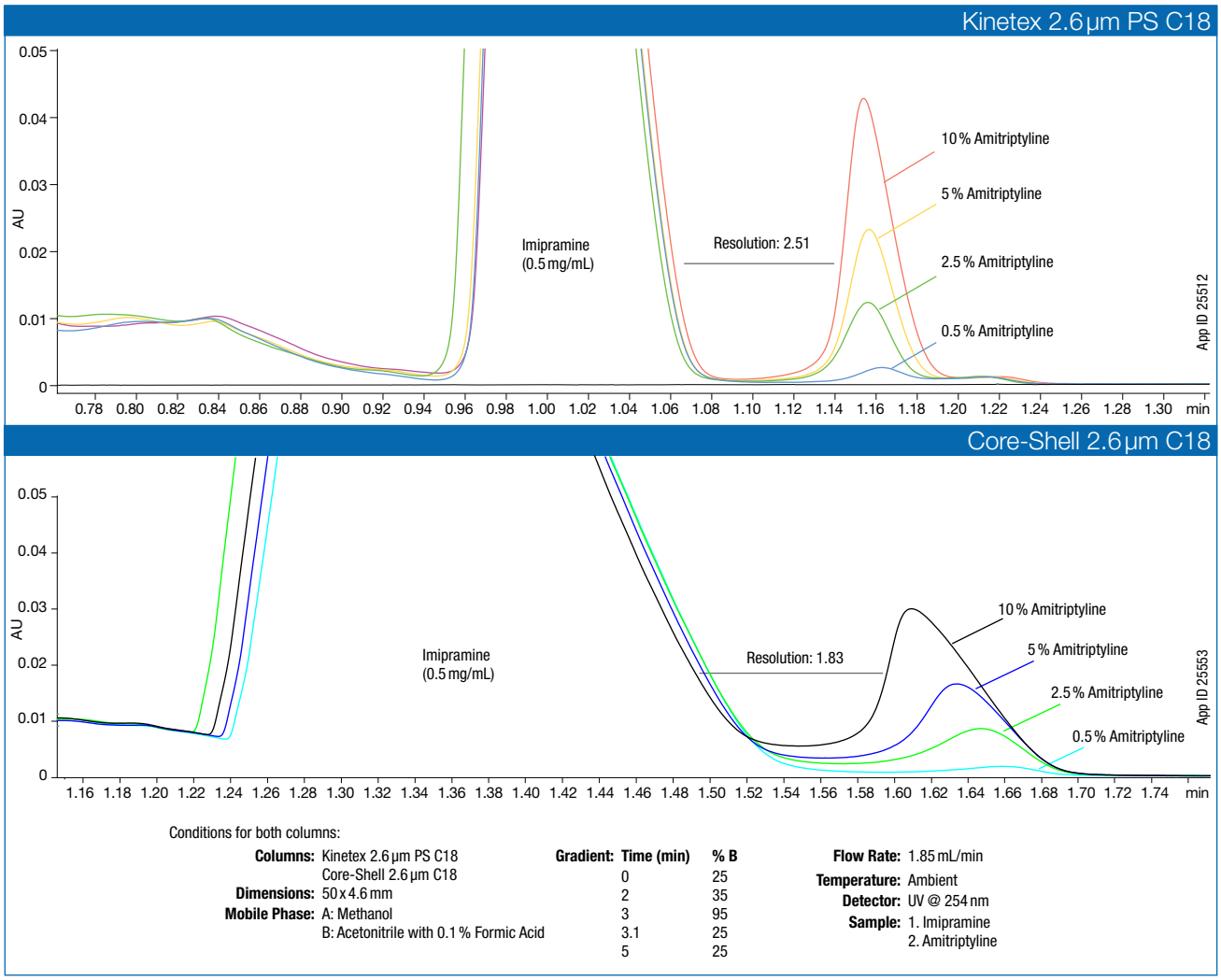
A Versatile C18

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



Conditions for both columns:

Columns: Kinetex 2.6 µm PS C18
Core-Shell 2.6 µm C18
Dimensions: 50 x 4.6 mm
Mobile Phase: A: Methanol
B: Acetonitrile with 0.1 % Formic Acid

Gradient: Time (min)	% B
0	25
2	35
3	95
3.1	25
5	25

Flow Rate: 1.85 mL/min
Temperature: Ambient
Detector: UV @ 254 nm
Sample: 1. Imipramine
2. Amitriptyline

Comparative separations may not be representative of all applications.

Kinetex™ Core-Shell Technology

Kinetex Polar C18

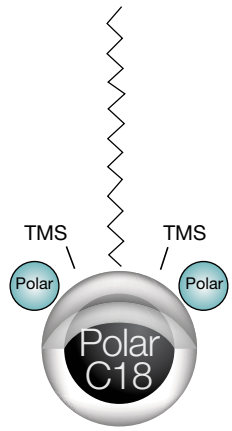
- **100 % aqueous stable**
- **Enhanced selectivity for polar analytes**
- **Orthogonal selectivity to traditional C18 phases**

2010 R&D 100 Award Recipient

A Versatile C18

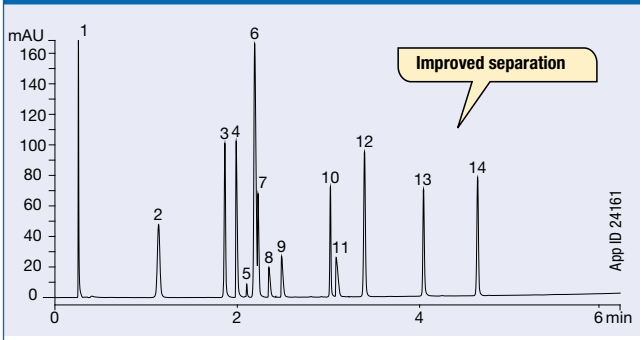
Who said all C18's are the same? By combining C18 ligands with a polar-modified surface, you can now achieve greater retention of polar and nonpolar compounds while ensuring 100 % aqueous stability.

Kinetex Polar C18

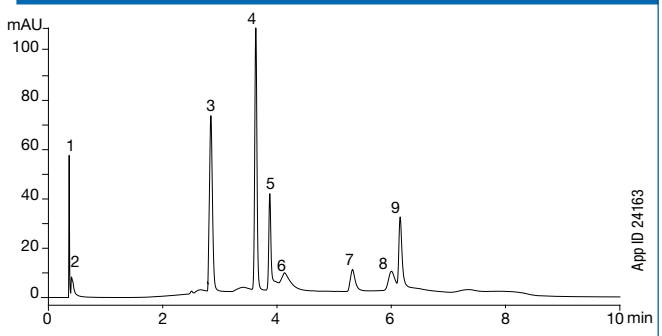


Acids, Bases, and Neutrals

Kinetex 2.6 µm Polar C18



Thermo Scientific® 3 µm Hypercarb®



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 Acentonitrile

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:

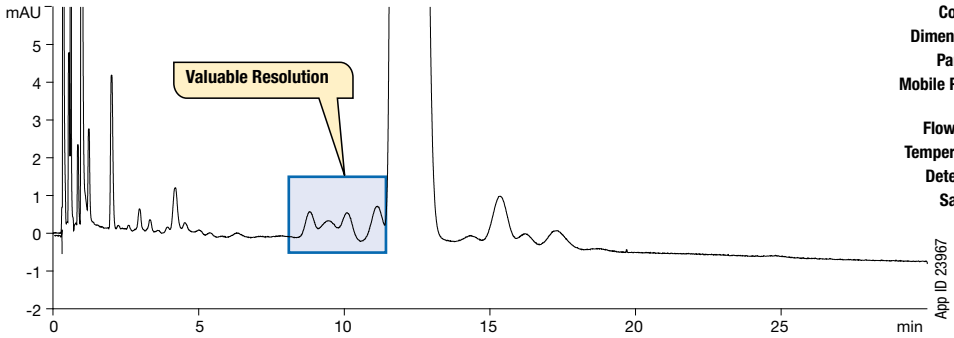
1. Pyridine
2. Acetaminophen
3. Sulfathiozole
4. Quinidine
5. Quinidine Impurity
6. Phenol
7. Acebutolol
8. Chlorpheniramine
9. Triprolidine
10. Prednisolone
11. Nortriptyline
12. 5-Methyl Salicyl Aldehyde
13. Diflunisal
14. Hexanophenone

Comparative separations may not be representative of all applications.

Enhanced Polar Selectivity

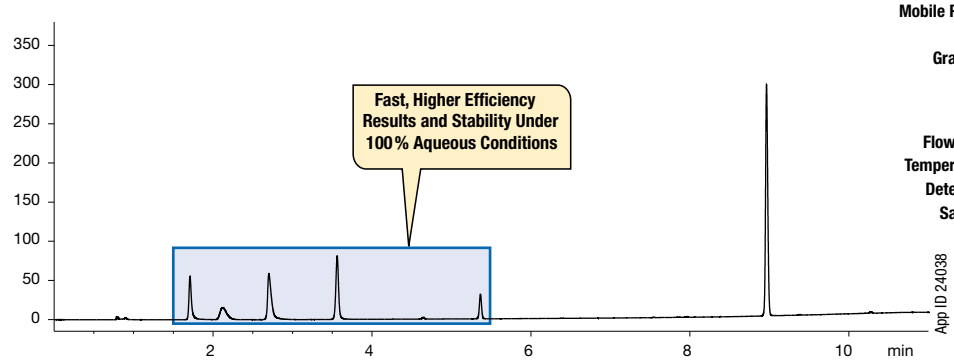
The Kinetex Polar C18 contains a C18 ligand alongside a polar modified surface that increases polar compound retention and improves resolution values. Additionally, the advanced proprietary bonding technology used with this phase ensures 100 % aqueous stability as well as balanced retention on non-polar 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

Water Soluble Vitamins

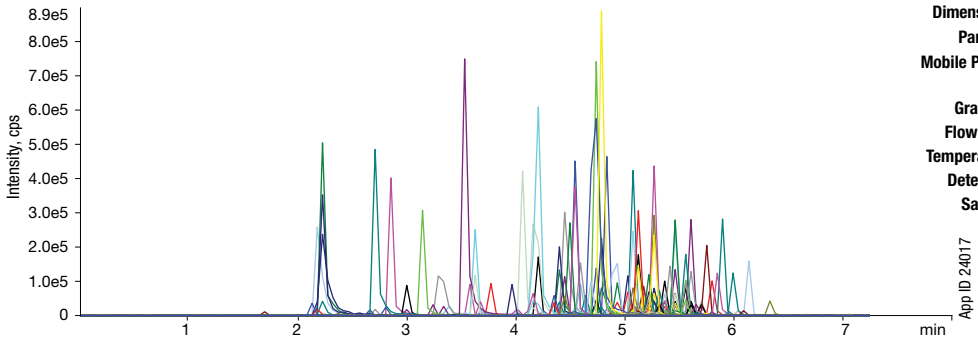


Column: Kinetex 2.6 µm Polar C18
Dimensions: 100 x 4.6 mm
Part No.: 00D-4759-E0
Mobile Phase: A: 20 mM Potassium Phosphate
B: Methanol

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

Multi-Class 206 Pesticide Panel Screen



Column: Kinetex 2.6 µm Polar C18
Dimensions: 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

Kinetex™ Core-Shell Technology

Kinetex Biphenyl

- **Remarkable separation power**
- **Rugged and reliable**
- **100 % aqueous stable**

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Selectivity That a C18 Just Can't Give You!

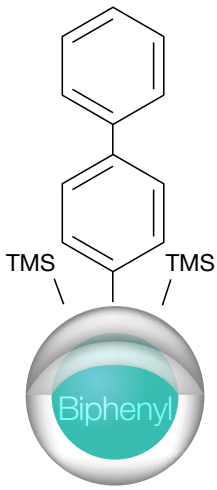
Think high performance, enhanced retention, and the ability to go where a traditional C18 can't. The Kinetex Biphenyl offers the high performance benefits of a core-shell particle with a unique stationary phase capable of becoming the go-to selectivity for reversed phase method development. Use Kinetex 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

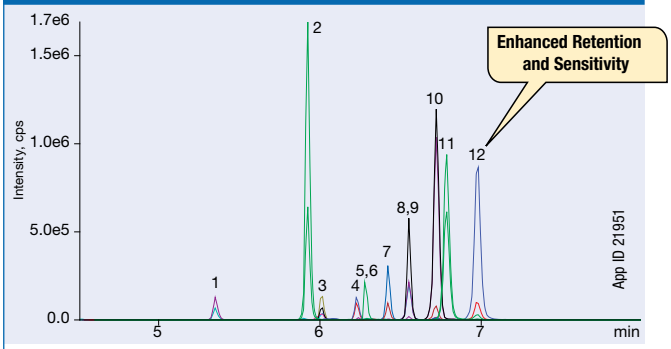
Weak Ionic or Dipole-Dipole Interactions
High electron density created by dual ring structure behaves similar to a weak cation exchanger, giving enhanced retention for basic analytes

Kinetex Biphenyl

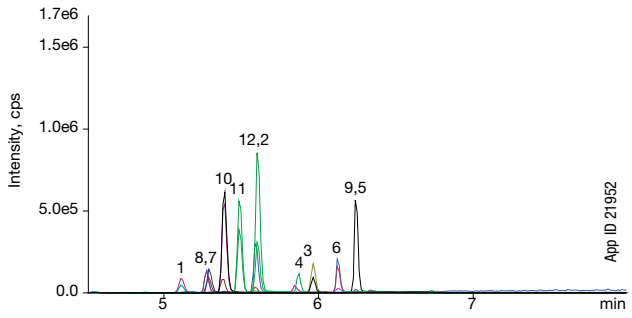


Mycotoxins

Kinetex 2.6 µm Biphenyl



Waters® SunFire® 3.5 µm C18



Conditions for both columns:

Column: Kinetex 2.6 µm Biphenyl
Waters SunFire 3.5 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 5 mM Ammonium acetate with 0.1 % Acetic acid
B: Methanol with 5 mM Ammonium acetate with 0.1 % Acetic acid

Gradient:

Time (min)	% B
0	2
2	2
5	80
5.2	98
8	98
8.01	2
11	2

Flow Rate: 0.45 mL/min
Temperature: 40 °C
Detection: MS/MS (SCIEX® API 4000™)
Sample:
1. 15-Acetyldeoxynivalenol
2. DAS
3. FB1
4. HT-2 Toxin
5. FB2
6. T-2 Toxin
7. Aflatoxin M1
8. Aflatoxin G2
9. Ochratoxin A
10. Aflatoxin G1
11. Aflatoxin B2
12. Aflatoxin B1

Comparative separations may not be representative of all applications.

Kinetex™ Core-Shell Technology

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.

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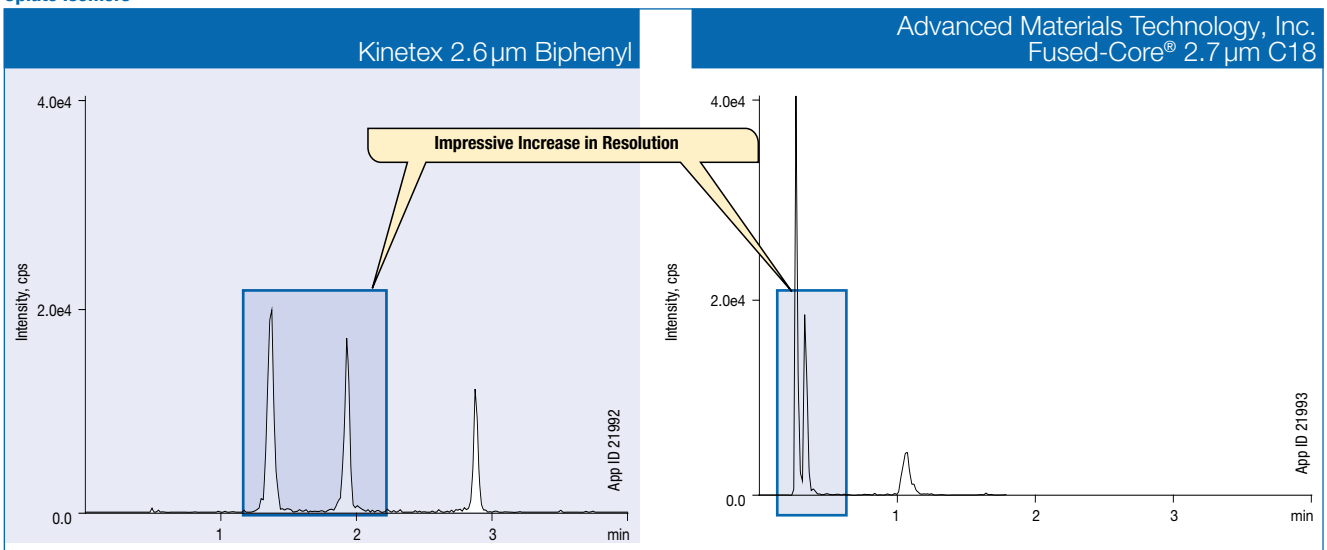
Opiate Isomers



Conditions for both columns:

Column: Kinetex 2.6 µm Biphenyl
Fused-Core 2.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Methanol

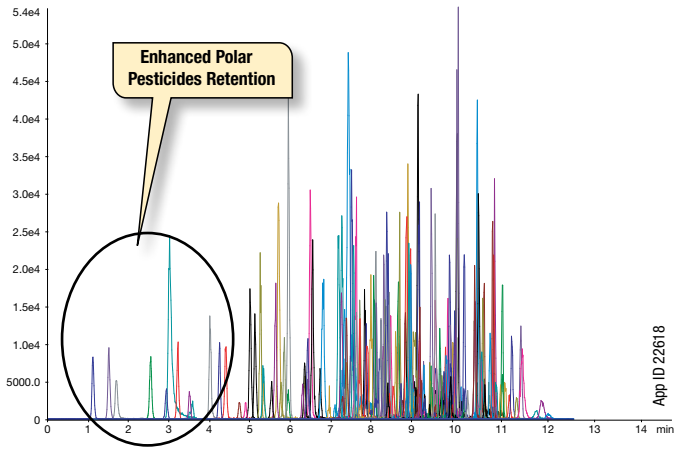
Gradient:	Time (min)	% B
	0	10
	0.5	10
	2	25
	4.5	80
	4.51	85
	5.5	85
	5.51	10
	7	10

Flow Rate: 0.6 mL/min
Temperature: 40 °C
Detection: MS/MS (SCIEX® API 4000™)
Sample: 1. Morphine
2. Hydromorphone
3. Norhydrocodone

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™ Core-Shell Technology

Kinetex F5

- **Reduce method development time by days**
- **Greater reproducibility than other PFPs**
- **5 interaction mechanisms**
- **4 valuable LC separation modes**

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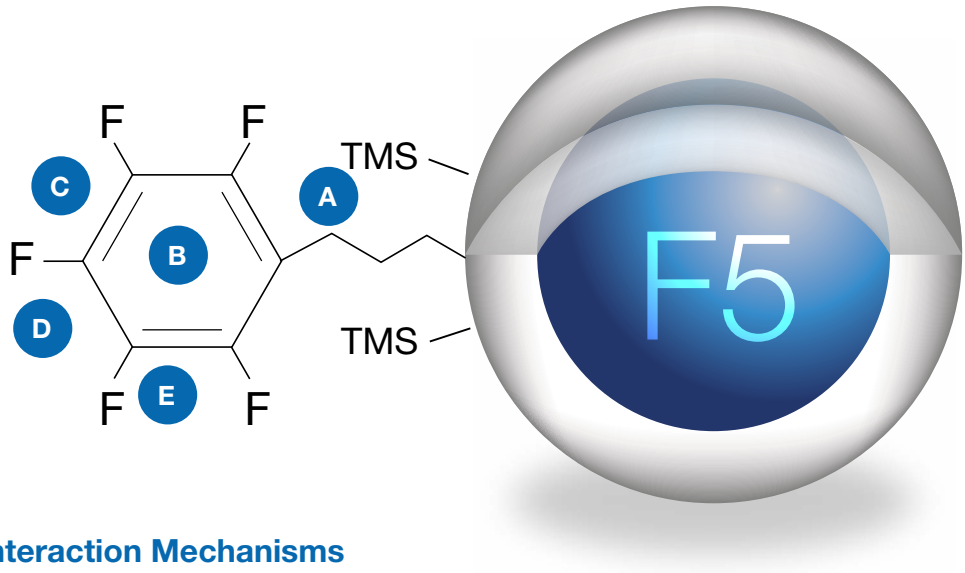
How I Work

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— 4 Separation Modes

- **Reversed Phase**
- **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

Kinetex™ Core-Shell Technology

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.

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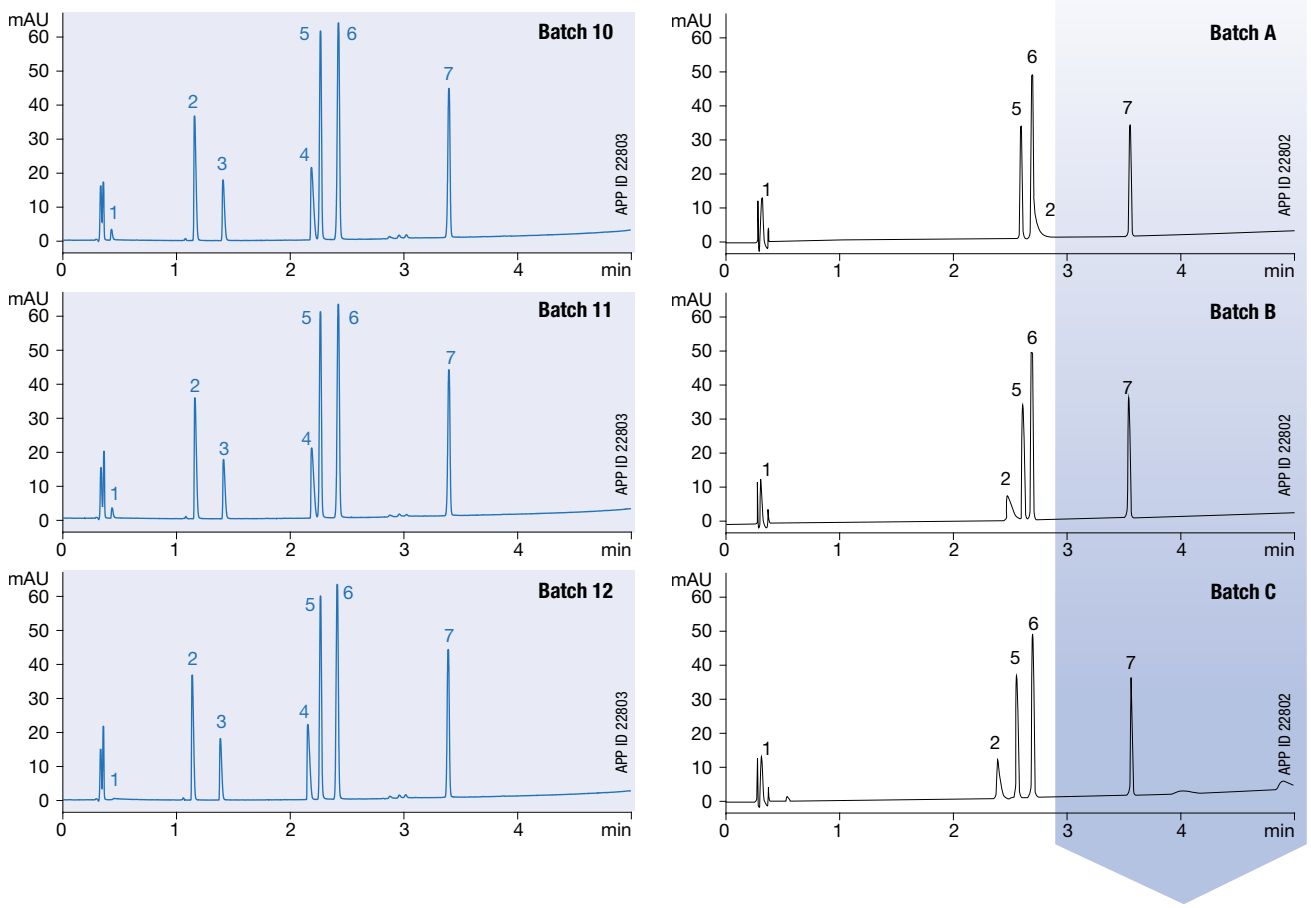


Conditions for all columns:

Columns: Kinetex 2.6 µm F5
Ascentis Express 2.7 µm F5
Dimensions: 50 x 4.6 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile
Gradient: 5-95 % B over 5 minutes
Flow Rate: 1.85 mL/min

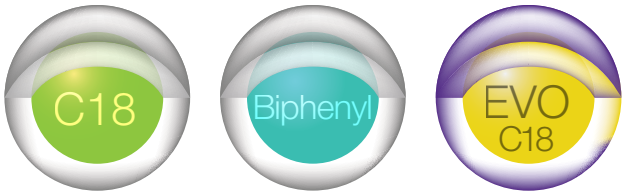
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Pindolol
3. Chlorpheniramine
4. Nortriptyline
5. 3-Methyl-4-Nitrobenzoic acid
6. 5-Methyl Salicyl Aldehyde
7. Hexaphenone

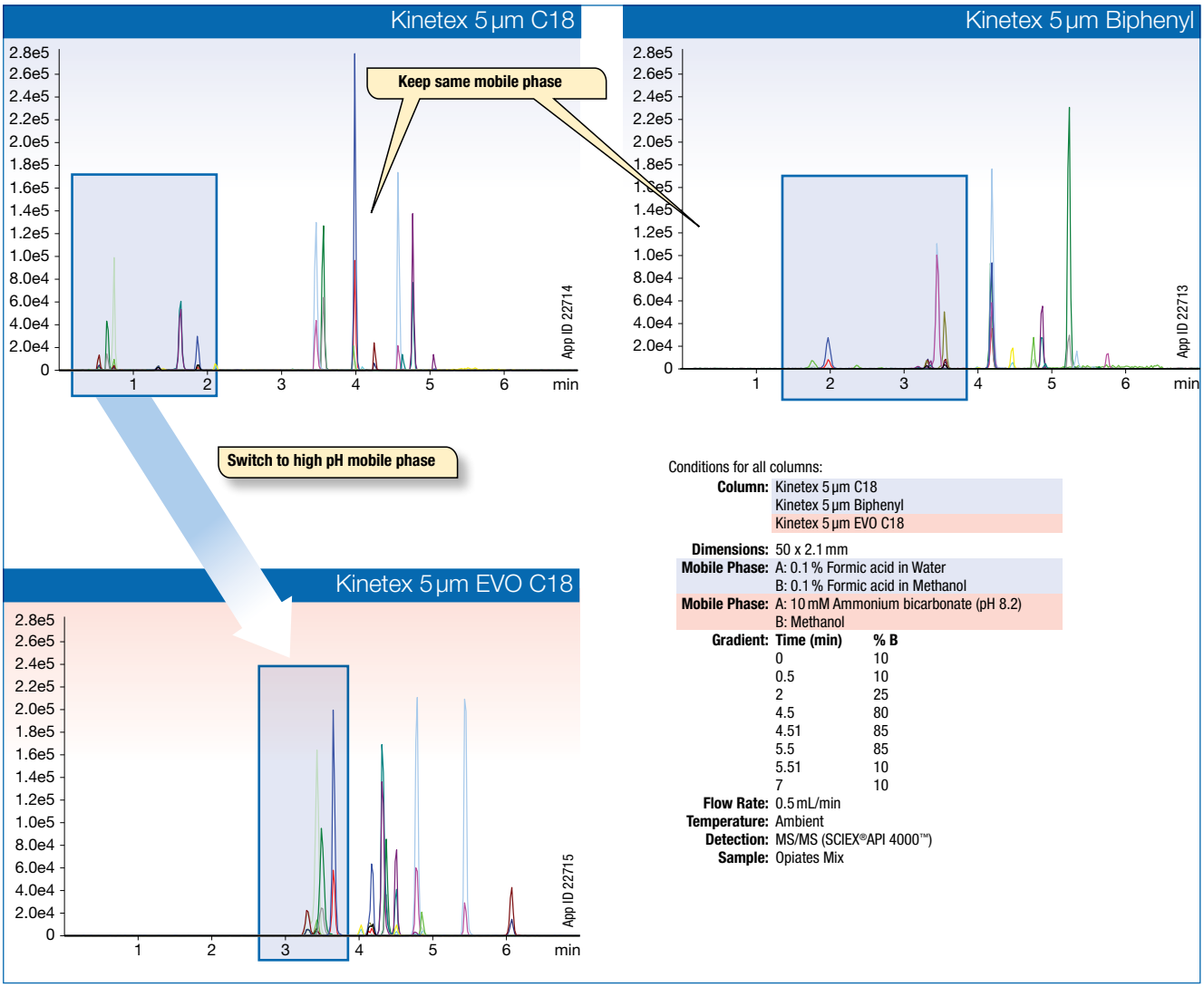
Comparative separations may not be representative of all applications.

Kinetex™ Core-Shell Technology

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.





Conditions for all columns:

Column:	Kinetex 5 µm C18 Kinetex 5 µm Biphenyl Kinetex 5 µm EVO C18
Dimensions:	50 x 2.1 mm
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

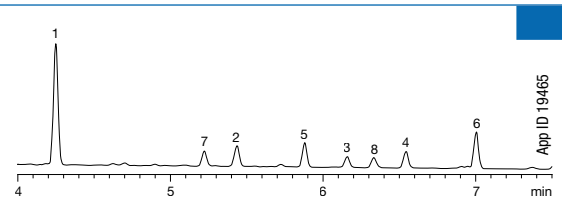
Gradient:	**Time (min)**	**% B**
	0	10
	0.5	10
	2	25
	4.5	80
	4.51	85
	5.5	85
	5.51	10
	7	10

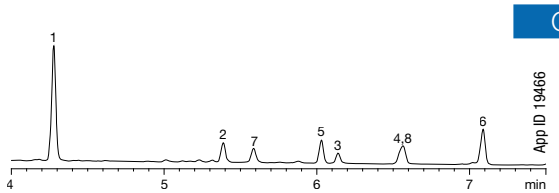
Flow Rate:	0.5 mL/min
Temperature:	Ambient
Detection:	MS/MS (SCIEX®API 4000™)
Sample:	Opiates Mix

Kinetex Core-Shell LC Columns *(cont'd)*

Kinetex™ Core-Shell Technology

Veterinary Drugs





Conditions for both columns:

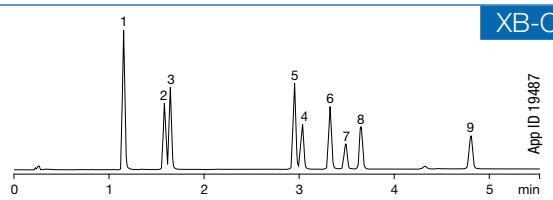
Column: Kinetex 2.6 µm C8
Kinetex 2.6 µm C18
Dimensions: 100 x 4.6 mm
Mobile Phase: A: 0.1 % Phosphoric acid in Water
B: 0.1 % Phosphoric acid in Acetonitrile

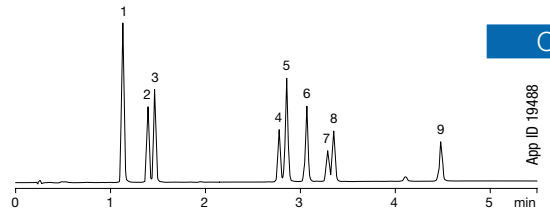
Gradient:

Time (min)	% B	Time (min)	% B
0	30	9	95
4	50	10	30
7.5	70		

Flow Rate: 1.5 mL/min
Temperature: 25 °C
Detection: UV @ 230 nm
Sample:
1. Naproxen
2. Fenoprofen
3. Ibuprofen
4. Phenylbutazone
5. Indomethacin
6. Meclofenamic acid
7. Matrix impurity
8. Matrix impurity

Steroids





Conditions for both columns:

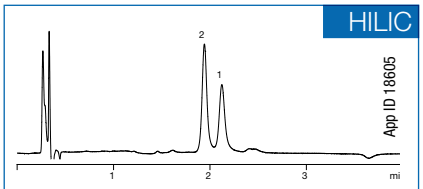
Column: Kinetex 2.6 µm XB-C18
Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: Water
B: Acetonitrile

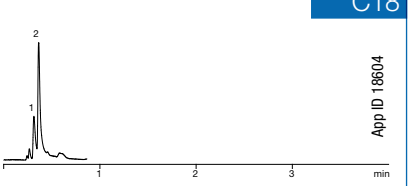
Gradient:

Time (min)	% B	Time (min)	% B
0	20	6.01	20
6	60	8	20

Flow Rate: 0.5 mL/min
Temperature: 30 °C
Detection: UV @ 220 nm
Sample:
1. Estriol
2. Hydrocortisone
3. Cortisone
4. Estradiol
5. Cortisone-21-acetate
6. 21-Hydroxyprogesterone
7. Estrone
8. 17-Hydroxyprogesterone
9. Deoxycorticosterone acetate

Norepinephrine and Epinephrine





Conditions for both columns:

Column: Kinetex 2.6 µm HILIC
Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase (HILIC): Acetonitrile / 100 mM Ammonium formate pH 3.2 (92:8)
Mobile Phase (C18): 5 mM Ammonium formate pH 3.2 / Methanol (97:3)
Flow Rate: 0.4 mL/min
Temperature: 30 °C
Detection: UV @ 210 nm
Sample:
1. Norepinephrine
2. Epinephrine

Acids, Bases, and Neutrals Mix

Conditions for both columns:

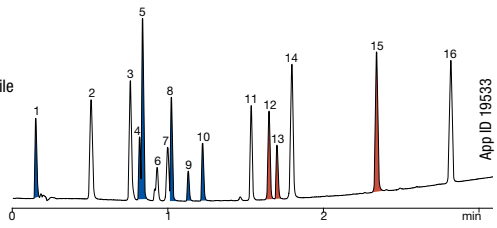
Column: Kinetex 2.6 µm C18
Kinetex 2.6 µm Phenyl-Hexyl
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile

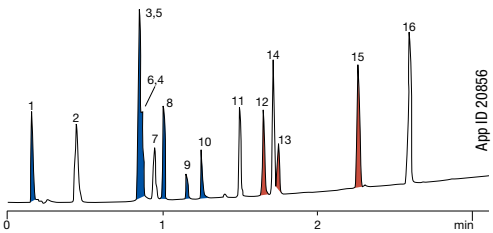
Gradient:

Time (min)	% B
0	5
0.2	5
4.2	95
4.21	5
5.5	5

Flow Rate: 0.8 mL/min
Temperature: 30 °C
Detection: UV @ 254 nm (ambient)
Sample:
1. Pyridine
2. Acetaminophen
3. Pindolol
4. Quinidine
5. Sulfathiazole
6. Acebutolol
7. Benzyl alcohol
8. Chlorpheniramine
9. Phenol
10. Triprolidine
11. Nortriptyline
12. Prednisolone
13. 3-Methyl-4-nitrobenzoic acid
14. 2-Hydroxy-5-methylbenzaldehyde
15. Diflunisal
16. Hexanophenone

red-acids
blue-bases
white-neutrals





Comparative separations may not be representative of all applications.

Kinetex™ Core-Shell Technology

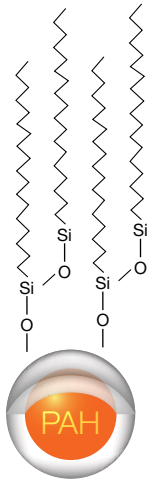
Kinetex PAH

- **Expanded resolution with chemical selectivity specifically for PAHs**
- **Increased throughput and sensitivity with core-shell technology for HPLC/UHPLC**

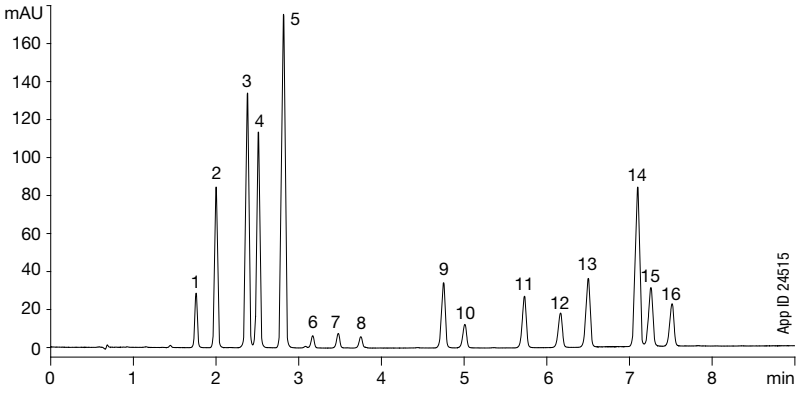
R&D 100 2010 R&D 100 Award Recipient

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



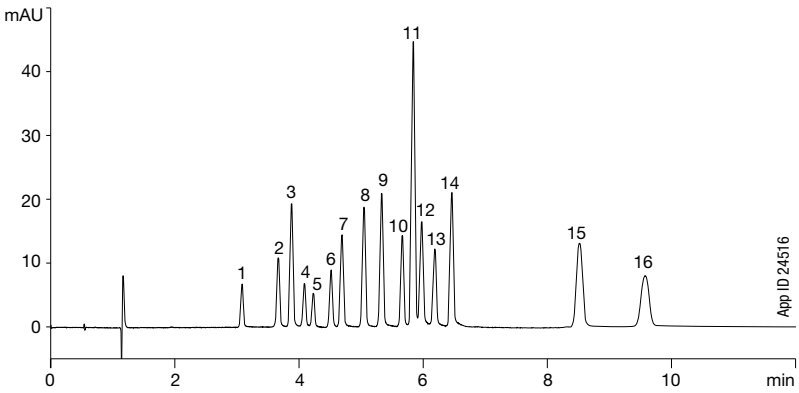
Column: Kinetex 3.5 µm PAH
Dimensions: 100 x 4.6 mm
Part No.: 00D-4764-E0
Mobile Phase: A: Water
B: Acetonitrile

Gradient:	**Time (min)**	**% B**
	0	50
	7	100
	8	100
	9	50
	12	50

Flow Rate: 1.2 mL/min
Temperature: 35 °C
Detection: UV @ 292 nm

Sample:
1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Dibenz[a,h]anthracene
15. Benzo[g,h,i]perylene
16. Indeno[1,2,3-cd]pyrene

EU 15+1 PAH Analysis



Column: Kinetex 3.5 µm 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
Temperature: 35 °C
Detection: UV @ 292 nm

Sample:
1. Benzo[c]fluorene
2. Cyclopenta[c,d]pyrene
3. Benz[a]anthracene
4. Chrysene
5. 5-Methylchrysene
6. Benzo[j]fluoranthene
7. Benzo[b]fluoranthene
8. Benzo[k]fluoranthene
9. Benzo[a]pyrene
10. Dibenzo[a,l]pyrene
11. Dibenz[a,h]anthracene
12. Benzo[g,h,i]perylene
13. Indeno[1,2,3-cd]pyrene
14. Dibenzo[a,e]pyrene
15. Dibenzo[a,i]pyrene
16. Dibenzo[a,h]pyrene

Kinetex™ Core-Shell Technology

Applications

Clinical Research and Toxicology

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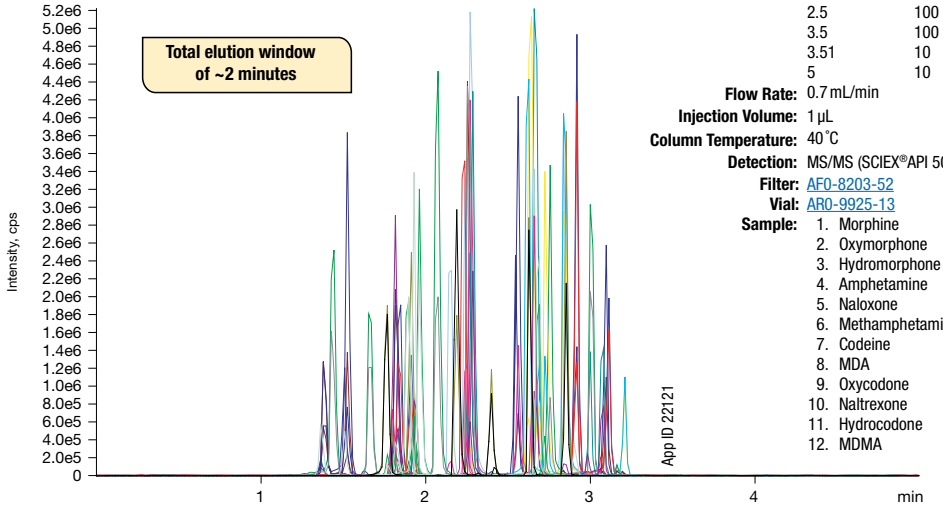
Comprehensive Drug Research Panel



Column: Kinetex 2.6 µm Biphenyl
Dimensions: 50 x 3.0 mm
Part No.: 00B-4622-Y0
Guard Cartridge: AJ0-9208
Guard Holder: AJ0-9000
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: AF0-8203-52
Vial: AR0-9925-13
Sample:

1. Morphine
2. Oxymorphone
3. Hydromorphone
4. Amphetamine
5. Naloxone
6. Methamphetamine
7. Codeine
8. MDA
9. Oxycodone
10. Naltrexone
11. Hydrocodone
12. MDMA
13. MDEA
14. Norfentanyl
15. Tramadol
16. Benzoylecgonine
17. Meperidine
18. Meprobamate
19. Norbuprenorphine
20. Fentanyl
21. Buprenorphine
22. Flurazepam
23. Carisoprodol
24. PCP
25. Propoxyphene
26. Sufentanil
27. 6-MAM
28. Midazolam
29. Normeperidine
30. EDDP
31. Methadone
32. Lorazepam
33. Clonazepam
34. Norpropoxyphene
35. Oxazepam
36. Hydroxyalprazolam
37. Nordiazepam
38. Flunitrazepam
39. Temazepam
40. Alprazolam
41. Diazepam

Vitamin D

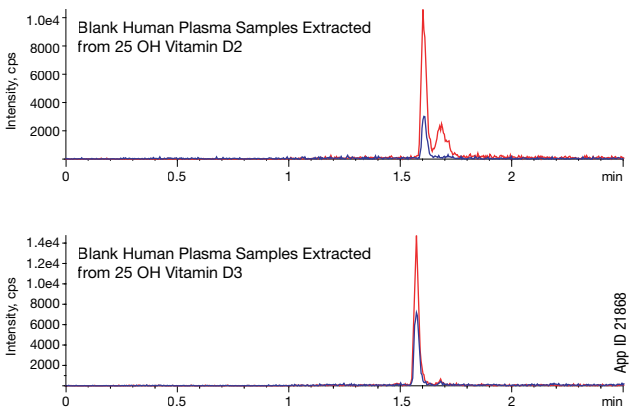
Column: Kinetex 2.6 µm C18
Dimensions: 30 x 3.0 mm
Guard Cartridge: AJ0-8775
Guard Holder: AJ0-9000
Part No.: 00A-4462-Y0
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Methanol

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: AF0-8203-52
Vial: AR0-9925-13
Sample:

1. 25-Hydroxy Vitamin D2 (25-OH D2)
2. 25-Hydroxy Vitamin D3-2H3
3. 25-Hydroxy Vitamin D3-d6 (25-OH D3-d6)



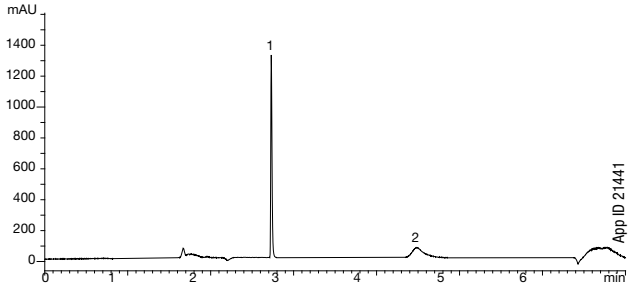
Human Plasma Vitamin C

Column: Kinetex 5 µm XB-C18
Dimensions: 150 x 4.6 mm
Guard Cartridge: AJ0-8768
Guard Holder: AJ0-9000
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: AF0-8103-52
Vial: AR0-9925-13
Sample: 1. Vitamin C (ascorbic acid)
2. Uric acid



Kinetex™ Core-Shell Technology

Applications

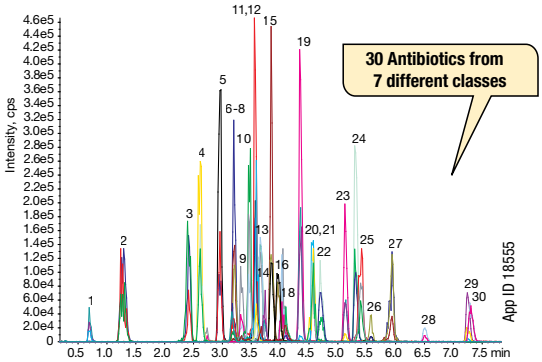
Food Testing

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
Sample: See full list of analytes at www.phenomenex.com



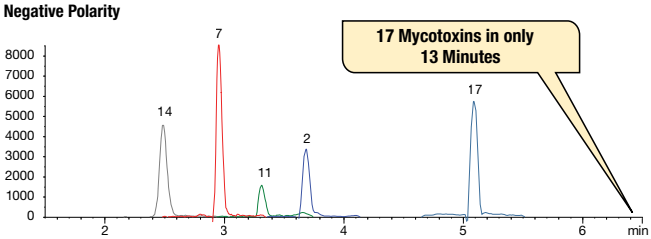
Multi-Toxin Screen

Column: Kinetex 2.6 µm XB-C18 100Å
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

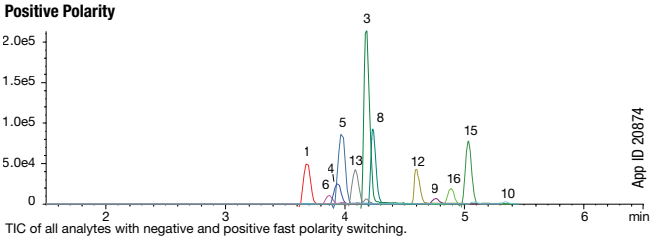
Gradient:	Time (min)	% B	Time (min)	% B
	0	2	5.2	98
	2	2	8	98
	5	80		

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
2. 3-Acetyldeoxynivalenol
3. Aflatoxin B1
4. Aflatoxin B2
5. Aflatoxin G1
6. Aflatoxin G2
7. Deoxynivalenol
8. Diacetoxyscirpenol
9. Fumonisin B1
10. Fumonisin B2
11. Fusarenon X
12. HT-2 toxin
13. Monoacetoxyscirpenol
14. Nivalenol
15. Ochratoxin
16. T-2 toxin
17. Zearalenon

Negative Polarity



Positive Polarity



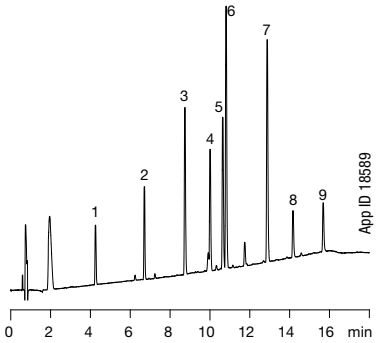
TIC of all analytes with negative and positive fast polarity switching.

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
2. Sudan Orange G
3. Fast Garnet GBC
4. Dimethyl yellow
5. Sudan Red G
6. Sudan I
7. Sudan II
8. Sudan III
9. Sudan IV



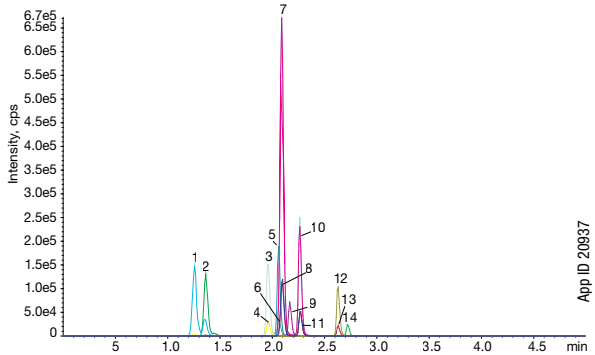
Pharmaceutical

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
2. DM-Doxepin
3. Imipramine-D3 (IS)
4. Imipramine
5. Desipramine-D3 (IS)
6. Desipramine
7. Nortriptyline-D3 (IS)
8. Nortriptyline
9. Amitriptyline
10. Protriptyline-D3 (IS)
11. Protriptyline
12. Clomipramine-D3 (IS)
13. Clomipramine
14. DM-Clomipramine



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Kinetex™ Core-Shell Technology

Applications

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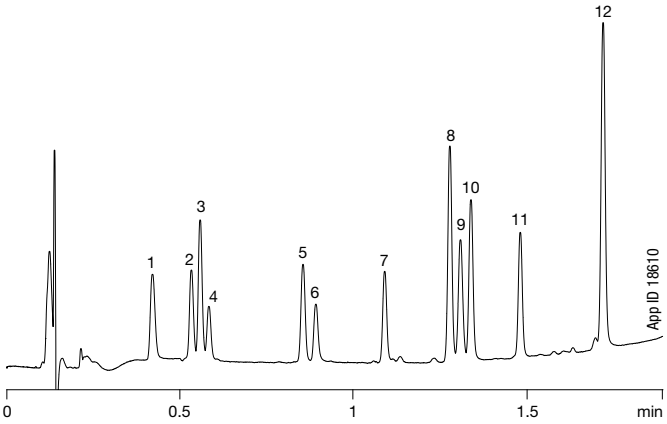
Environmental

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 ºC
Detection: UV @ 210 nm
Filter: AF0-8203-52
Vial: AR0-9925-13
Sample :
1. Aldicarb sulfoxide
2. Oxamyl
3. Aldicarb sulfone
4. Methomyl
5. 3-OH-Carbofuran
6. Aldicarb sulfone-related impurity
7. Aldicarb
8. Baygon® (Propoxur)
9. Carbofuran
10. Carbaryl
11. 1-Naphthol
12. Methiocarb

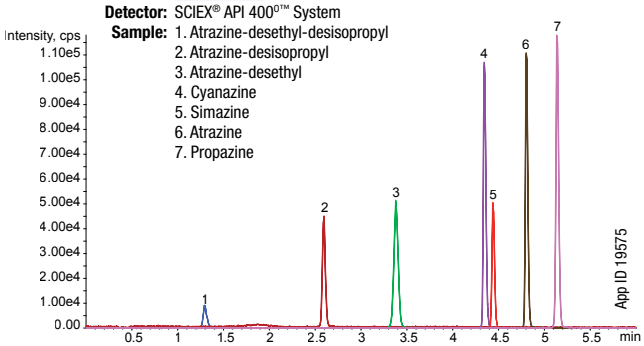


Triazine Pesticides: EPA Method 536

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: AR0-9925-13
Detector: SCIEX® API 400™ System
Sample:
1. Atrazine-desethyl-desisopropyl
2. Atrazine-desisopropyl
3. Atrazine-desethyl
4. Cyanazine
5. Simazine
6. Atrazine
7. Propazine

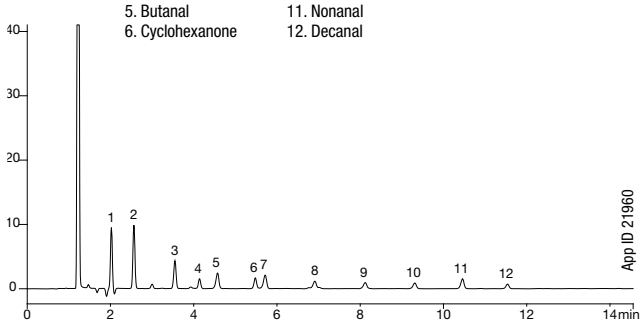


Carbonyl Compounds in Drinking Water

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: AR0-9925-13
Sample:
1. Formaldehyde
2. Acetaldehyde
3. Propanal
4. Crotonaldehyde
5. Butanal
6. Cyclohexanone
7. Pentanal
8. Hexanal
9. Heptanal
10. Octanal
11. Nonanal
12. Decanal



Kinetex Core-Shell LC Columns *(cont'd)*

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/PSI)
Polar C18	1.5-8.5*	2.6	100	200	9	L1	1,035/15,000*
PS C18	1.5-8.5*	2.6	100	200	9	L1	1,035/15,000*
EVO C18	1-12	5, 2.6, 1.7	100	200	11	L1	1,035/15,000*
C18	1.5-8.5**	5, 2.6, 1.7, 1.3	100	200	12	L1	1,035/15,000*
XB-C18	1.5-8.5**	5, 3.5, 2.6, 1.7	100	200	10	L1	1,035/15,000*
C8	1.5-8.5**	5, 2.6, 1.7	100	200	8	L7	1,035/15,000*
Biphenyl	1.5-8.5**	5, 2.6, 1.7	100	200	11	L11	1,035/15,000*
Phenyl-Hexyl	1.5-8.5**	5, 2.6, 1.7	100	200	11	L11	1,035/15,000*
F5	1.5-8.5**	5, 2.6, 1.7	100	200	9	L43	1,035/15,000*
HILIC	2.0-7.5	5, 2.6, 1.7	100	200	0	L3	1,035/15,000*
PAH	1.5-8.5*	3.5	100	200	12	L118	1,035/15,000*

**Columns are pH stable from 1.5-10 under isocratic conditions. Columns are pH stable 1.5-8.5 under gradient conditions.
*Pressure limits are stable for all Kinetex columns 4.6 mm ID and under. For 10 mm ID Kinetex columns pressure > 413 bar/6000 psi may compromise column longevity. For 21.1, 30, and 50 mm ID Kinetex columns pressure > 241 bar/3500 psi may compromise column longevity.

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	00A-4605-AN	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
HILIC	—	00B-4606-AN	—	—	AJ0-8786

for 2.1 mm ID

5 µm MidBore™ Columns (mm)					SecurityGuard ULTRA Cartridges‡
Phases	30 x 3.0	50 x 3.0	100 x 3.0	150 x 3.0	3/pk
EVO C18	00A-4633-Y0	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	00A-4601-Y0	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 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
HILIC	—	—	00F-4606-E0	00G-4606-E0	AJ0-8772

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

5 µm Semi-Preparative Columns (mm)				SecurityGuard SemiPrep Cartridges***
Phases	100 x 10	150 x 10	250 x 10	10 x 10 /3pk
EVO C18	—	00F-4633-N0	00G-4633-N0	AJ0-9306
F5	—	—	00G-4724-N0	AJ0-9323
C18	00D-4601-N0	00F-4601-N0	00G-4601-N0	AJ0-9278
Biphenyl	—	00F-4627-N0	00G-4627-N0	AJ0-9280
XB-C18	—	00F-4605-N0	00G-4605-N0	AJ0-9278

for ID: 9-16 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 *(cont'd)*

Kinetex™ Core-Shell Technology

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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 /ea
EVO C18	00B-4633-U0-AX	00D-4633-U0-AX	00F-4633-U0-AX	00G-4633-U0-AX	AJ0-9305
F5	00B-4724-U0-AX	00D-4724-U0-AX	00F-4724-U0-AX	—	AJ0-9325
Biphenyl	—	—	00F-4627-U0-AX	00G-4627-U0-AX	AJ0-9273
XB-C18	00B-4605-U0-AX	00D-4605-U0-AX	00F-4605-U0-AX	00G-4605-U0-AX	AJ0-9204
C18	00B-4601-U0-AX	00D-4601-U0-AX	00F-4601-U0-AX	00G-4601-U0-AX	AJ0-9204
C8	00B-4608-U0-AX	00D-4608-U0-AX	00F-4608-U0-AX	00G-4608-U0-AX	AJ0-9217
Phenyl-Hexyl	00B-4603-U0-AX	00D-4603-U0-AX	00F-4603-U0-AX	00G-4603-U0-AX	AJ0-9216
HILIC	—	—	00F-4606-U0-AX	—	—

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	3/pk	3/pk
PAH	00B-4764-AN	00D-4764-AN	AJ0-9535	AJ0-9534
			for 2.1 mm ID	for 3.0 mm ID

3.5 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-4744-E0	00F-4744-E0	—	AJ0-8768
PAH	00D-4764-E0	00F-4764-E0	00G-4764-E0	AJ0-9533
				for 4.6 mm ID

2.6 µm Microbore Columns (mm)			
Phases	50 x 1.0	100 x 1.0	150 x 1.0
XB-C18	00B-4496-A0	00D-4496-A0	00F-4496-A0
C18	00B-4462-A0	—	—

2.6 µm Micro LC Columns (mm)						
Phases	30 x 0.3	50 x 0.3	100 x 0.3	150 x 0.3	50 x 0.5	150 x 0.5
XB-C18	00A-4496-AC	00B-4496-AC	00D-4496-AC	00F-4496-AC	00B-4496-AF	00F-4496-AF
Biphenyl	—	00B-4622-AC	—	00F-4622-AC	00B-4622-AF	—
C18	00A-4462-AC	00B-4462-AC	—	00F-4462-AC	00B-4462-AF	—
EVO C18	—	00B-4725-AC	—	00F-4725-AC	00B-4725-AF	—
F5	—	00B-4723-AC	00D-4723-AC	00F-4723-AC	00B-4723-AF	—

For information on Micro LC Columns, Traps, and Fittings, see pages 175-177.

2.6 µm MercuryMS™ LC-MS Cartridges (mm)	
Phases	20 x 4.0
Biphenyl	00M-4622-D0-CE

MercuryMS Cartridge Holders		
Part No.	Description	Unit
CH0-7188	Direct-Connect Cartridge Holder, 20 mm	ea
CH0-5845	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	00A-4725-Y0	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	—	—	00D-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. AJ0-8277

Kinetex Core-Shell LC Columns *(cont'd)*

Kinetex™ Core-Shell Technology

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	00A-4725-E0	00B-4725-E0	—	00D-4725-E0	00F-4725-E0	00G-4725-E0	AJ0-9296
PS C18	00A-4780-E0	00B-4780-E0	—	00D-4780-E0	00F-4780-E0	00G-4780-E0	AJ0-8949
Polar C18	00A-4759-E0	00B-4759-E0	—	00D-4759-E0	00F-4759-E0	—	AJ0-9530
Biphenyl	—	00B-4622-E0	—	00D-4622-E0	00F-4622-E0	—	AJ0-9207
XB-C18	—	00B-4496-E0	00C-4496-E0	00D-4496-E0	00F-4496-E0	—	AJ0-8768
C18	00A-4462-E0	00B-4462-E0	00C-4462-E0	00D-4462-E0	00F-4462-E0	—	AJ0-8768
C8	—	00B-4497-E0	00C-4497-E0	00D-4497-E0	00F-4497-E0	—	AJ0-8770
HILIC	—	00B-4461-E0	00C-4461-E0	00D-4461-E0	00F-4461-E0	—	AJ0-8772
Phenyl-Hexyl	—	00B-4495-E0	00C-4495-E0	00D-4495-E0	00F-4495-E0	—	AJ0-8774
F5	00A-4723-E0	00B-4723-E0	—	00D-4723-E0	00F-4723-E0	—	AJ0-9320
							for 4.6 mm ID

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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	—

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	00A-4628-AN	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 page 205.

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
Phenyl	—	—	00D-4500-Y0	AJ0-8781
				for 3.0 mm ID

‡SecurityGuard ULTRA Cartridges require holder, Part No.: AJ0-9000

1.3 µm Minibore Columns (mm)		
Phases	30 x 2.1	50 x 2.1
C18	00A-4515-AN	00B-4515-AN

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

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 page 213 for more information.

For Core-Shell Performance Enhancement Kit description, see page 214.

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pages 206-207.

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pages 210-211.

For more about SecurityGuard ULTRA Cartridge System, see page 155.

LiChrosorb

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

5 µm Columns (mm)				SecurityGuard Cartridges (mm)
Phases	**125 x 4.0**	**250 x 4.0**	**250 x 4.6**	**4 x 3.0**
				/10pk
RP-8	00E-0233-D0	00G-0233-D0	00G-0233-E0	AJ0-4290
				for ID: 3.2-8.0 mm

SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJ0-4282

LiChrospher

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

4 µm (Superspher) Columns (mm)		SecurityGuard Cartridges (mm)	
Phases	**250 x 4.0**	**4 x 2.0**	**4 x 3.0**
		/10pk	/10pk
RP-8	00G-3042-D0	AJ0-4289	AJ0-4290
		for ID: 2.0-3.0 mm	3.2-8.0 mm

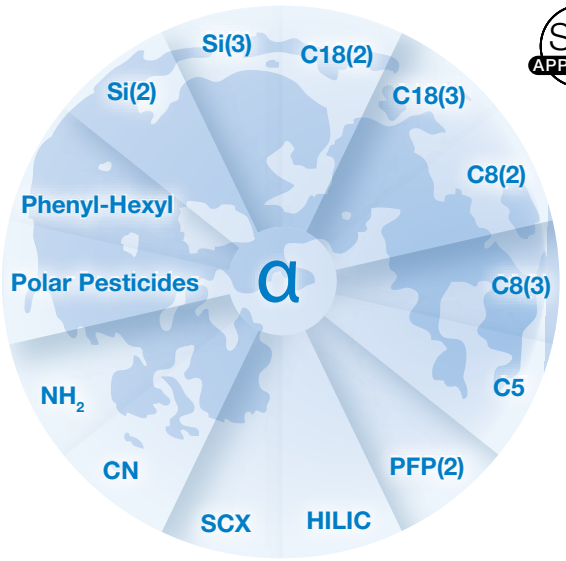
SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJ0-4282

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 2.0**	**4 x 3.0**
					/10pk	/10pk
RP-8	00E-3049-D0	00G-3049-D0	—	00G-3049-E0	AJ0-4289	AJ0-4290
RP-18	00E-3050-D0	00G-3050-D0	—	00G-3050-E0	AJ0-4286	AJ0-4287
RP-8 endcapped	—	—	—	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
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.



SFC APPROVED

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
NH_2	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	0.55 % Sulfur Load, 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
Polar Pesticides	Proprietary	3	100	380	8	2-8	☾		☾		

* pH range is 1.5 - 9 under gradient conditions. pH range is 1.5 - 10 under isocratic conditions.

UHPLC
Try out Luna Omega 1.6µm fully porous UHPLC columns to boost your UHPLC instrumentation performance (see page 108).

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**

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

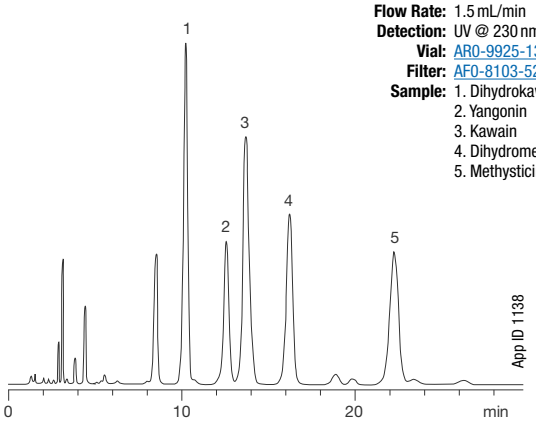
Luna Silica(3)

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. Dihydrokawain
2. Yangonin
3. Kawain
4. Dihydromethysticin
5. Methysticin



Incredible Silica Smoothness

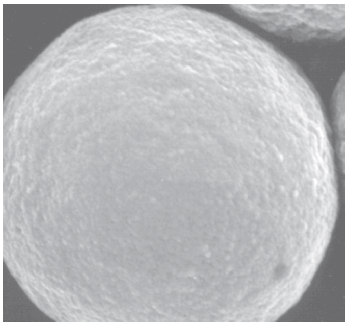
Luna silica is extremely smooth and spherical. For bonded phases, this provides a uniform bonding surface for consistent and even bonded phase coverage. The likelihood of silica particle shearing and breakage during bonding and packing is very low; thus, Luna columns have high efficiencies and long column lifetimes.

- **Recommended for preparative and bulk packing into DAC systems, see page 178 for more information**

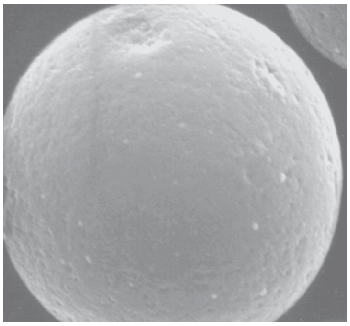
Long Column Lifetimes and Excellent Performance

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.

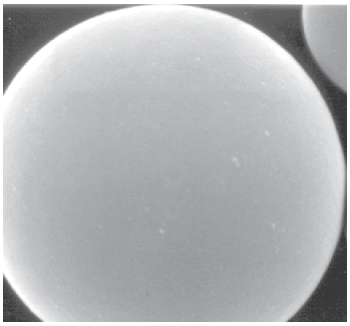
Superior Particle Smoothness



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), and 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 1,000 hours**

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

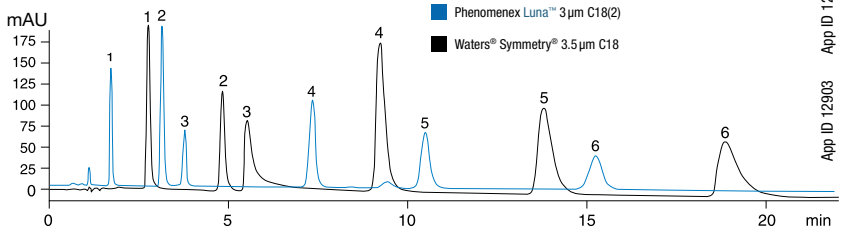
LC-MS Certified

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.

Applications

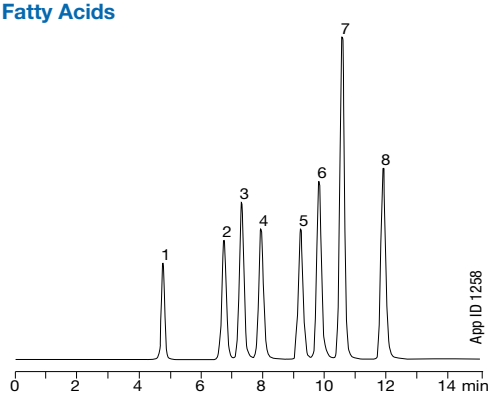
Polar, Acidic Drugs



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



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

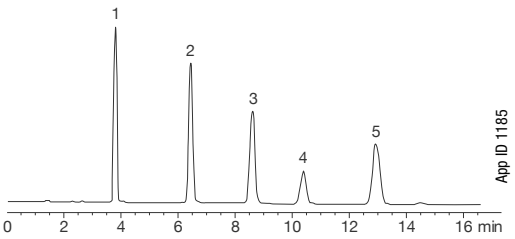
Sample: 1. Lauric acid
2. Myristic acid
3. Palmitoleic acid
4. Linoleic acid
5. Palmitic acid
6. Oleic acid
7. Heptadecanoic acid
8. Stearic acid

The comparative data presented here may not be representative for all applications.

Luna C18(2), C18(3), C8(2), C8(3), C5 *(cont'd)*

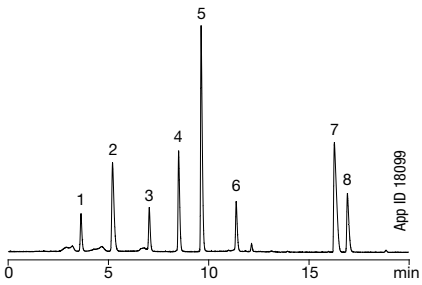
Steroids

Column: Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Part No.: 00F-4252-E0
Mobile Phase: 0.1 % H_3PO_4 /Acetonitrile/Methanol (54:35:11)
Flow Rate: 0.75 mL/min
Detection: UV @ 254 nm
Sample: 1. Hydrocortisone
2. Corticosterone
3. 11-a-Hydroxyprogesterone
4. Cortisone Acetate
5. 11-Ketoprogesterone



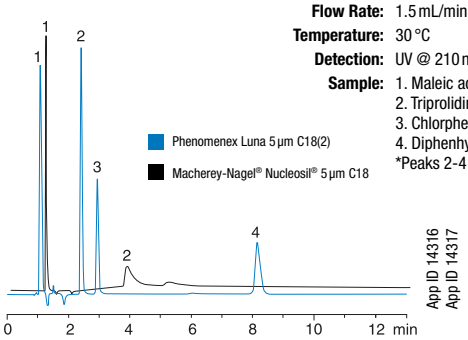
Narcotics

Columns: Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Part No.: 00F-4252-E0
Mobile Phase: A: 10 mM NH_4OAc, pH 5.5
B: Acetonitrile
Gradient: A/B (95:5) for 3 minutes, then A/B (95:5) to A/B (60:40) in 23 minutes
Flow Rate: 1.0 mL/min
Temperature: 45 °C
Detection: UV @ 254 nm (ambient)
Sample: 1. Normorphine
2. Morphine
3. Hydromorphone
4. Norcodeine
5. Codeine
6. Hydrocodone
7. Cocaine
8. Norcocaine



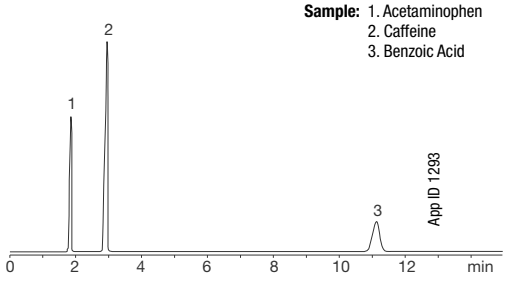
Basic Compounds

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



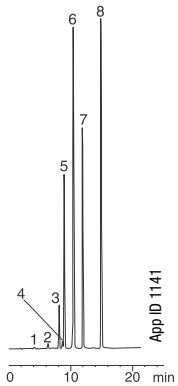
Acetaminophen, USP Method

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



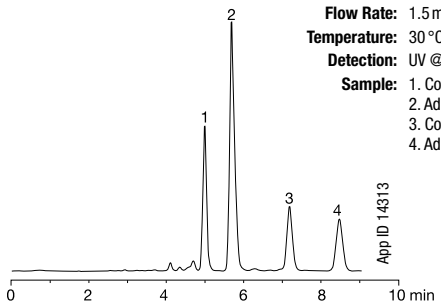
Pharmaceutical Preservatives

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 % H_3PO_4 / Water with 0.1 % H_3PO_4 (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:

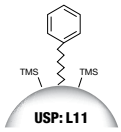
- **Highly reproducible and stable phenyl phase**
- **Dual selectivity of both phenyl phase and a short alkyl phase (C5 or C8)**
- **Excellent retention of aromatic and polar, amine compounds**
- **Recommended for US EPA Method 8330B for explosives analysis**
- **1.5 to 10 pH stability for over 10000 hours**

Luna Phenyl-Hexyl

USP: L11 | LC-MS Certified

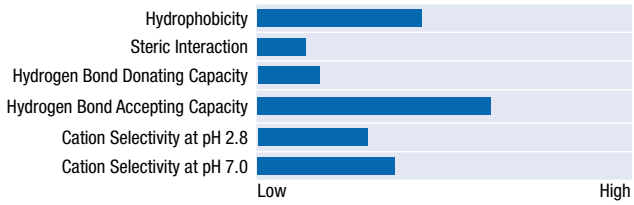
pH Stability:	**1.5-9.0***
Particle Size:	3 µm, 5 µm, 10 µm, 10 µm-*PREP*, and 15 µm
Phase:	Phenyl with Hexyl (C6) linker, endcapped
Application:	Non-polar compounds
Strength:	Aromatic selectivity enhanced by higher hydrophobicity due to hexyl linker

* pH range is 1.5 - 10 under isocratic conditions.
pH range is 1.5 - 9 under gradient conditions.



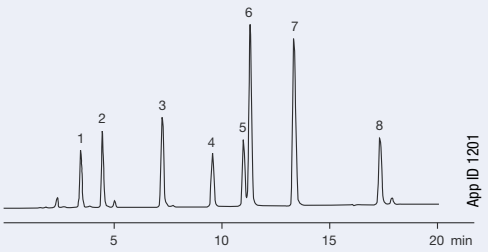
Luna Phenyl-Hexyl

Our most hydrophobic phenyl column and it will also provide good hydrogen accepting functionality for acidic retention.

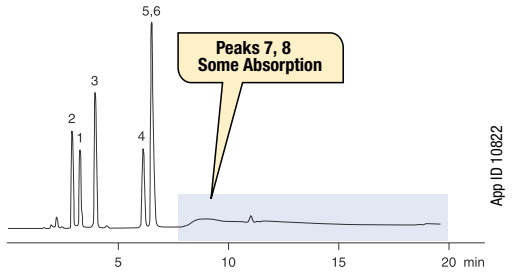


Chromatographic Comparisons of Phenyl Columns

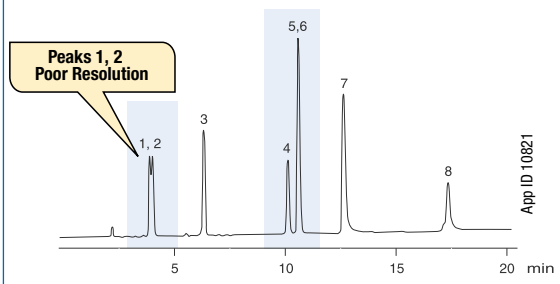
Luna 5 µm Phenyl-Hexyl



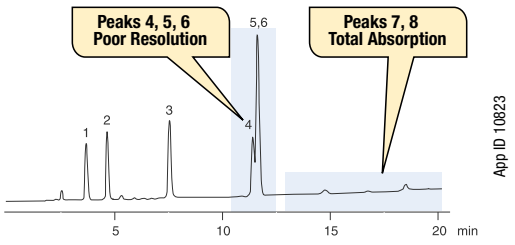
Waters® Spherisorb® 5 µm Phenyl



Agilent Technologies® ZORBAX® 5 µm SB-Phenyl



Agilent Technologies ZORBAX 5 µm Phenyl



Antibacterials

Conditions for all columns:

Dimensions: 150 x 4.6 mm
Mobile Phase: A: 20 mM KH_2PO_4, pH 2.5
B: Acetonitrile
Gradient: A/B (80:20) to A/B (75:25) in 5 min to A/B (55:45) in 15 min
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Sample:
1. Carbadox
2. Thiamphenicol
3. Furazolidone
4. Oxolinic Acid
5. Sulfadimethoxine
6. Sulfaquinoxaline
7. Nalidixic Acid
8. Piromidic Acid

Comparative separations may not be representative of all applications.

Luna CN (cyano)

Proven Reproducibility

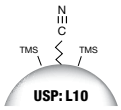
For carboxyl, carbonyl, and amine containing compounds, Luna CN columns offer a unique polar selectivity in reversed phase and normal phase modes. Luna CN columns provide sharp peaks and great reproducibility run-to-run, column-to-column and batch-to-batch. State of the art modification of the silca 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

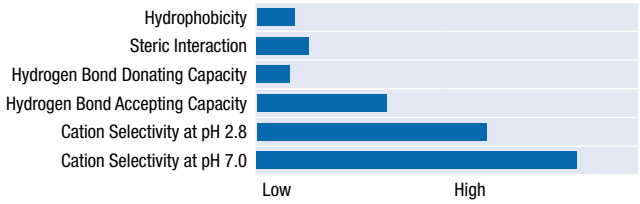
USP: L10

pH Stability:	**1.5-7.0**
Particle Size:	3 µm, 5 µm, and 10 µm
Phase:	Cyano, endcapped
Application:	Compounds with COOH, CO, NH_2, NHR_2, or NR_2
Strength:	Improved reproducibility for more consistent results run-to-run, column-to-column, batch-to-batch



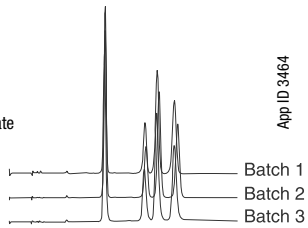
Luna CN

Nitrile groups bound to the silica surface offer a unique polar selectivity under reversed phase or normal phase conditions.



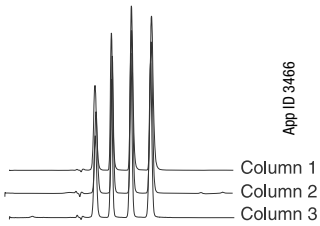
Batch-to-Batch Reproducibility

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



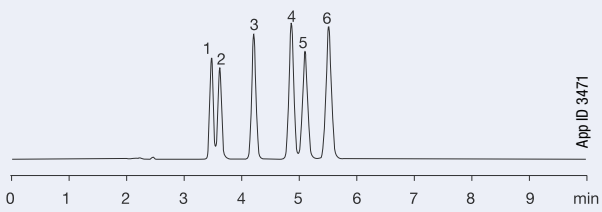
Column-to-Column Reproducibility

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

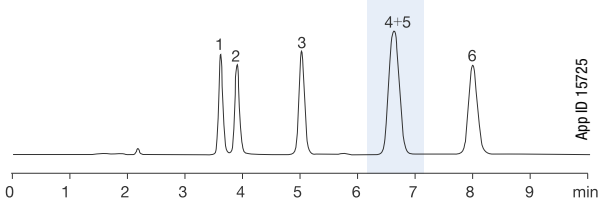


Chromatographic Comparisons of CN Columns

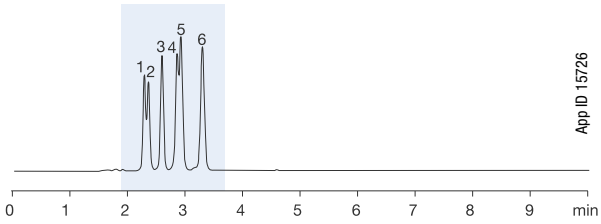
Luna 5 µm CN



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

Comparative separations may not be representative of all applications.

Luna NH_2 (amino)

Developed for Ruggedness

Luna NH_2 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 NH_2 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**

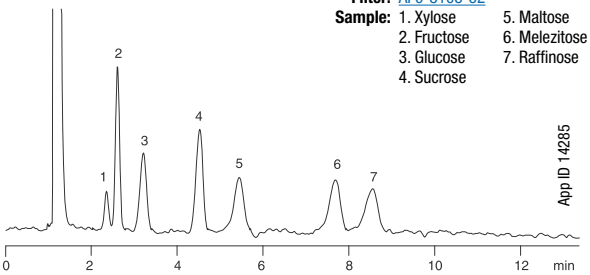
Luna NH_2

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

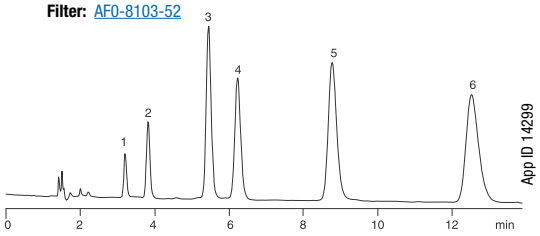
Simple Sugars

Column: Luna 5 µm NH_2
Dimensions: 250 x 4.6 mm
Part No.: 00G-4378-E0
Guard Cartridge: AJ0-4302
Guard Holder: KJ0-4282
Mobile Phase: Acetonitrile/Water (80:20)
Flow Rate: 3 mL/min
Temperature: 40 °C
Detection: RI
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample: 1. Xylose, 2. Fructose, 3. Glucose, 4. Sucrose, 5. Maltose, 6. Melezitose, 7. Raffinose



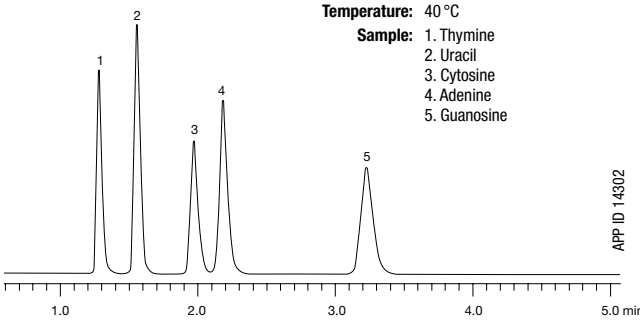
Steroids

Column: Luna 5 µm NH_2
Dimensions: 250 x 4.6 mm
Part No.: 00G-4378-E0
Guard Cartridge: AJ0-4302
Guard Holder: KJ0-4282
Mobile Phase: Hexane/Ethanol (85:15)
Flow Rate: 2 mL/min
Temperature: 22 °C
Detection: UV @ 240 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample: 1. 11-Ketoprogesterone, 2. 11-Hydroxyprogesterone, 3. Cortisone Acetate, 4. Prednisolone 21-Acetate, 5. Cortisone, 6. Prednisolone



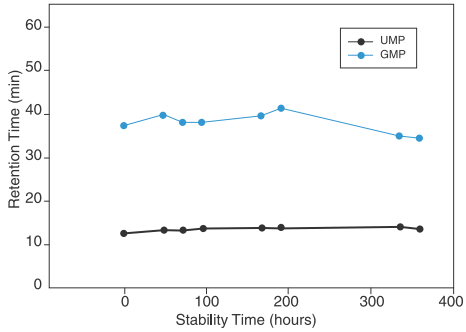
Nucleic Acid Bases

Column: Luna 5 µm NH_2
Dimensions: 150 x 4.6 mm
Part No.: 00F-4378-E0
Mobile Phase: Acetonitrile/Water (80:20)
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Temperature: 40 °C
Sample: 1. Thymine, 2. Uracil, 3. Cytosine, 4. Adenine, 5. Guanosine



Stability in 100 % Aqueous Mobile Phase

Column: Luna 5 µm NH_2
Dimensions: 250 x 4.6 mm
Part No.: 00G-4378-E0
Guard Cartridge: AJ0-4302
Guard Holder: KJ0-4282
Mobile Phase: 20 mM Potassium Phosphate Buffer pH 2.7
Flow Rate: 1.5 mL/min
Detector: UV @ 254 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: Ambient
Injection: 2.5 µL
Conditions: Continuously flushed at 1.0 mL/min using 100 % 20 mM Potassium Phosphate Buffer pH 2.7 between injections



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**

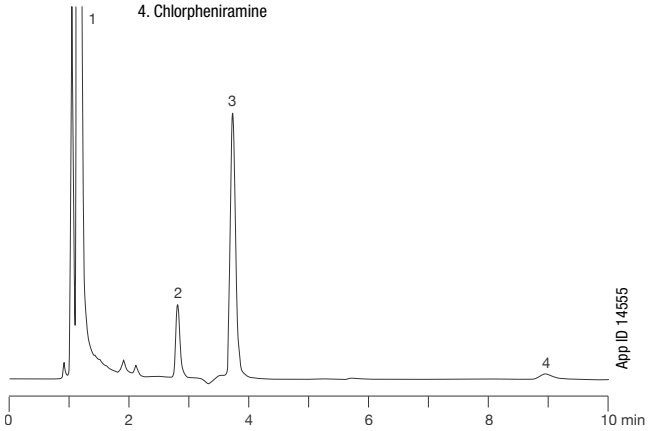
Luna SCX

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

Childrens Tylenol Cold Syrup

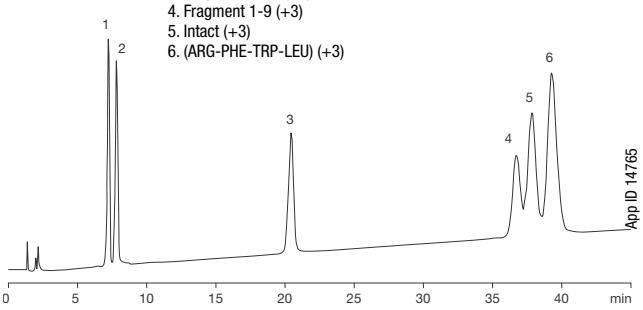
Column: Luna 5 µm SCX
Dimensions: 150 x 4.6 mm
Part No.: 00F-4398-E0
Guard Cartridge: AJ0-4308
Guard Holder: KJ0-4282
Mobile Phase: 50 mM KH_2PO_4, pH 2.5/Acetonitrile (35:65)
Injection Volume: 1 µL
Flow Rate: 1.5 mL/min
Detection: UV @ 210 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample Prep: Dissolve 1 part Childrens Tylenol Cold in 10 parts Methanol
Sample: 1. Acetaminophen
2. Pseudoephedrine
3. Dextromethorphan
4. Chlorpheniramine



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.

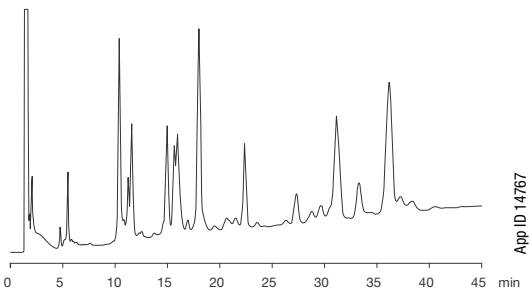
Peptides

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 °C
Detection: UV @ 215 nm
Vial: AR0-9925-13
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)



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 °C
Detection: UV @ 215 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection Volume: 50 µL (20 µg on column)
Sample: Bovine Cytochrome *c* trypsin digest



Luna HILIC

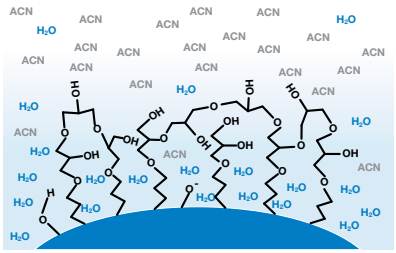
Increase MS Sensitivity and Retention for Polar Compounds

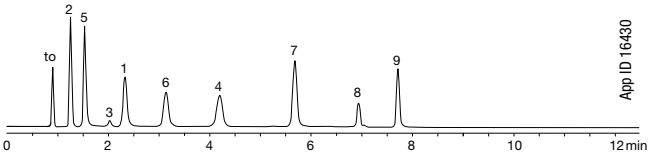
Luna HILIC columns retain a water-enriched layer on the surface of the silica. This water layer facilitates the transfer of polar compounds onto the stationary phase for increased retention.

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**



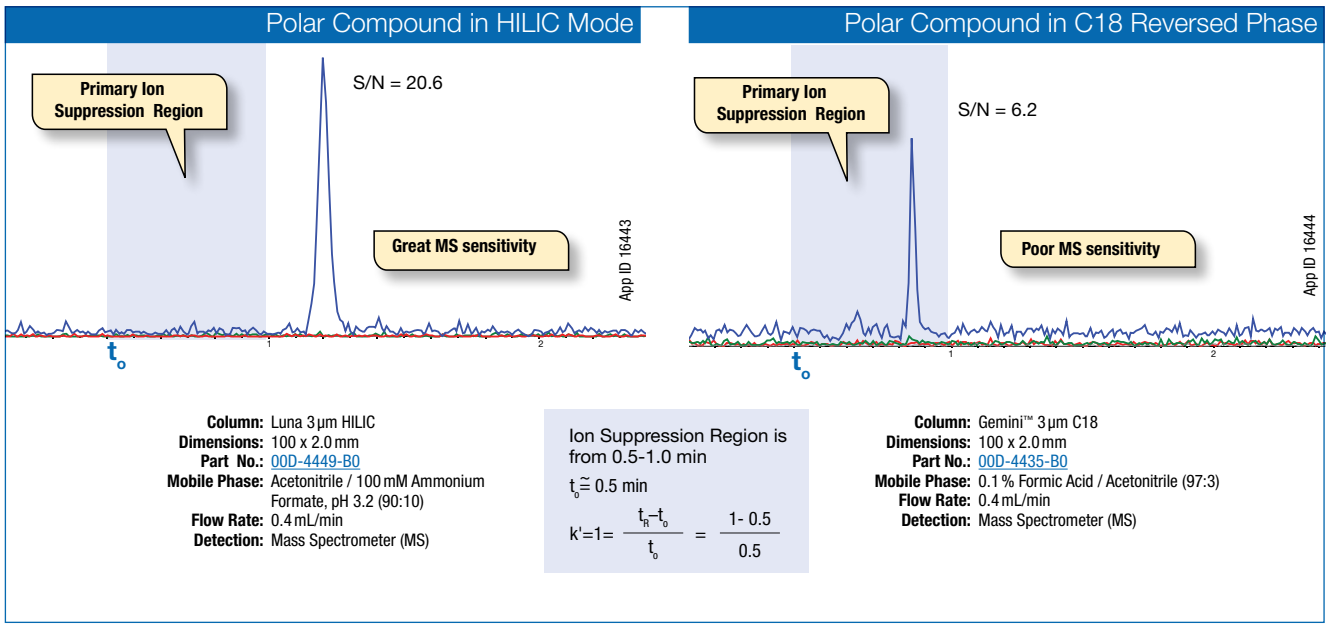


Column: Luna 5 µm HILIC
Dimensions: 150 x 4.6 mm
Part No.: 00F-4450-E0
Guard Cartridge: AJ0-8329
Guard Holder: KJ0-4282
Mobile Phase: A: Acetonitrile
B: Water
C: 100 mM Ammonium Acetate, pH 5.8
Gradient: A/B/C (90:5:5) for 2.5 min to A/B/C (50:45:5) in 7.5 min, hold for 2.5 min. Re-equilibrate @ A/B/C (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_a3.0 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



Column: Luna 3 µm HILIC
Dimensions: 100 x 2.0 mm
Part No.: 00D-4449-B0
Mobile Phase: Acetonitrile / 100 mM Ammonium Formate, pH 3.2 (90:10)
Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS)

Ion Suppression Region is from 0.5-1.0 min

$t_o \cong 0.5$ min

$$k' = 1 = \frac{t_R - t_o}{t_o} = \frac{1 - 0.5}{0.5}$$

Column: Gemini™ 3 µm C18
Dimensions: 100 x 2.0 mm
Part No.: 00D-4435-B0
Mobile Phase: 0.1 % Formic Acid / Acetonitrile (97:3)
Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS)

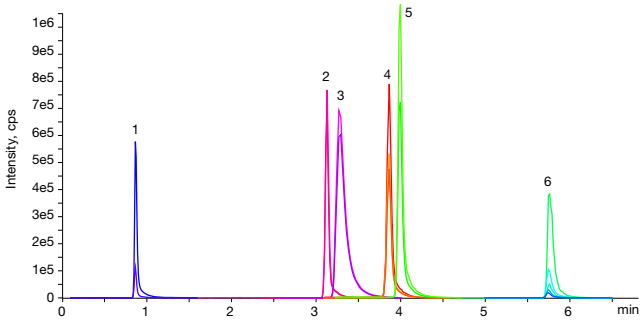
Luna Polar Pesticides

NO MORE analytical struggles due to matrices' complexity and polarity, sample derivatization, lengthy column conditioning, and the need of multi columns and systems for your food analysis.

The Luna Polar Pesticides LC column unique selectivity delivers robust analysis of underivatized polar pesticides from food and environmental matrices.

Fast column conditioning, excellent analyte retention, versatile selectivity, and great peak symmetry.

Underivatized Cationic Pesticides Analysis



LC Conditions

Column: Luna 3 µm Polar Pesticides
Dimensions: 100 x 2.1 mm
Part No.: 00D-4798-AN
Guard Cartridge: AJ0-8789
Guard Holder: AJ0-9000
Mobile Phase: A: 100 mM Ammonium Formate in Water, adjust pH to 3 with Formic Acid
B: Acetonitrile

Gradient:	Time (min)	% B
	0	97
	0.5	97
	4.0	70
	5.0	40
	6.0	40
	6.1	97
	10	97

Flow Rate: 0.5 mL/min
Injection Volume: 0.5 µL
Temperature: 40 °C
Experiment Type: MRM
Detector: SCIEX® 5500

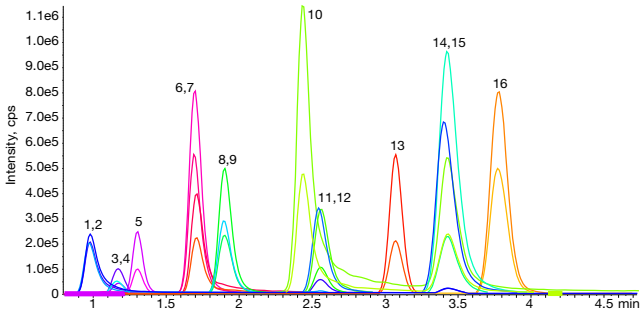
MRM Conditions

Polarity: Positive
Gas Temperature: 450 °C
GS1: 40 psi
GS2: 30 psi
CUR: 50 psi
IS: 4500 V

MRM Table

Peak No.	Analyte	RT (min)	Q1	Q2	DP	CE
1	Ethylthiourea	0.89	103	44	86	22
			103	86	84	26
2	Propamocarb	3.2	189	102	200	39
			189	74	200	48
3	Mepiquat	3.31	114	98	250	45
			114	70	180	45
4	Matrine	3.85	249	150	100	43
			249	110	100	46
			249	176	100	45
5	Oxamatrine	4.22	265	247	60	41
			265	205	60	41
			265	136	60	41
6	Paraquat	5.69	186	171	140	27
			186	77	140	60
			93	171	150	15
			93	77	150	31

Underivatized Anionic Pesticides Analysis



LC Conditions

Column: Luna 3 µm Polar Pesticides
Dimensions: 100 x 2.1 mm
Part No.: 00D-4798-AN
Guard Cartridge: AJ0-8789
Guard Holder: AJ0-9000
Mobile Phase: A: 0.3 % Formic Acid in Water
B: 0.3 % Formic Acid in Acetonitrile

Gradient:	Time (min)	% B
	0	2
	0.5	2
	6.0	20
	7.0	90
	9.0	90
	9.1	2
	12	2

Flow Rate: 0.3 mL/min
Injection Volume: 1 µL
Temperature: 40 °C
Detection: MRM
Detector: SCIEX® 7500

Sample:
1. AMPA
2. AMPA-$^{13}C,^{15}N$
3. Maleic Hydrazide-D2
4. Maleic Hydrazide
5. Glufosinate
6. MPPA
7. Glyphosate
8. N-Acetyl-Glufosinate
9. N-Acetyl-Glufosinate-D3
10. Phosphonic Acid
11. Ethephon-D4
12. Ethephon
13. Chlorate
14. Fosetyl Al-D15
15. Fosetyl Al
16. Perchlorate

MRM Conditions

Polarity: Negative
Gas Temperature: 450 °C
GS1: 40 psi
GS2: 30 psi
CUR: 40 psi
IS: -4500 V

Features and Benefits

	Material Characteristic	Benefit
Morphology	Fully Porous	High Sample Loading
Phase	Proprietary Polar	• Unique selectivity • Retention of polar analytes • Fast equilibration • 100 % Aqueous stability • 100 % Organic stability • Multi-mode retention
Pore Size	100 Å	Right size for pesticide analysis
Carbon Load	8 %	Great polar and nonpolar retention
Surface Area	380 m^2/g	Improved analyte interaction with stationary phase

"The Luna Polar Pesticides LC column significantly reduced analysis time thanks to its fast re-equilibration! This column has improved our polar pesticides analyses."

Dr Giacomo Napolitano, PhD
—Lab Manager - Lifeanalytics S.r.l.

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

Luna PFP(2)

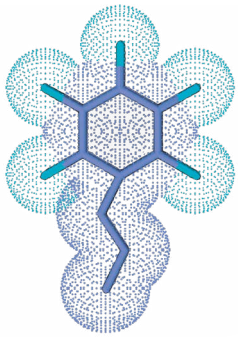
Powerful Selectivity for Reversed Phase Methods

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.

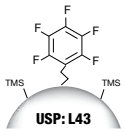
- **Achieve excellent selectivity using four mechanisms of solute/stationary phase interactions**
- **Extremely discerning for halogenated, aromatic and conjugated compounds**
- **Provides orthogonal selectivity even using traditional reversed phase mobile phase systems**

Luna PFP(2) selectivity is achieved through 4 mechanisms of interaction

- Hydrogen Bonding
- Dipole-Dipole Interactions
- Aromatic and π-π Interactions
- Hydrophobic

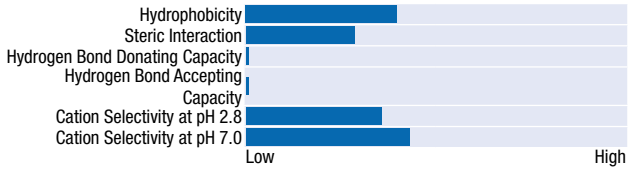


A typical alkyl phase (C18, C8) achieves selectivity through only 1 mechanism of interaction.



Luna PFP(2)

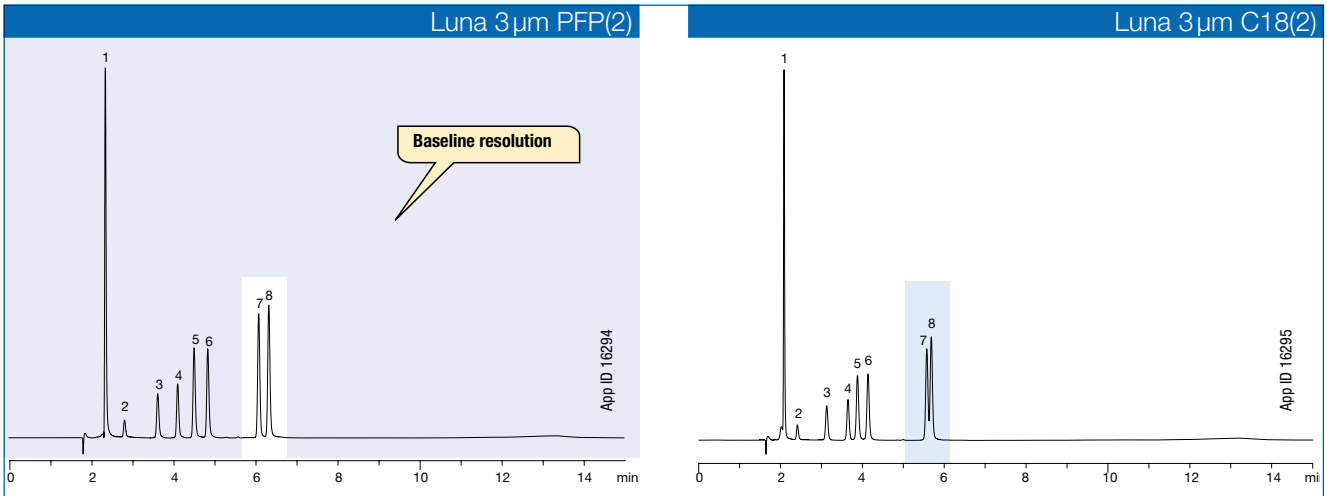
Pentafluorophenyl groups provide very little hydrogen bonding abilities, but the strongly electronegative fluorine groups will provide good charge based selectivity for cationic compounds, while the rigid bonded phase is a good steric selector.



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



Columns: Luna 3 µm PFP(2)
Luna 3 µm C18(2)
Part Nos.: 00F-4447-E0
00F-4251-E0

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 (80:20) to (55:45) in 10 min
Flow Rate: 1 mL/min
Temperature: 22 °C
Detection: UV @ 280 nm

Sample:
1. Gallic acid
2. Epigallo catechin
3. Catechin
4. Epicatechin
5. Epigallocatechin gallate
6. Gallocatechin gallate
7. Epicatechin gallate
8. Catechin gallate

Fast LC Solutions

SFC APPROVED

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)	—	—	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**
CH0-7187	10 mm direct-connect holder
CH0-7188	20 mm direct-connect holder

Standard Cartridge Holders	
Part No.	**Description**
CH0-5846	10 mm standard holder
CH0-5845	20 mm standard holder

Direct-Connect Holder

Standard Holder

Micro LC Columns

For information on Micro LC Columns, Traps, and Fittings, see pages 175-177.

Ordering Information

3 µm and 5 µm Micro LC 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	—	—	—	—	—

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282

HPLC Columns

Ordering Information

3 µm Microbore and Minibore Columns (mm)									SecurityGuard Cartridges (mm)		
Phases	**50 x 1.0**	**150 x 1.0**	**30 x 2.0**	**30 x 2.1**	**50 x 2.0**	**50 x 2.1**	**100 x 2.0**	**100 x 2.1**	**150 x 2.0**	**150 x 2.1**	**4 x 2.0***
											/10pk
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
Polar Pesticides				00A-4798-AN		00B-4798-AN		00D-4798-AN		00F-4798-AN	AJ0-8789

for ID: 2.0-3.0 mm

HPLC Columns *(cont'd)*

Ordering Information *(continued)*

3 µm 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
Polar Pesticides	—	—	00F-4798-Y0	—	—	—	—	—	AJ0-8789	—
									for ID: 2.0-3.0 mm	3.2-8.0 mm

5 µm 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
SCX	—	—	00B-4398-B0	—	—	AJ0-4307
PFP(2)	—	00A-4448-B0	00B-4448-B0	00F-4448-B0	—	AJ0-8326
						for ID: 2.0-3.0 mm

5 µm 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	—	00B-4255-Y0	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

5 µm 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 pages 210-211.

*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 ◆**
								/ea	/ea
Silica(2)	—	00D-4274-P0-AX	00F-4274-P0-AX	00G-4274-P0-AX	—	—	00G-4274-U0-AX	AJ0-7229	AJ0-8312
C5	—	—	—	00G-4043-P0-AX	—	—	—	—	—
C8(2)	00B-4249-P0-AX	—	00F-4249-P0-AX	00G-4249-P0-AX	—	00D-4249-U0-AX	—	AJ0-7840	AJ0-8302
C18(2)	00B-4252-P0-AX	00D-4252-P0-AX	00F-4252-P0-AX	00G-4252-P0-AX	00B-4252-U0-AX	00D-4252-U0-AX	00G-4252-U0-AX	AJ0-7839	AJ0-8301
CN	—	—	00F-4255-P0-AX	00G-4255-P0-AX	—	00D-4255-U0-AX	00G-4255-U0-AX	AJ0-8220	AJ0-8311
Phenyl-Hexyl	—	—	00F-4257-P0-AX	00G-4257-P0-AX	—	—	00G-4257-U0-AX	AJ0-7841	AJ0-8303
NH_2	—	—	00F-4378-P0-AX	00G-4378-P0-AX	—	—	—	AJ0-8162	AJ0-8309
PFP(2)	—	00D-4448-P0-AX	00F-4448-P0-AX	00G-4448-P0-AX	—	00D-4448-U0-AX	—	AJ0-8377	AJ0-8378
HILIC	—	00D-4450-P0-AX	00F-4450-P0-AX	00G-4450-P0-AX	—	—	00G-4450-U0-AX	AJ0-8595	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 ◆**
						/ea	/ea
Silica(2)	—	—	00G-4091-P0-AX	00G-4091-U0-AX	00G-4091-V0-AX	AJ0-7229	AJ0-8312
C5	—	00D-4092-P0-AX	00G-4092-P0-AX	—	00G-4092-V0-AX	—	—
C8(2)	—	—	00G-4250-P0-AX	00G-4250-U0-AX	00G-4250-V0-AX	AJ0-7840	AJ0-8302
C18(2)	00B-4253-P0-AX	00D-4253-P0-AX	00G-4253-P0-AX	00G-4253-U0-AX	00G-4253-V0-AX	AJ0-7839	AJ0-8301
CN	—	—	00G-4300-P0-AX	—	—	AJ0-8220	AJ0-8311
Phenyl-Hexyl	—	—	00G-4285-P0-AX	00G-4285-U0-AX	—	AJ0-7841	AJ0-8303
NH_2	—	—	00G-4379-P0-AX	—	00G-4379-V0-AX	AJ0-8162	AJ0-8309
SCX	—	—	00G-4401-P0-AX	—	00G-4401-P0-AX	AJ0-8595	AJ0-8596
						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‡**
			/10 pk	/3 pk
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

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

*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

For more dimensions and phases of Axia packed preparative columns, see page 11.

For SecurityGuard Cartridge Holders and Cartridges, see pages 150-154.

For Bulk Media, see page 180.

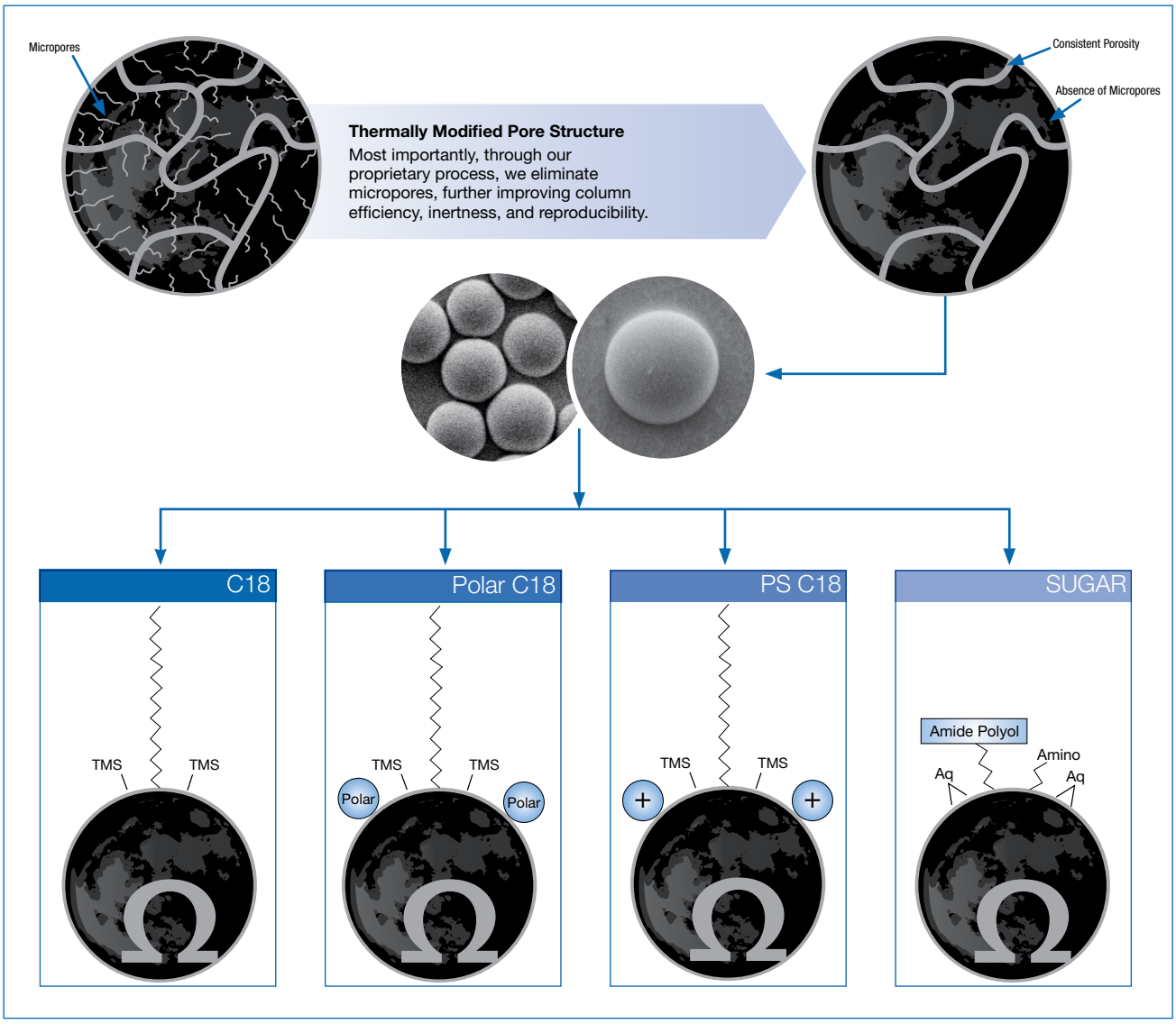
Method development column kits and method validation column kits are available. Contact Phenomenex for details.

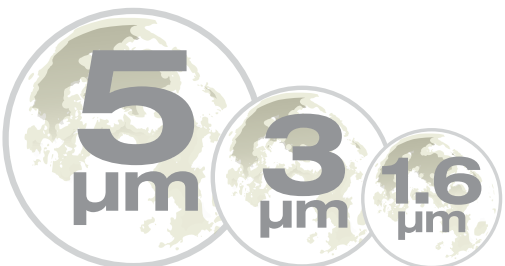
Luna Omega Silica

An Evolution in Silica Manufacturing Technology

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.

Thermally Modified Fully Porous Particle Technology



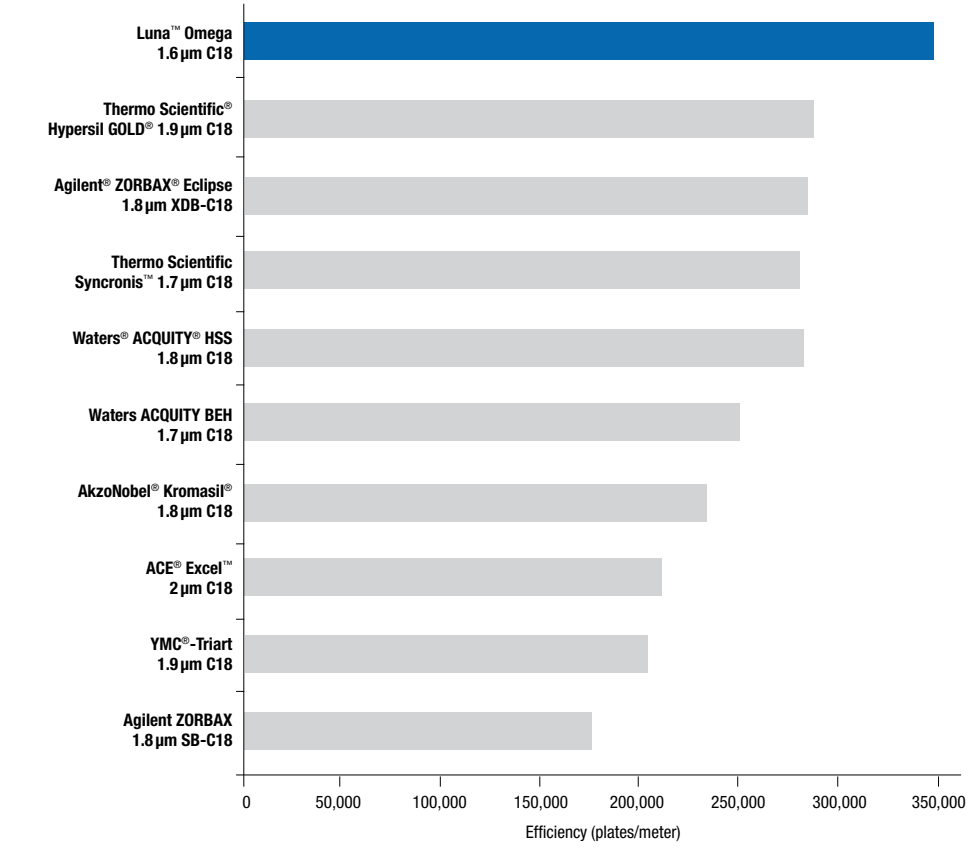


Luna Omega *(cont'd)*

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 1.6 µm, they fall drastically short and prevent UHPLC scientists from reaching their UHPLC potential.

UHPLC Efficiency Comparison



Conditions for all columns:

Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile/Water (65:35)
Flow Rate: 0.5 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
System: ACQUITY UPLC®
Sample: Naphthalene*

Comparative separations may not be representative of all applications.

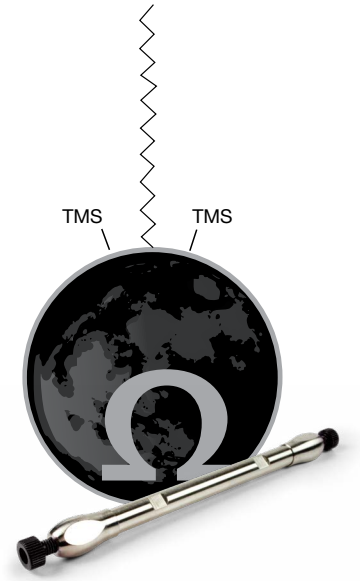
*Efficiency (plates/meter) comparison is based on peak performance associated with the compound naphthalene for all columns.

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pages 206-207.

Luna Omega *(cont'd)*

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 to HPLC to PREP LC solution with next level scalable reproducibility 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/PSI)	USP Column Classification
C18	1.6, 3, 5	100	260	11	1.5 - 8.5*	1034/15,000	L1

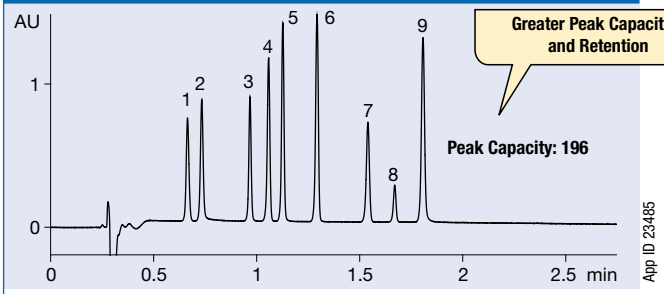
*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

Pressure limits are stable for all Luna Omega columns 4.6 mm ID and under.
For 10 mm ID Luna Omega columns pressure > 413 bar/6000 psi may compromise column longevity.
For 21.1 mm ID Luna Omega columns pressure > 241 bar/3500 psi may compromise column longevity.

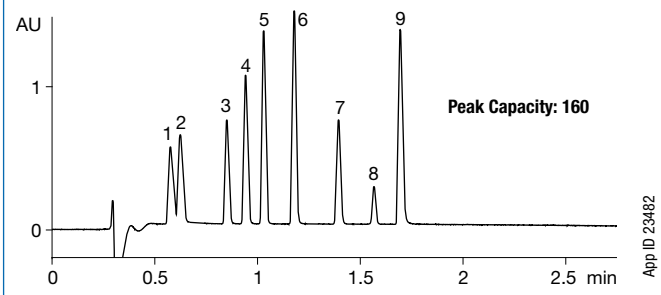
Greater Retention and Better Results

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.

Luna Omega 1.6 µm C18



Waters® ACQUITY® BEH 1.7 µm C18



Conditions for all columns:

Columns: Luna Omega 1.6 µm C18
ACQUITY BEH 1.7 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	10
3	55
3.5	55
3.51	10
5	10

Flow Rate: 0.4 mL/min

Temperature: Ambient

Detection: UV @ 205 nm

Sample:
1. Acetaminophen
2. 4-Aminobenzoic Acid
3. 4-Hydroxybenzoic Acid
4. 2-Acetaminophenol
5. 3-Hydroxybenzoic Acid
6. Salicylicamide
7. Phenol
8. Benzoic Acid
9. Salicylic Acid

Comparative separations may not be representative of all applications.

Luna Omega *(cont'd)*

Generating the Next Level Of Reliability Through Advanced Process Optimization

Over the past few years, our scientists and engineers with the help of customers and Danaher colleagues, have optimized our processes to provide products that deliver very high levels of performance and newly achievable levels of reliability and reproducibility.

Reproducible and Scalable

By setting a new standard for reliability, the Luna Omega C18 spans UHPLC and HPLC with a scalable range of high-performance particle sizes that will ensure that your developed methods are easily transferred. From single compound identification to complex impurity profiles, the Luna Omega C18 will serve as a pillar for your lab to count on day in and day out.

Batch-to-Batch Reproducibility Study

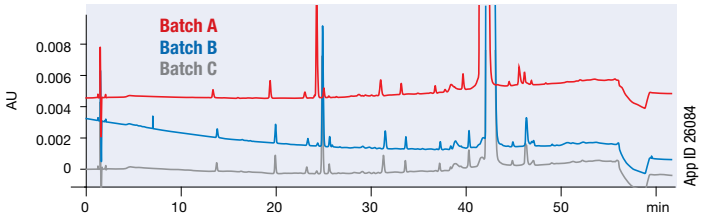
In this example, we compared three batches of Luna Omega C18 using all three different particle sizes on a complex QC Pharmaceutical representative sample.

Conditions for all columns:

Mobile Phase: A: Water with 0.1 % Formic Acid
B: Acetonitrile with 0.1 % Formic Acid
Temperature: 30 °C
Detection: UV @ 254 nm
Injection Volume: 5 µL
Sample: 5 mg/mL of Chlorhexidine and Related Substances

Luna Omega 5 µm C18

Impurity Profile 3 Batch Comparison

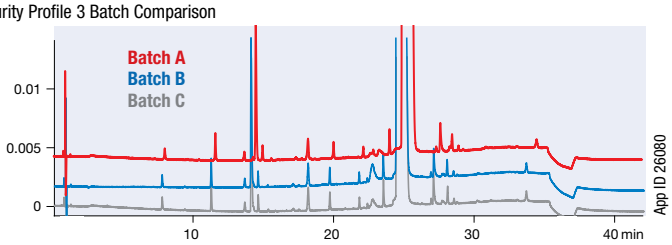


Column: Luna Omega 5 µm C18
Dimensions: 250 x 4.6 mm
Part No.: 00G-4785-E0

Gradient: Time (min)	% B
0	2
2.5	2
52.5	35
55	35
57.5	2
62.5	2

Luna Omega 3 µm C18

Impurity Profile 3 Batch Comparison

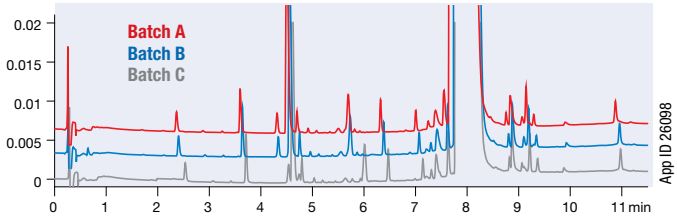


Column: Luna Omega 3 µm C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4784-E0

Gradient: Time (min)	% B
0	2
1.5	2
31.5	35
34.5	35
36	2
42	2

Luna Omega 1.6 µm C18

Impurity Profile 3 Batch Comparison

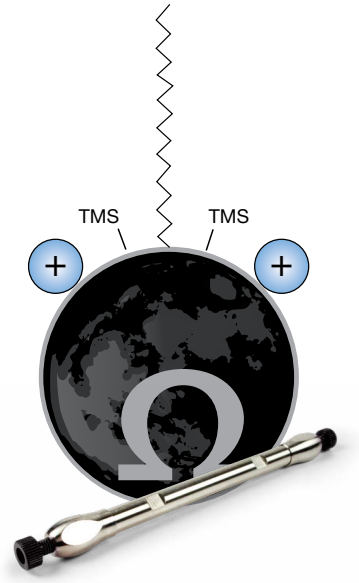


Column: Luna Omega 1.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4742-AN

Gradient: Time (min)	% B
0	2
0.5	2
10.5	35
11.5	35
12	2
14	2

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 provides better peak shape for bases at low pH under LC-MS conditions, 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/PSI)	USP Column Classification
PS C18	1.6, 3, 5	100	260	9	1.5 - 8.5*	1034/15,000	L1

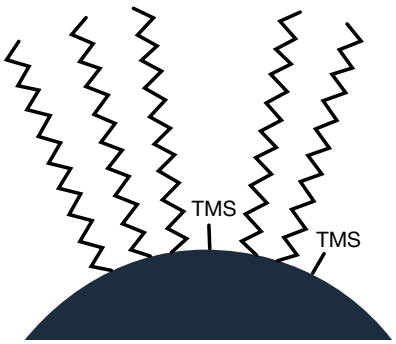
*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

Pressure limits are stable for all Luna Omega columns 4.6 mm ID and under.
For 10 mm ID Luna Omega columns pressure > 413 bar/6000 psi may compromise column longevity.
For 21.1 mm ID Luna Omega columns pressure > 241 bar/3500 psi may compromise column longevity.

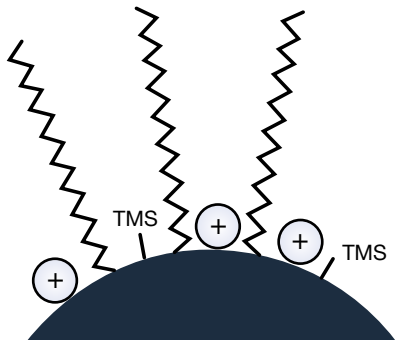
A C18, But More Positive

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

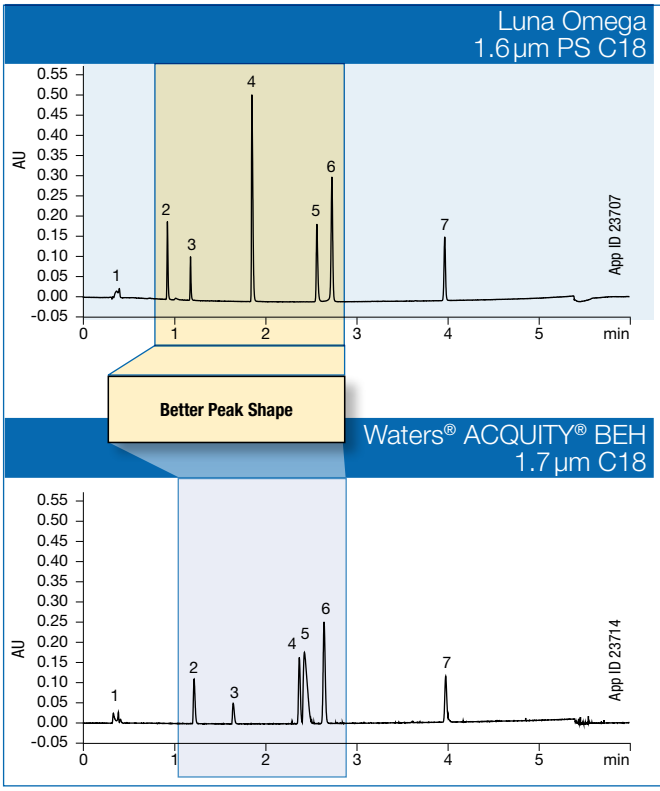


Luna Omega PS C18 *(cont'd)*

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



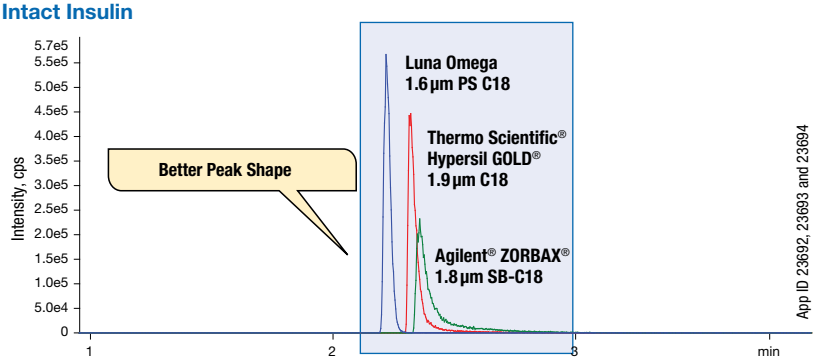
Conditions for all columns:

Columns: Luna Omega 1.6µm PS C18
ACQUITY BEH 1.7µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: Water with 0.1% Formic Acid
B: Acetonitrile with 0.1% Formic Acid
Gradient:

Time (min)	% B
0	5
5	95
5.1	5
8	5

Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: MS/MS
Detector: SCIEX® API 4000™
Sample:
1. Uracil
2. Pindolol
3. Chlorpheniramine
4. Nortriptyline
5. 3-Methyl-4-nitrobenzoic acid
6. 5-Methyl salicylaldehyde
7. Hexanophenone

Intact Insulin



Conditions for all columns:

Columns: Luna Omega 1.6µm PS C18
Hypersil GOLD 1.9µm C18
ZORBAX 1.8µm SB-C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: Water with 0.1% Formic Acid
B: Acetonitrile with 0.1% Formic Acid
Gradient:

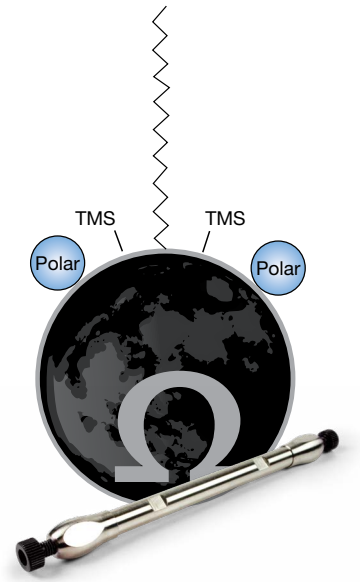
Time (min)	% B
0	3
3	80
3.1	3
5	3

Flow Rate: 0.5 mL/min
Temperature: 22 °C
Detection: MS/MS
Detector: SCIEX API 4000™
Sample: 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 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/PSI)	USP Column Classification
Polar C18	1.6, 3, 5	100	260	9	1.5 - 8.5*	1034/15,000	L1

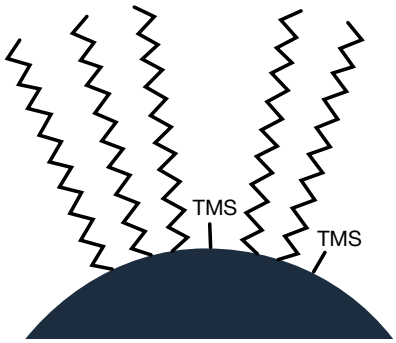
*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

Pressure limits are stable for all Luna Omega columns 4.6 mm ID and under.
For 10 mm ID Luna Omega columns pressure > 413 bar/6000 psi may compromise column longevity.
For 21.1 mm ID Luna Omega columns pressure > 241 bar/3500 psi may compromise column longevity.

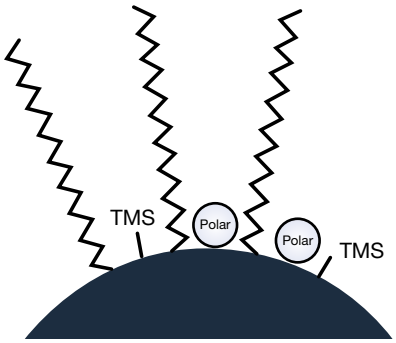
A C18, But Different

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

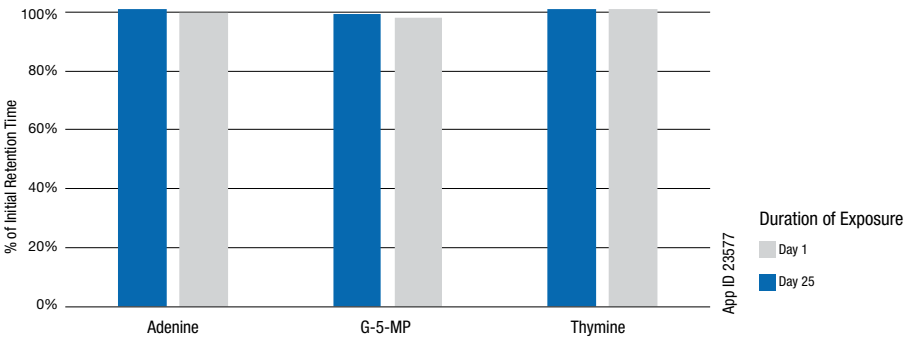


Luna Omega Polar C18 *(cont'd)*

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.

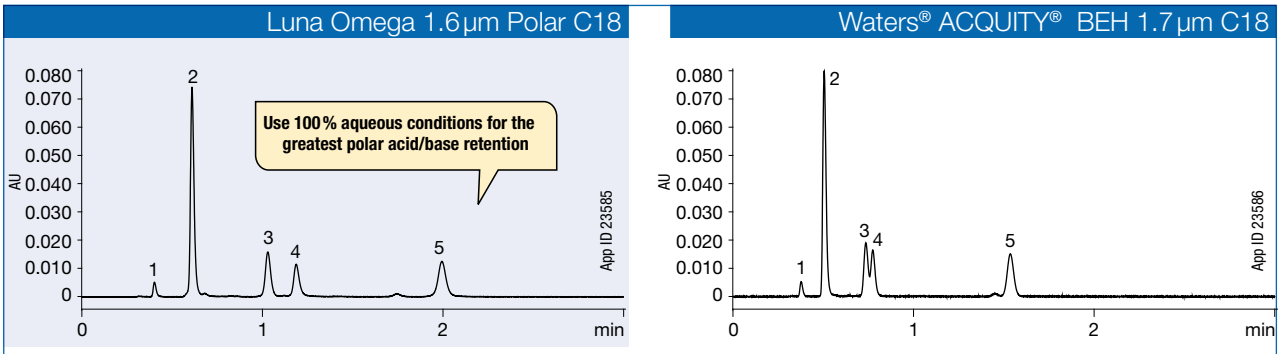
Aqueous Stability of Luna Omega Polar C18



Conditions for all columns:

Columns: Luna Omega 1.6 µm Polar C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4748-AN
Mobile Phase: 10 mM Ammonium Formate with 0.1 % Formic Acid
Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: UV @ 254 nm
Sample: 1. Adenine
2. Guanosine-5-Monophosphate
3. Thymine

Nucleosides in 100 % Aqueous Conditions



Conditions for all columns:

Columns: Luna Omega 1.6 µm Polar C18
ACQUITY BEH 1.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: 20 mM Ammonium Formate pH 3.0
Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: UV @ 285 nm
Sample: 1. Thiourea
2. 5-Fluorocytosine
3. Guanosine-5-Monophosphate
4. Adenine
5. Thymine

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**

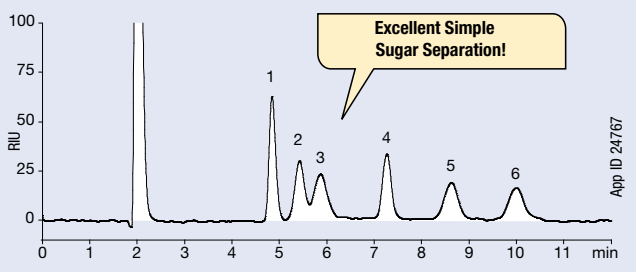
Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	pH Stability	Pressure Limit (bar/PSI)	USP Column Classification
Luna Omega SUGAR	3	100	260	<2	2.0-7.0	1034/15,000	L8

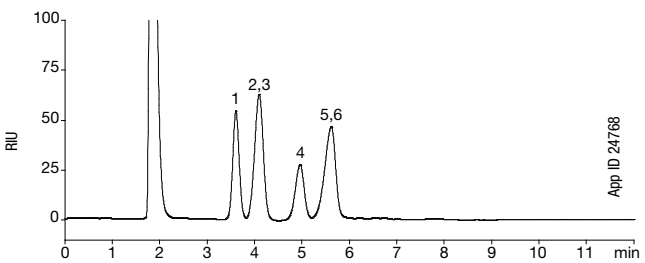
Exceptional Retention and Separation

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.

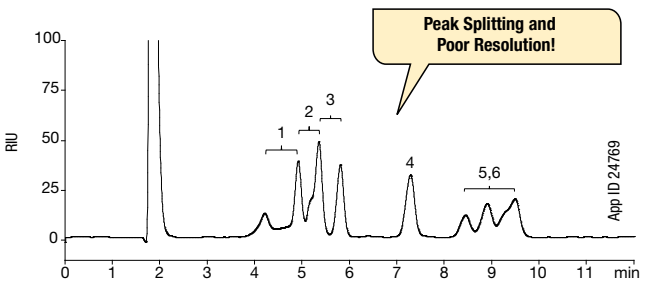
Luna Omega 3 µm SUGAR



Fully Porous 3 µm NH_2



Hybrid Fully Porous 3.5 µm Amide



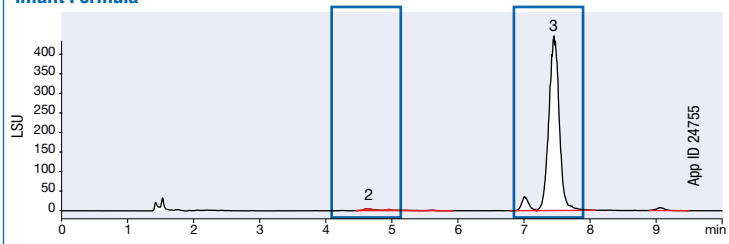
Conditions for all columns:

Columns: Luna Omega 3 µm SUGAR
Fully Porous 3 µm NH_2
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

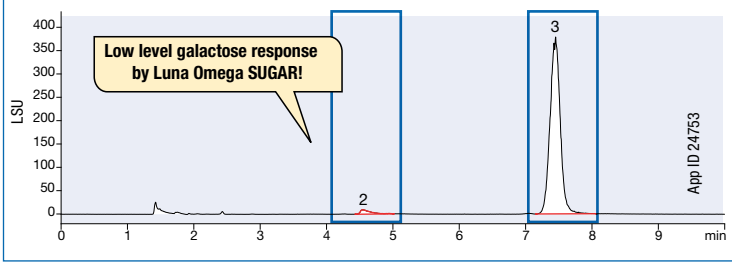
Comparative separations may not be representative of all applications.

Luna Omega SUGAR *(cont'd)*

Infant Formula



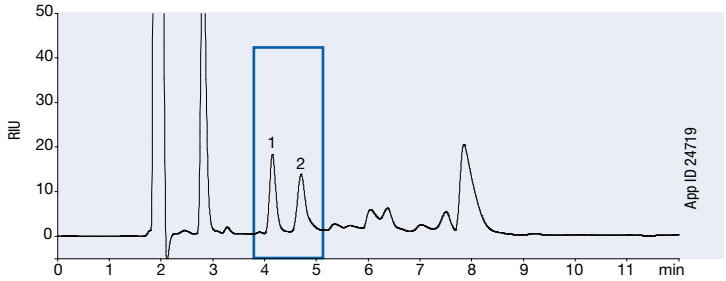
2% Fat Milk



Conditions for both samples:

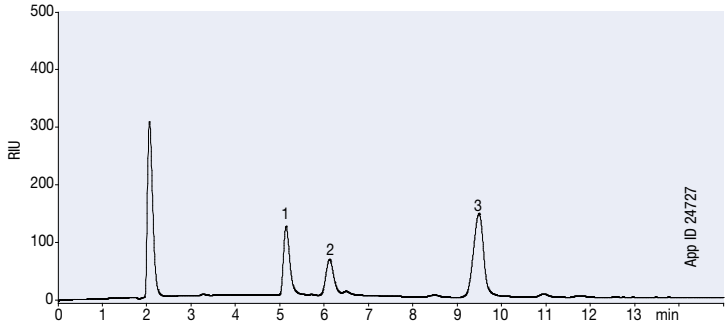
Column: Luna Omega 3 µm SUGAR
Dimensions: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: Acetonitrile/Water (75:25)
Flow Rate: 1 mL/min
Temperature: 35 °C
Detection: ELSD
Sample: 1. Glucose
2. Galactose
3. Lactose

Merlot



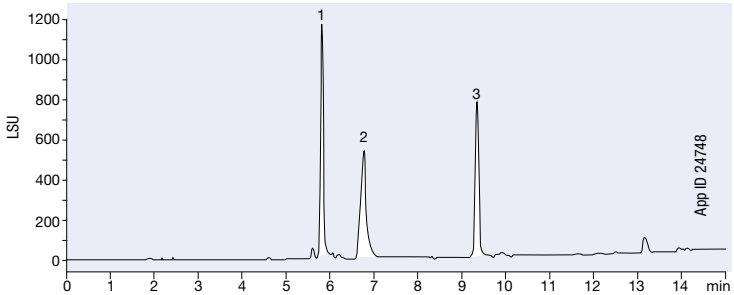
Column: Luna Omega 3 µm SUGAR
Dimensions: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: Acetonitrile/Water (75:25)
Flow Rate: 1 mL/min
Temperature: 40 °C
Detection: RI
Sample: 1. Fructose
2. Glucose

Orange Juice



Column: Luna Omega 3 µm SUGAR
Dimensions: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: Acetonitrile/Water (80:20)
Flow Rate: 1 mL/min
Temperature: 40 °C
Detection: RI
Sample: 1. Fructose
2. Glucose
3. Sucrose

Animal Feed and Molasses



Column: Luna Omega 3 µm SUGAR
Dimensions: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: A: Water
B: Acetonitrile/Isopropanol/Water (90:5:5)

Gradient:

Time (min)	% B
0	90
0.5	90
15.5	70
17	70
18	90
20	90

Flow Rate: 1 mL/min
Injection Volume: 5 µL
Temperature: 35 °C
Detection: ELSD
Sample: 1. Fructose
2. Glucose
3. Sucrose

Luna Omega *(cont'd)*

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	—	00D-4752-A0	—
C18	00B-4742-A0	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 Micro LC 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 Columns (mm)					SecurityGuard Cartridges (mm)
Phases	**30 x 2.1**	**50 x 2.1**	**100 x 2.1**	**150 x 2.1**	**4 x 2.0* /10 pk**
Polar C18	00A-4760-AN	00B-4760-AN	00D-4760-AN	00F-4760-AN	AJ0-7600
PS C18	00A-4758-AN	00B-4758-AN	00D-4758-AN	00F-4758-AN	AJ0-7605
C18	—	00B-4784-AN	00D-4784-AN	00F-4784-AN	AJ0-7611
SUGAR	—	00B-4775-AN	00D-4775-AN	00F-4775-AN	AJ0-4496

for ID: 2.0-3.0 mm

3 µm MidBore™ Columns (mm)				SecurityGuard Cartridges (mm)
Phases	**50 x 3.0**	**100 x 3.0**	**150 x 3.0**	**4 x 2.0* /10 pk**
Polar C18	00B-4760-Y0	00D-4760-Y0	00F-4760-Y0	AJ0-7600
PS C18	00B-4758-Y0	00D-4758-Y0	00F-4758-Y0	AJ0-7605
C18	00B-4784-Y0	00D-4784-Y0	00F-4784-Y0	AJ0-7611
SUGAR	—	—	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* /10 pk**
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
C18	00B-4784-E0	00D-4784-E0	00F-4784-E0	00G-4784-E0	AJ0-7612
SUGAR	—	00D-4775-E0	00F-4775-E0	00G-4775-E0	AJ0-4495

for ID: 3.2-8.0 mm

For 5 µm Luna Omega Micro LC Columns, Traps, and Fittings, see page 175-177.

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* /10 pk**
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* /10 pk**
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
C18	00B-4785-E0	00D-4785-E0	00F-4785-E0	00G-4785-E0	AJ0-7612

for ID: 3.2-8.0 mm

5 µm Semi-Preparative Columns (mm)		SecurityGuard Cartridges (mm)
Phases	**250 x 10**	**10 x 10** /3 pk**
Polar C18	00G-4754-N0	AJ0-9519
PS C18	00G-4753-N0	AJ0-9520

for ID: 9-16 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

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**	**15 x 21.2** /ea**
Polar C18	00B-4754-P0-AX	00D-4754-P0-AX	00F-4754-P0-AX	00G-4754-P0-AX	AJ0-7603
PS C18	00B-4753-P0-AX	00D-4753-P0-AX	00F-4753-P0-AX	00G-4753-P0-AX	AJ0-7608
C18	—	—	—	00G-4785-P0-AX	—

for ID: 18-29 mm

5 µm Axia™ Packed Preparative Columns (mm) (cont'd)					SecurityGuard Cartridges (mm)
Phases	**100 x 30**	**150 x 30**	**250 x 30**	**250 x 50**	**15 x 30.0♦ /ea**
Polar C18	00D-4754-U0-AX	00F-4754-U0-AX	00G-4754-U0-AX	00G-4754-V0-AX	AJ0-7604
PS C18	00D-4753-U0-AX	00F-4753-U0-AX	00G-4753-U0-AX	00G-4753-V0-AX	AJ0-7609

for ID: 30-49 mm

phenomenex™

Anionic and Cationic Pesticides Analysis with ONE Column

Luna Polar Pesticides HPLC column

- Fast equilibration
- Excellent retention
- Versatile selectivity

Mentioned in the QuPPe-PO v12.2 (EURL-SRM)

www.phenomenex.com/lunapolarpesticides

Coated and Immobilized Polysaccharide Chiral Phases that Offer Broad Enantioselectivity

SFC APPROVED

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.

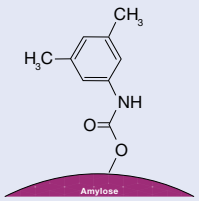
Technical Specifications

Particle Size	3, 5 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)

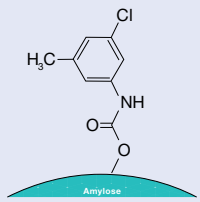
†Please inquire for availability

Resolve Over 92% of Your Enantiomers with Our Eight Coated and Immobilized Phases!

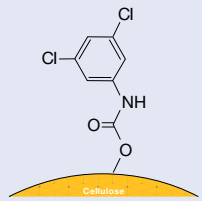
Immobilized Lux Columns



Lux i-Amylose-1
Amylose tris
(3,5-dimethylphenylcarbamate)

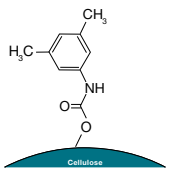


Lux i-Amylose-3
Amylose tris
(3-chloro-5-methylphenylcarbamate)

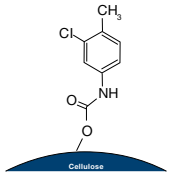


Lux i-Cellulose-5
Cellulose tris
(3,5-dichlorophenylcarbamate)

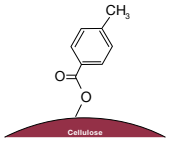
Coated Lux Columns



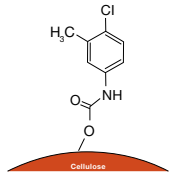
Lux Cellulose-1
Cellulose tris
(3,5-dimethylphenylcarbamate)



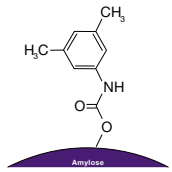
Lux Cellulose-2
Cellulose tris
(3-chloro-4-methylphenylcarbamate)



Lux Cellulose-3
Cellulose tris
(4-methylbenzoate)



Lux Cellulose-4
Cellulose tris
(4-chloro-3-methylphenylcarbamate)



Lux Amylose-1
Amylose tris
(3,5-dimethylphenylcarbamate)

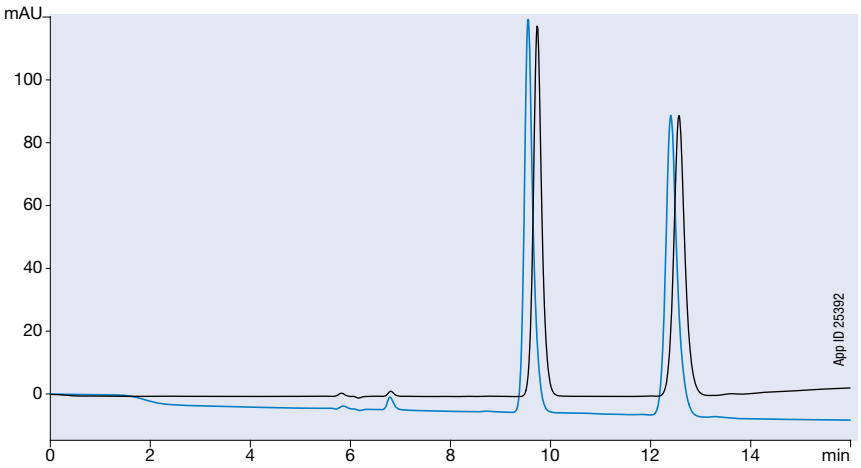
Easily upgrade from your existing chiral columns to Lux LC/SFC columns!

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)
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)
CHIRALPAK AD®, AD-H®, AD-3, AD-RH®, and AD-3R	Lux Amylose-1	Amylose tris(3,5-dimethylphenylcarbamate)

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.

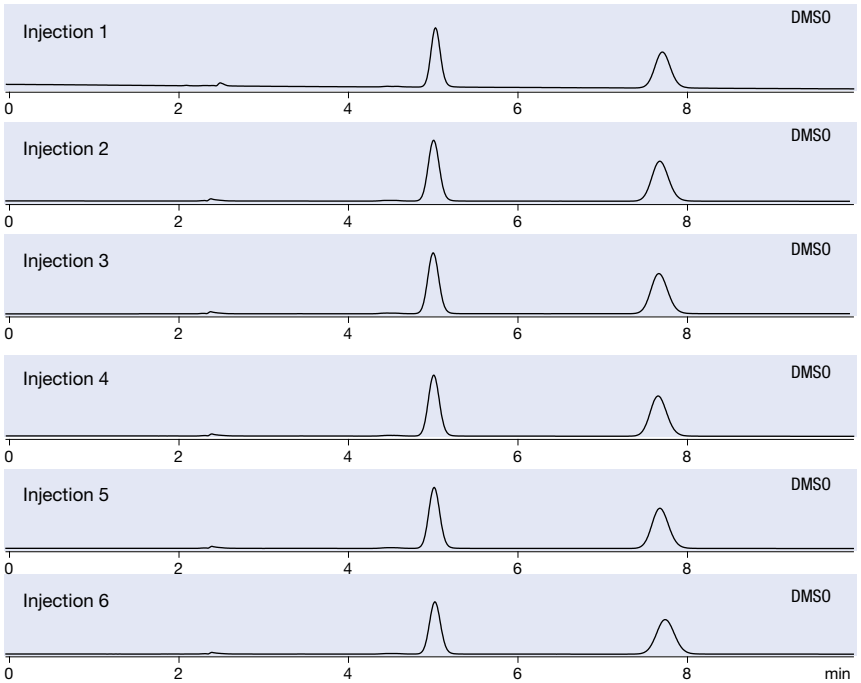
Conditions for all separations:

Columns: Lux 5 µm i-Amylose-3
Dimensions: 250 x 4.6 mm
Part No.: 00G-4779-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.

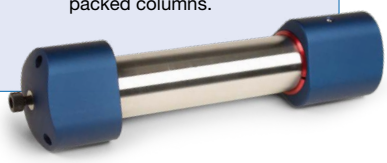


Conditions for all separations:

Column: Lux 5 µm i-Celluose-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.



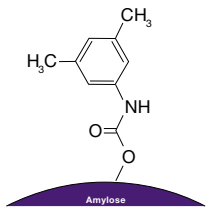
Lux Chiral Stationary Phases

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.

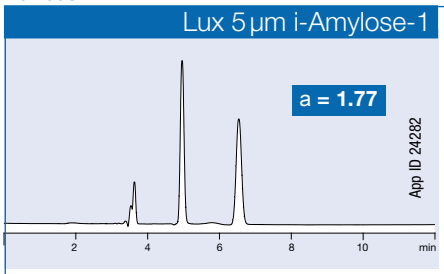
Lux i-Amylose-1: Immobilized 3,5-Dimethyl Phenylcarbamate Selector

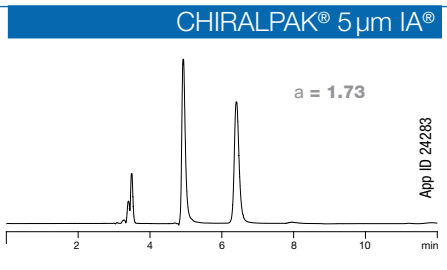
Known to have broad enantio-recognition, this incredibly popular Amylose tris (3,5-dimethylphenylcarbamate) chiral selector provides polar, electrostatic, hydrophobic, van der Waals, and other retention mechanisms.



Amylose tris(3,5-dimethylphenylcarbamate)

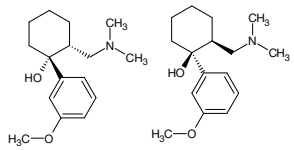
Tramadol





Conditions for both columns:

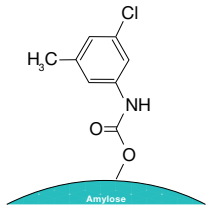
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % DEA in Hexane / 0.1 % DEA in IPA (90:10)
Flow Rate: 1 mL/min
Detection: UV @ 270 nm
Temperature: Ambient



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

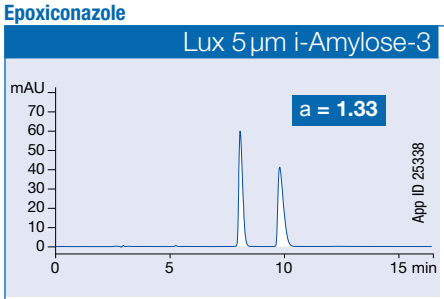
Lux i-Amylose-3: Immobilized 3-Chloro, 5-Methyl Phenylcarbamate Selector

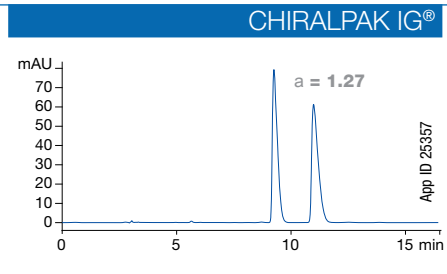
Lux immobilized chiral stationary phases provide complementary but distinct enantioselectivity for a wide range of chirality. In addition, the immobilization process allows for the use of a wide range of mobile phases and strong solvents, making the Lux immobilized phases an ideal set of chiral phases to start screening with.



Amylose tris(3-chloro-5-methylphenylcarbamate)

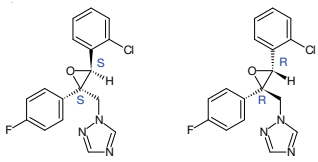
Epoxiconazole





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



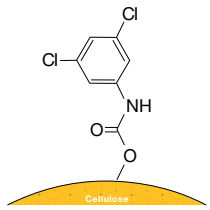
Columns used for comparison were manufactured by DAICEL Corporation. Phenomenex is in no way affiliated with DAICEL Corporation.
Comparative separations may not be representative of all applications.

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

SFC APPROVED

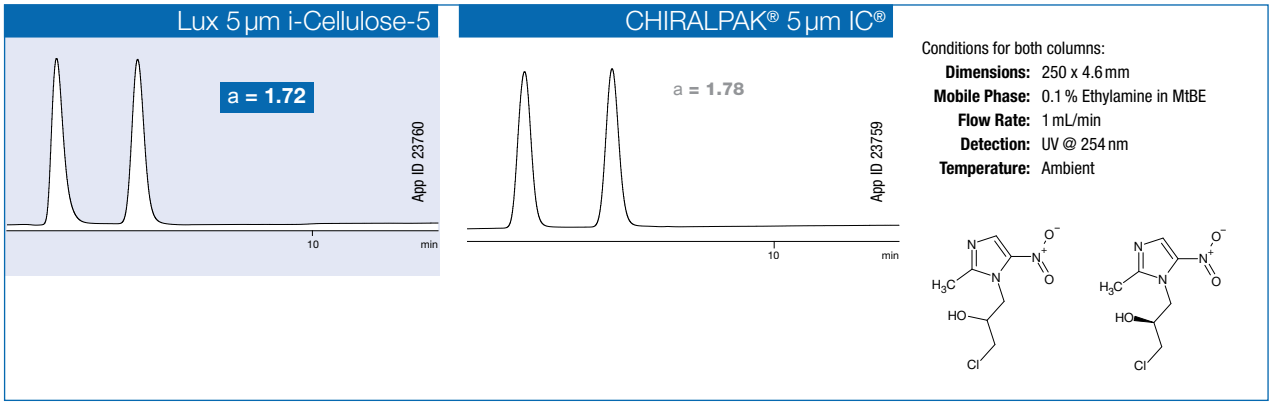
Lux i-Cellulose-5:
Immobilized 3,5-Dichloro Phenylcarbamate Selector

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



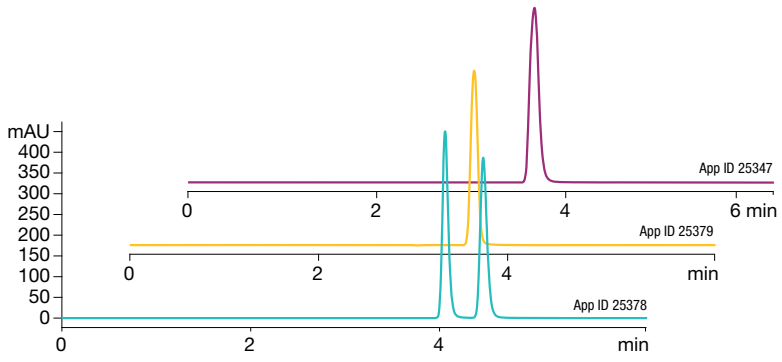
Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Ethylamine in MtBE
Flow Rate: 1 mL/min
Detection: UV @ 254 nm
Temperature: Ambient

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.

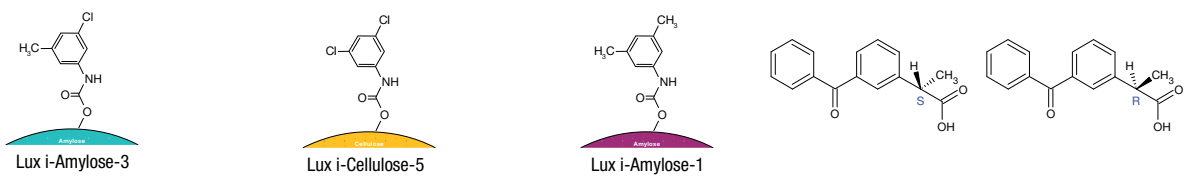
Immobilized Selectivity Comparison

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



Conditions for all:
Columns: Lux 5 µm i-Amylose-3
Lux 5 µm i-Cellulose-5
Lux 5 µm i-Amylose-1
Dimensions: 250 x 4.6 mm
Part No.: 00G-4779-E0
00G-4756-E0
00G-4762-E0
Mobile Phase: Acetonitrile with 0.1 % Formic Acid
Flow Rate: 1.0 mL/min
Injection Volume: 10 µL (2 mg/mL)
Detection: UV @ 254 nm
Temperature: Ambient

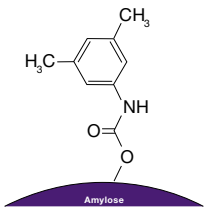


Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

SFC APPROVED

Lux Amylose-1:
Coated 3,5-Dimethyl Phenylcarbamate Selector

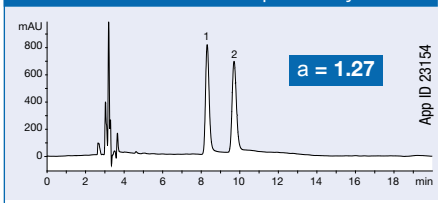
This universally trusted amylose phenylcarbamate derivative is absolutely essential to any chiral screen. Lux Amylose-1 is a guaranteed alternative to CHIRALPAK® AD®. Expect equivalent or better performance when using this Lux phase.



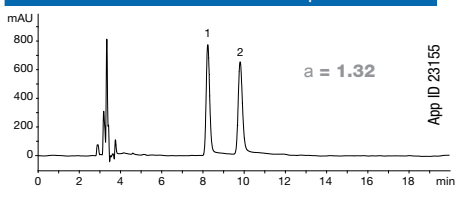
Amylose tris(3,5-dimethylphenylcarbamate)

Ketoprofen

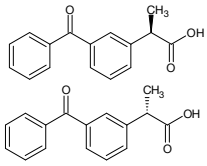
Lux 5 µm Amylose-1



CHIRALPAK® 5 µm AD-H®



Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Formic acid in Hexane / 0.1 % Formic acid in Isopropanol (80:20)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient



Chiral Screening

For more information or to begin a project today, please contact your local Phenomenex representative.

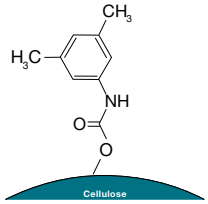
www.phenomenex.com/contact-us

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

SFC APPROVED

Lux Cellulose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector

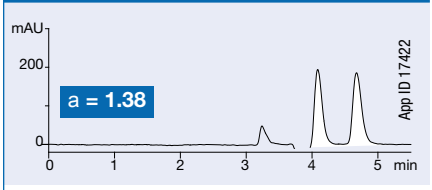
This universally trusted cellulose phenylcarbamate derivative is absolutely essential to any chiral screen. Guaranteed alternative to CHIRALCEL® OD-H®. Expect equivalent or better performance.



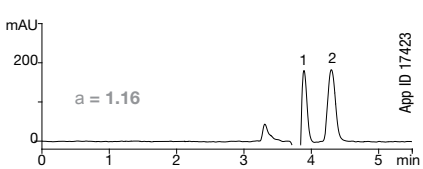
Cellulose tris(3,5-dimethylphenylcarbamate)

Metoprolol

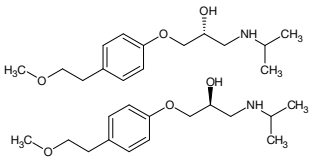
Lux 5 µm Cellulose-1



CHIRALCEL® 5 µm OD-H®



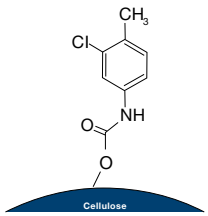
Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Acetonitrile / 0.1 % Diethylamine in Isopropanol (95:5)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

Lux Cellulose-2: Coated 3-Chloro, 4-Methyl Phenylcarbamate Selector

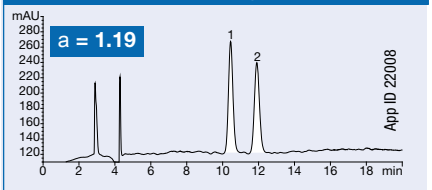
This first-to-market halogenated cellulose phenylcarbamate derivative offers unique chiral recognition abilities that complement the rest of the Lux family of columns.



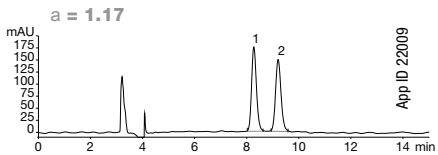
Cellulose tris(3-chloro-4-methylphenylcarbamate)

Alprenolol

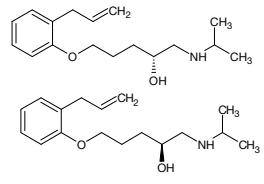
Lux 5 µm Cellulose-2



CHIRALCEL® 5 µm OZ-H®



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



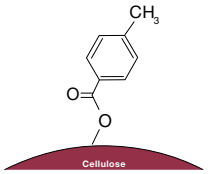
Comparative separations may not be representative of all applications.

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

SFC APPROVED

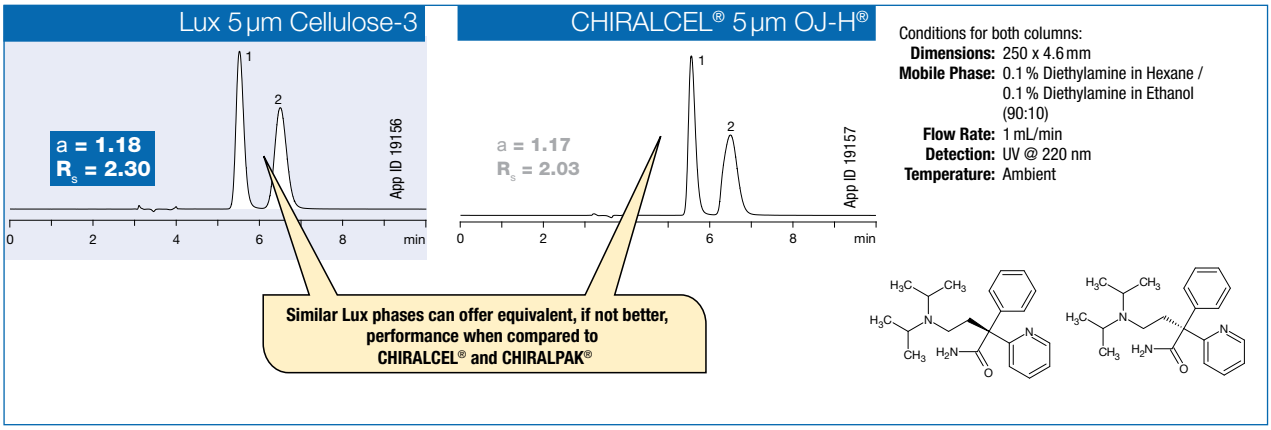
Lux Cellulose-3: Coated 4-Methyl Phenylacetate Selector

This cellulose methylbenzoate derivative offers distinct and complementary chiral recognition abilities.



Cellulose tris(4-methylbenzoate)

Disopyramide

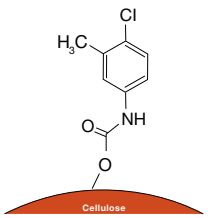


Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Hexane / 0.1 % Diethylamine in Ethanol (90:10)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

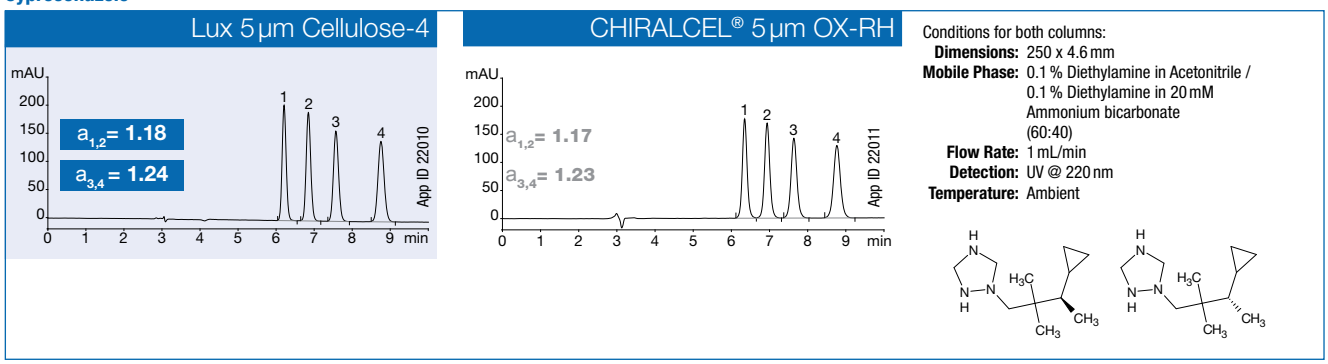
Lux Cellulose-4: Coated 4-Chloro, 3-Methyl Phenylcarbamate Selector

This chlorinated cellulose phenylcarbamate derivative offers unique chiral recognition abilities.



Cellulose tris(4-chloro-3-methylphenylcarbamate)

Cyproconazole

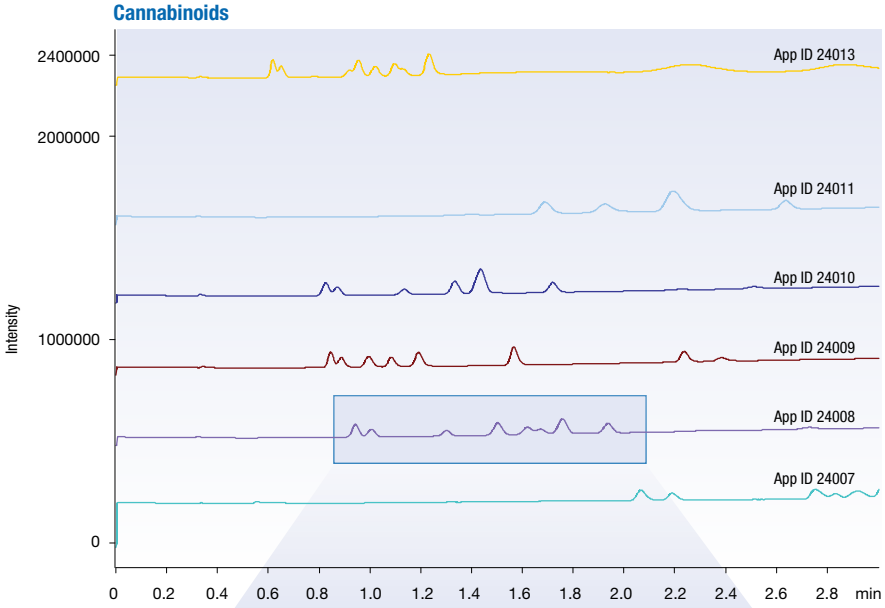


Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Acetonitrile / 0.1 % Diethylamine in 20 mM Ammonium bicarbonate (60:40)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

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.



Conditions for all columns:

Columns: Lux 3 µm i-Cellulose-5
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:

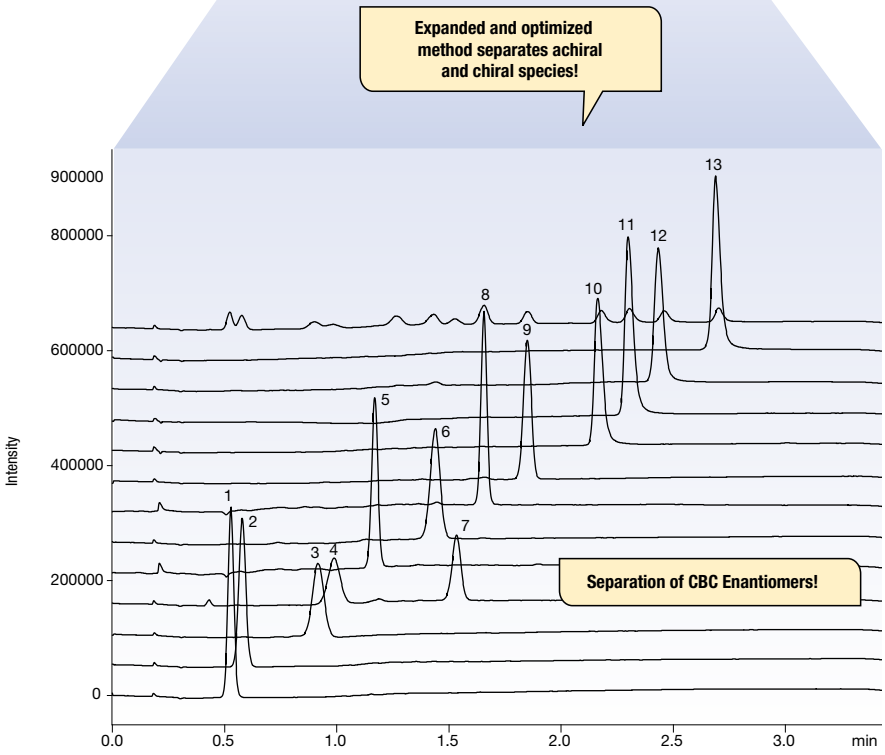
Time (min)	% B
0	5
2.5	25
3	25

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
2. CBN
3. Delta-8-THC
4. CBC (Enantiomer 1)
5. CBD
6. Delta-9-THC
7. CBC (Enantiomer 2)
8. THCV
9. CBG
10. CBDA
11. CBDVA
12. THCA
13. CBGA

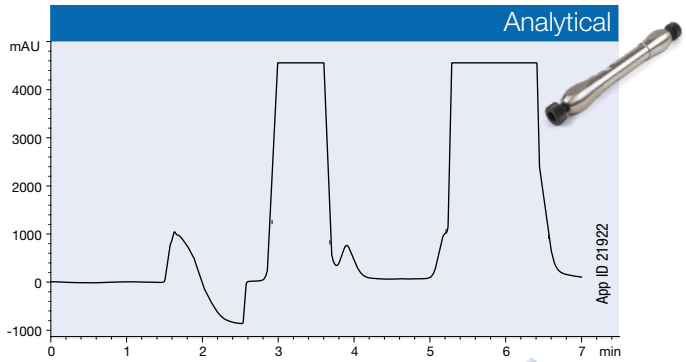
Axia™ Chiral Columns Out Perform Other Prep Columns

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.

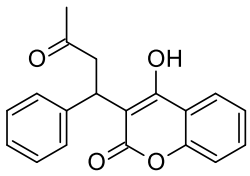
To better understand how much Axia technology improves column performance over traditionally slurry packed preparative columns we scaled-up a 5 µm Lux Cellulose-1 chiral media analytical column and packed the same media into two different 150 x 21.2 mm ID columns. One column was packed using Axia technology 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.

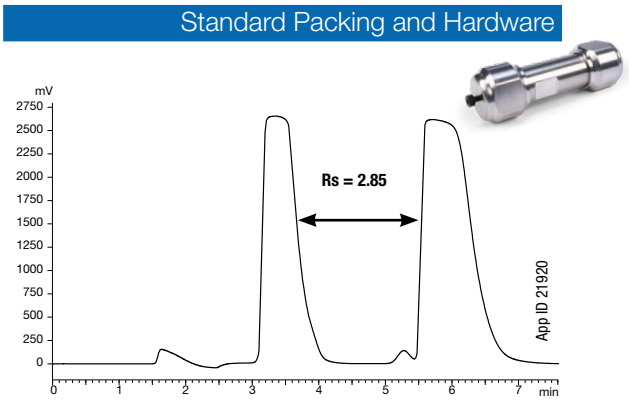
Warfarin Chiral Purification in Normal Phase Mode

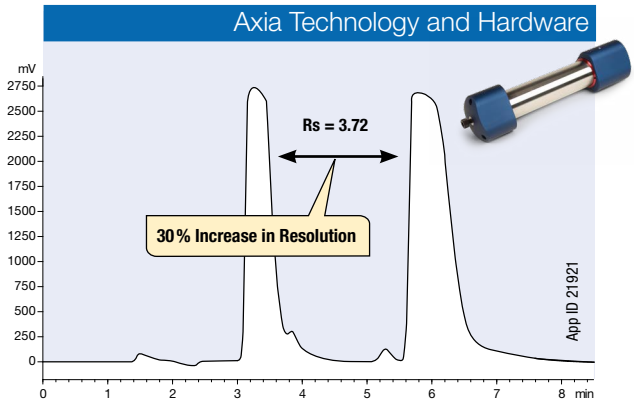


Column: Lux 5 µm Cellulose-1
Dimensions: 150 x 4.6 mm
Mobile Phase: Hexane/Ethanol (75:25)
Flow Rate: 1 mL/ min
Temperature: Ambient
Inj. Volume: 100 µL



Warfarin





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 and SFC Columns *(cont'd)*

Ordering Information

3 µm Minibore, MidBore™, and Analytical Columns (mm)										SecurityGuard™ Cartridges (mm)	
Phases	**50 x 2.0**	**150 x 2.0**	**50 x 3.0**	**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-Y0	—	—	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	00B-4755-Y0	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	00B-4458-Y0	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	00B-4456-Y0	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	00B-4492-Y0	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	00B-4490-Y0	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	00B-4729-Y0	00D-4729-Y0	00F-4729-Y0	00B-4729-E0	00D-4729-E0	00F-4729-E0	00G-4729-E0	AJ0-9337	AJ0-9336
									for ID:	2.0–3.0 mm	3.2–8.0 mm

5 µm 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-B0	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
						for ID: 2.0–3.0 mm	3.2–8.0 mm

5 µm 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
			for ID: 9–16 mm

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.

5 µm 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
					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

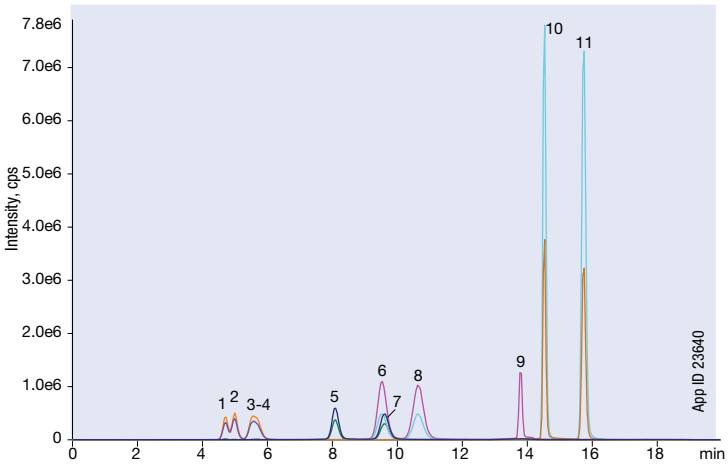
Rapid and Accurate Chiral Separation of Methamphetamine and Amphetamine Enantiomers from Urine

SFC APPROVED

Lux 3µm AMP is a unique LC media that is specifically developed and tested for the chiral analysis of amphetamine and substituted amphetamines, including methamphtetamine. 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 3µm 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

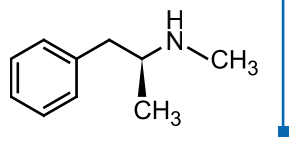
Flow Rate: 0.42 mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX® 4500 QTRAP®)

1. 1S,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:

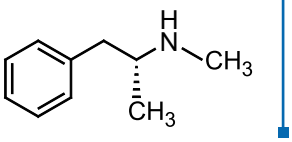
acetaminophen
aspirin
(±)-chlorpheniramine
caffeine
diphenhydramine
dextromethorphan
ibuprofen
(±)-MDA
(±)-MDEA
phenylephrine
norephedrine

D-Methamphetamine



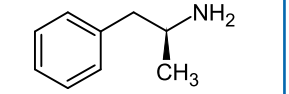
S(+)-Methamphetamine

L-Methamphetamine



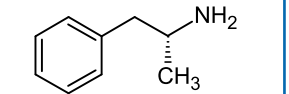
R(-)-Methamphetamine

D-Amphetamine



S(+)-Amphetamine

L-Amphetamine



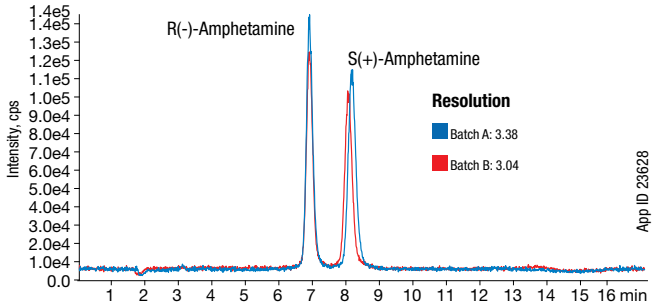
R(-)-Amphetamine

Lux AMP Chiral LC Columns *(cont'd)*

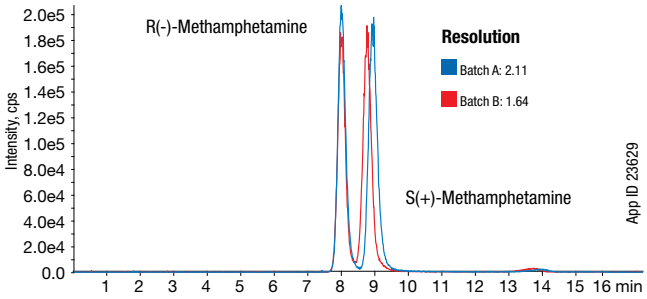
Exceptional Reliability

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.

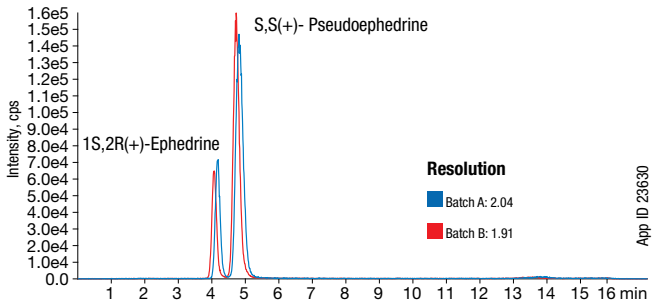
Amphetamine Enantiomers



Methamphetamine Enantiomers



Ephedrine and Pseudoephedrine



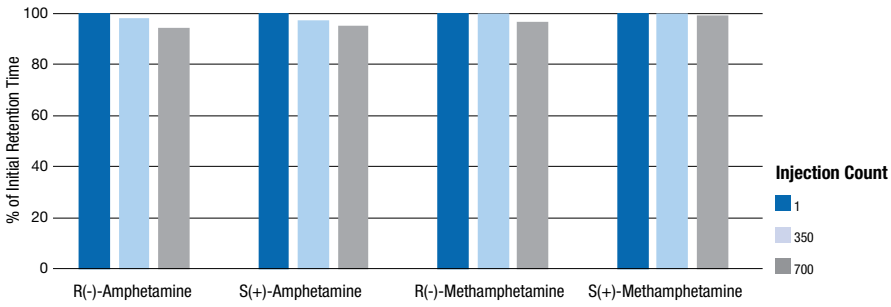
Column: Lux 3 µm AMP
Dimension: 150 x 3.0 mm
Part No.: 00F-4751-Y0
Mobile Phase: A: 5 mM Ammonium Bicarbonate, adjusted to pH 11 with Ammonium Hydroxide
B: Methanol

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:
1. Ephedrine
2. Pseudoephedrine
3. R(-)-Amphetamine
4. S(+)-Amphetamine
5. R(-)-Methamphetamine
6. S(+)-Methamphetamine

Excellent Lifetime



Ordering Information

3 µm Analytical Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phase	100 x 3.0	150 x 3.0	150 x 4.6	4 x 2.0*	4 x 3.0*
				10/pk	10/pk
AMP	00D-4751-Y0	00F-4751-Y0	00F-4751-E0	AJ0-8475	AJ0-8476
				for ID: 2.0 - 3.0 mm	3.2 - 8.0 mm

*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282

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 21.2 mm 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)
Analytical Columns		
CH0-8373	Onyx Monolithic C18	50 x 2.0
CH0-8158	Onyx Monolithic C18	100 x 3.0
CH0-7643	Onyx Monolithic C18	100 x 4.6
CH0-7644	Onyx Monolithic C18	50 x 4.6
CH0-7645	Onyx Monolithic C18	25 x 4.6
CH0-8611	Onyx Monolithic HD-C18	100 x 4.6
CH0-7647	Onyx Monolithic C8	100 x 4.6
SemiPrep Columns		
CH0-7878	Onyx Monolithic C18	100 x 10.0
Guard Cartridge System		
KJ0-8465	Onyx Monolithic C18 Guard Cartridge Kit (3/pk cartridges + holder)	5 x 3.0
CH0-8466	Onyx Monolithic C18 Guard Cartridges (3/pk)	5 x 3.0
CH0-7649	Onyx Monolithic C18 Guard Cartridges (3/pk)	5 x 4.6
KJ0-7652	Onyx Monolithic C18 Guard Cartridge Kit (3/pk cartridges + holder + wrench)	10 x 4.6
CH0-7650	Onyx Monolithic C18 Guard Cartridges (3/pk)	10 x 4.6
Column Coupler		
AQ0-7654	Onyx Column Coupler, 0.020 in. ID	

For Onyx Reversed Phase Column Check Standard, see page 208.

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 Ultrastyragel™, and other columns (see p. 320)**
- **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 10^6 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.

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

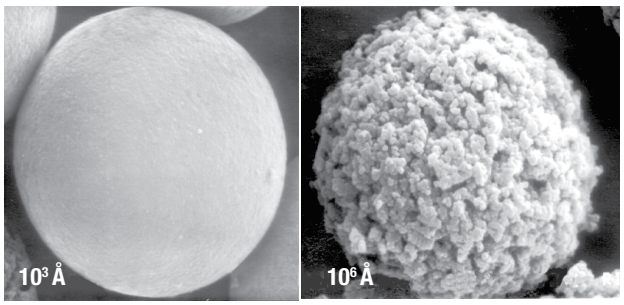
* Tested in THF ** For 300 x 7.8 mm ID columns

† See note on p. 444 regarding pore sizes and exclusion limits

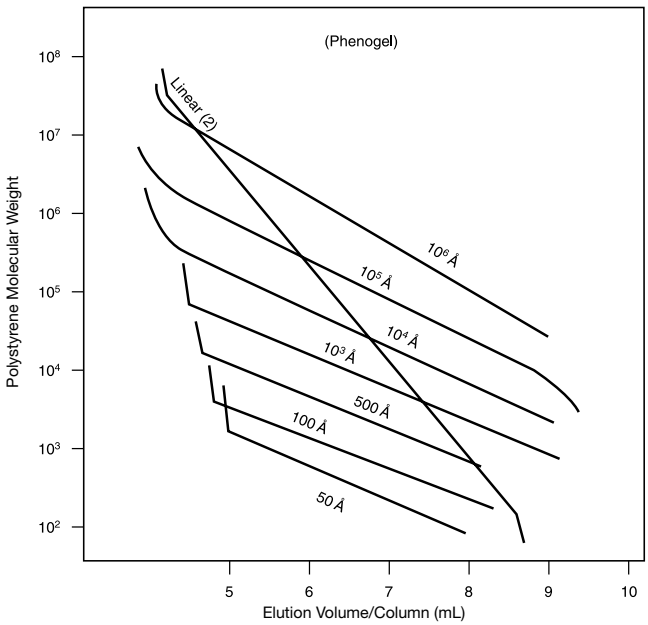
Column Selection by Molecular Weight

Sample Type	Molecular Weight	Phenogel Column
Small Organics	100 - 3 K 500 - 6 K 1 K - 15 K	50 Å 100 Å 500 Å
Resins	1 K - 75 K 5 K - 500 K 10 K - 1,000 K	10^3 Å 10^4 Å 10^5 Å
High MW Polymers	60 K - 10,000 K 100 - 10,000 K	10^6 Å Linear(2)

SEM Photos of Phenogel Polymer Beads



Column Molecular Weight Calibration Curves



Solvent and Temperature Compatibility

- **Phenogel columns are packed in tetrahydrofuran (THF)**
- **Columns can also be shipped DMF to help minimize equilibration time**

Solvent Compatibility Table

Mobile Phase Solvent	Phenogel Pore Size (Å) 50	100	500	10^3	10^4	10^5	10^6	Linear & Mixed	Suggested Operating Temp.
Acetone	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	
0-Chlorophenol	Y*	Y	Y	Y	Y	Y	Y	Y	100 °C
0-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.*

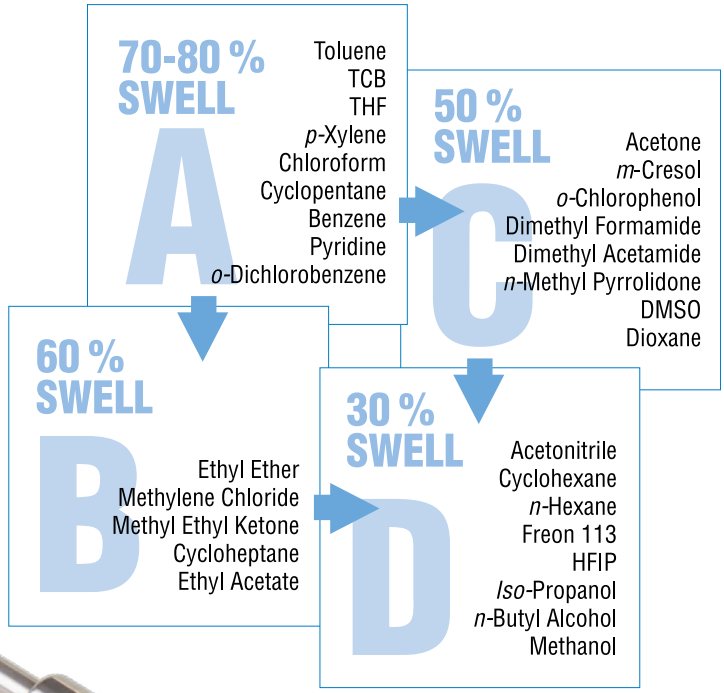
N = Not Compatible
Y = Compatible

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 249 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.

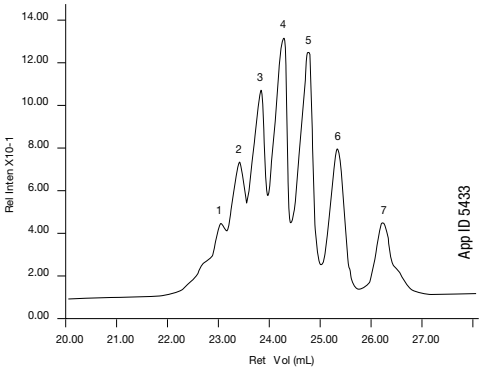


Pharmaceutical Excipients Analysis

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.

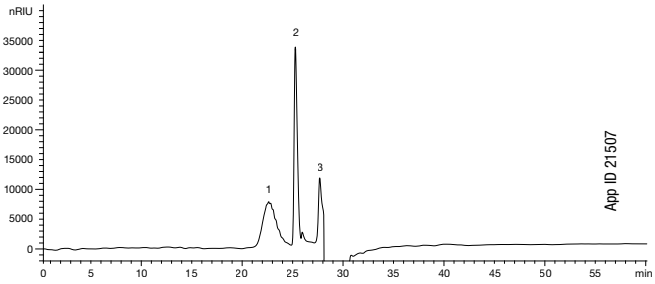
Polyethylene Glycol 330

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
2. dp6 458 MW
3. dp5 370 MW
4. dp4 282 MW
5. dp3 194 MW
6. dp2 106 MW
7. dp1 62 MW



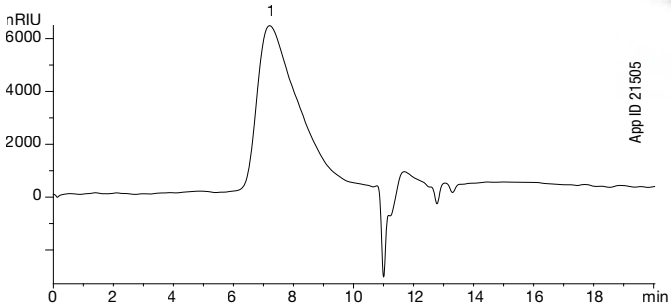
Polyethylene Glycol 106

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)

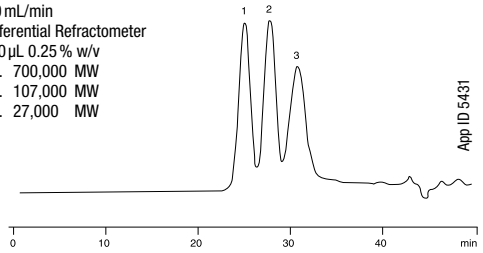


50 Å - 10^6 Å Columns

- **High resolution at low cost**
- **Customize your analysis by coupling different pore-size columns**
- **Wide range of solvent compatibility**

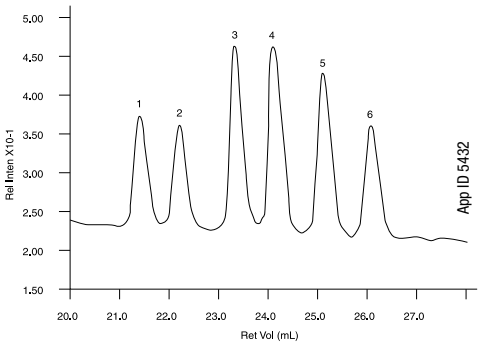
Polymethyl Methacrylates (Wide MW Range)

Column: Phenogel 5 µm 10^5 Å, 10^4 Å, 10^3 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:
1. 700,000 MW
2. 107,000 MW
3. 27,000 MW



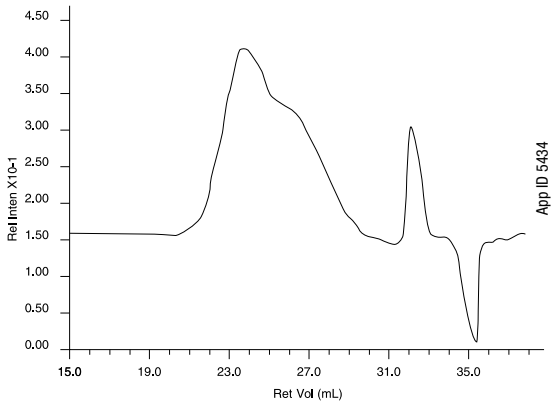
Closely Related Hydrocarbons

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:
1. C40 562 MW
2. C32 450 MW
3. C24 338 MW
4. C20 282 MW
5. C16 226 MW
6. C13 184 MW



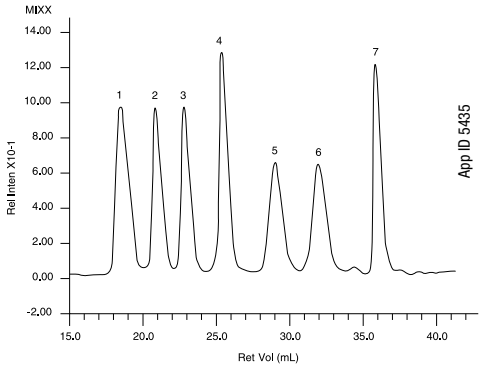
Polyethylene Oxide (PEO)

Column: Phenogel 10 µm 10^5, 10^4, 10^3 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



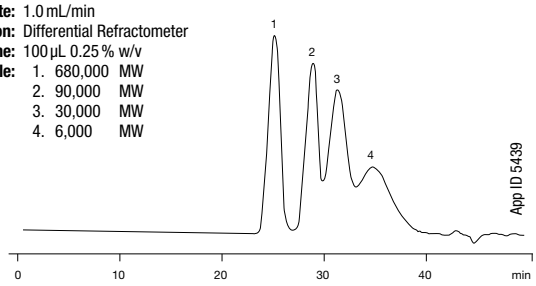
Polystyrenes (Wide MW Range)

Column: Phenogel 10 µm 10^5, 10^4, 10^3 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:
1. 1,560,000 MW
2. 260,000 MW
3. 94,000 MW
4. 30,000 MW
5. 6,100 MW
6. 845 MW
7. 146 MW



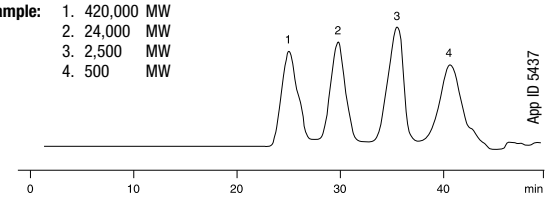
Poly-(α-Methyl Styrene) (Wide MW Range)

Column: Phenogel 5 µm 10^5, 10^4 , 10^3 , 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:
1. 680,000 MW
2. 90,000 MW
3. 30,000 MW
4. 6,000 MW



Polybutadienes (Wide MW Range)

Column: Phenogel 5 µm 10^5, 10^4, 10^3, 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:
1. 420,000 MW
2. 24,000 MW
3. 2,500 MW
4. 500 MW

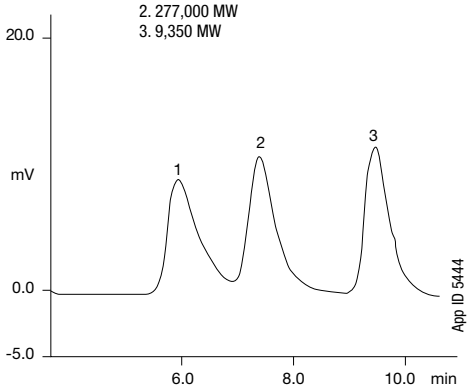


Linear Columns

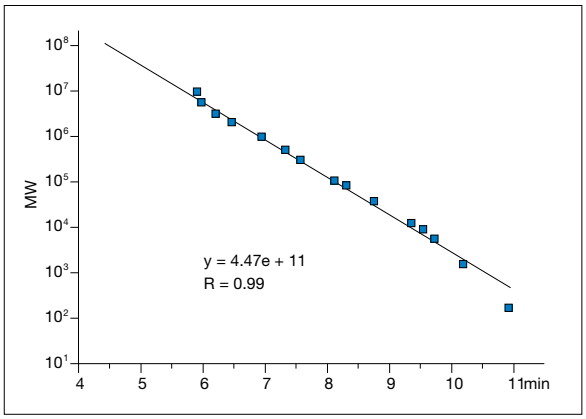
- **Linear calibration to 10 million daltons**
- **Long column lifetime**
- **Excellent mechanical stability**
- **Excellent for analyzing a wide range of molecular weights**

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: AR0-9925-13
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

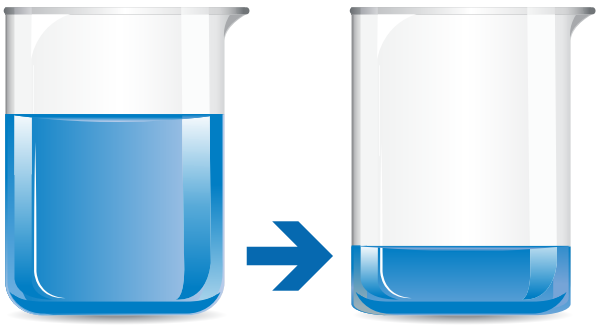
- **Decrease solvent consumption**
- **Retain same elution profile**
- **Reduce solvent disposal costs**

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 Down on Waste!



7.5-8.0 mm ID — 4.6 mm ID

DISCOVER HOW MUCH YOU WILL SAVE
when switching to Phenogel Narrow Bore columns!

Try our solvent savings calculator web tool at
www.phenomenex.com/GPCSavings

Phenogel Organic GPC/SEC Columns *(cont'd)*

Ordering Information

5 µm Analytical Columns (mm)		Shipping Solvent THF	Shipping Solvent DMF	Guards	SecurityGuard™ Cartridges (mm)
		300 x 7.8	300 x 7.8	50 x 7.8	4 x 3.0*
Pore Size	**MW Range**			ea	/3pk
50 Å	100-3 K	00H-0441-K0	00H-0441-K0-DF	03B-2088-K0	AJ0-9292
100 Å	500-6 K	00H-0442-K0	—	03B-2088-K0	AJ0-9292
500 Å	1 K-15 K	00H-0443-K0	—	03B-2088-K0	AJ0-9292
10^3 Å	1 K-75 K	00H-0444-K0	00H-0444-K0-DF	03B-2088-K0	AJ0-9292
10^4 Å	5 K-500 K	00H-0445-K0	—	03B-2088-K0	AJ0-9292
10^5 Å	10 K-1,000 K	00H-0446-K0	00H-0446-K0-DF	03B-2088-K0	AJ0-9292
10^6 Å	60 K-10,000 K	00H-0447-K0	—	03B-2088-K0	AJ0-9292
		300 x 7.8	300 x 7.8	50 x 7.8	4 x 3.0*
Mixed Beds				ea	/3pk
Linear(2)	100-10,000 K	00H-3259-K0	00H-3259-K0-DF	03B-2088-K0	AJ0-9292

for 3.2–8.0 mm ID

5 µm Narrow Bore (NB) Columns (mm)			Guards	SecurityGuard Cartridges (mm)
		300 x 4.6	30 x 4.6	4 x 3.0*
Pore Size	**MW Range**		ea	/3pk
50 Å	100-3 K	00H-0441-E0	03A-2088-E0	AJ0-9292
100 Å	500-6 K	00H-0442-E0	03A-2088-E0	AJ0-9292
500 Å	1 K-15 K	00H-0443-E0	03A-2088-E0	AJ0-9292
10^3 Å	1 K-75 K	00H-0444-E0	03A-2088-E0	AJ0-9292
10^4 Å	5 K-500 K	00H-0445-E0	03A-2088-E0	AJ0-9292
10^5 Å	10 K-1,000 K	00H-0446-E0	03A-2088-E0	AJ0-9292
10^6 Å	60 K-10,000 K	00H-0447-E0	03A-2088-E0	AJ0-9292
		300 x 4.6	30 x 4.6	4 x 3.0*
Mixed Beds			ea	/3pk
Linear(2)	100-10,000 K	00H-3259-E0	03A-2088-E0	AJ0-9292

for 3.2–8.0 mm ID

10 µm Analytical Columns (mm)			Guards	SecurityGuard Cartridges (mm)
		300 x 7.8	50 x 7.8	4 x 3.0*
Pore Size	**MW Range**		ea	/3pk
50 Å	100-3 K	00H-0641-K0	03B-2090-K0	AJ0-9292
100 Å	500-6 K	00H-0642-K0	03B-2090-K0	AJ0-9292
500 Å	1 K-15 K	00H-0643-K0	03B-2090-K0	AJ0-9292
10^3 Å	1 K-75 K	00H-0644-K0	03B-2090-K0	AJ0-9292
10^4 Å	5 K-500 K	00H-0645-K0	03B-2090-K0	AJ0-9292
10^5 Å	10 K-1,000 K	00H-0646-K0	03B-2090-K0	AJ0-9292
10^6 Å	60 K-10,000 K	00H-0647-K0	03B-2090-K0	AJ0-9292
		300 x 7.8	50 x 7.8	4 x 3.0*
Mixed Beds			ea	/3pk
Linear(2)	100-10,000 K	00H-3260-K0	03B-2090-K0	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**		ea
100 Å	500-6 K	00H-0442-P0	03B-0642-P0

10 µm Preparative Columns (mm)			Guards
		300 x 21.2	50 x 21.2
Pore Size	**MW Range**		ea
100 Å	500-6 K	00H-0642-P0	03B-0642-P0

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 a Recommended Alternative to:

Manufacturer	Columns
Agilent® (Polymer Labs)	PLgel™
Jordi Labs	Jordi Resolve™ RP DVB Column Jordi Resolve DVB 13µ GPC Columns Jordi Resolve DVB GPC Column
Polymer Standards Service (PSS)	SDV® GRAM PolarSil PFG POLEFIN®
Shodex®	GPC K-800 Series GPC KF-800 Series GPC KD-800 Series GPC KF-200 Series
Tosoh Bioscience®	TSKgel® Hxl TSKgel Hhr
Waters®	Styragel® Ultrastyragel™ HSPgel™

*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282

For Column Heater, see page 205.

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 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

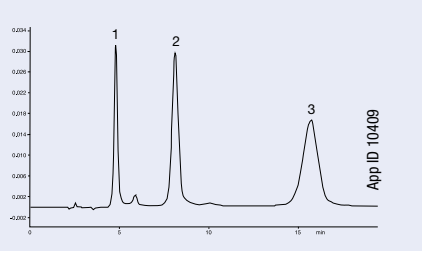
*pertains to dimethyltritylated (DMT) synthetic oligomer purification on a 150 x 4.1 mm column

Chromatographic Comparison of Polymer Columns

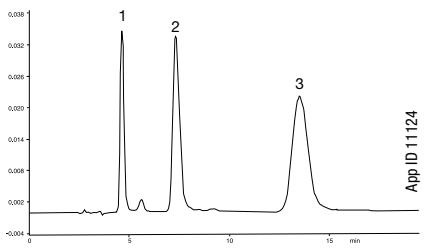
Tetracyclines

Dimensions: 150 x 4.6 mm
Mobile Phase: 50 g tertiary butyl alcohol in 200 mL water
60 mL pH 7.5 phosphate buffer
50 mL tetrabutyl ammonium hydrogen sulfate
10 mL EDTA disodium solution
diluted with water to 1000 mL
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Temperature: 60 °C
Injection Volume: 2 µL
Sample:
1. 4-Epioxytetracycline
2. Oxytetracycline
3. Tetracycline

PolymerX 5 µm RP-1



Agilent® 5 µm PLRP-S

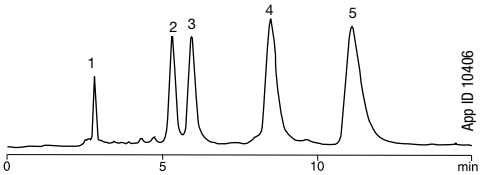


Comparative separations may not be representative of all applications.

Erythromycins

Column: PolymerX 7 µm RP-1
Dimensions: 250 x 4.6 mm
Part No.: 00G-4327-E0
Guard Cartridge: AJ0-5809
Guard Holder: KJ0-4282
Mobile Phase: A: 1.75 g dibasic potassium phosphate in 50 mL water, adjust to pH 9.0. Add 165 mL of tertiary butyl alcohol and 30 mL acetonitrile. Add water to a final volume of 1 L
B: Acetonitrile
A/B (50:50)
Flow Rate: 0.8 mL/min
Detection: UV @ 215 nm

Temperature: 75 °C
Injection Volume: 20 µL
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample:
1. Unknown
2. Erythromycin related compound N
3. Erythromycin C
4. Erythromycin A
5. Erythromycin B



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
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 page 208.

*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

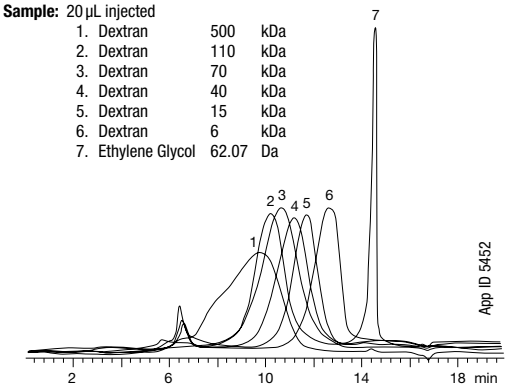
- **Highly hydrophilic synthetic polymer phase**
- **Suitable for water-soluble polymers**
- **Very low nonspecific interaction with the separation matrix**
- **Extremely cost-effective**
- **High efficiencies**
- **Good mechanical strength**

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.: CH0-9229
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



PolySep-GFC-P Technical Data and Specifications

Phase:	1000	2000	3000	4000	5000	6000	Linear
Exclusion Limits in Daltons:							
PEG	2×10^3	9×10^3	5×10^4	2×10^5	2×10^6	1×10^7	1×10^7
Pullulans	3.5×10^3	1×10^4	1×10^5	3.5×10^5	4×10^6	2×10^7	2×10^7
Separation Range (Da)	20 - 3K	100 - 10K	250 - 75K	3K - 400 K	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	CH0-9226	CH0-9225
2000	CH0-9227	CH0-9225
3000	CH0-9228	CH0-9225
4000	CH0-9229	CH0-9225
5000	CH0-9230	CH0-9225
6000	CH0-9231	CH0-9225
Linear	CH0-9232	CH0-9225

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 HPLC Column Heater (25-90 °C), see page 205.

PhenoAcademy

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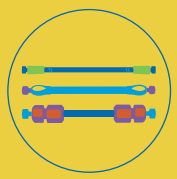
Training resources for lab managers.
Insightful learning for researchers.

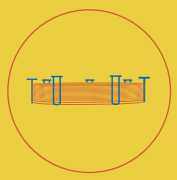
Upcoming LIVE webinars on advanced chromatography technique, method development, troubleshooting, data analysis, and more. Choose your region for available courses in your time zone to get started.

www.phenomenex.com/PhenoAcademy



LC

- Knowing your Analyte Properties to Optimize Analysis
- A Guide to Building Your LC Method Development Kit Plus Tips on Storage & Care
- Measuring Peak Separation Quality: Resolution, Asymmetry, Selectivity, Efficiency
- HPLC Mobile Phases and Gradients
- HPLC Troubleshooting, Column Care and Understanding Where Backpressure Comes From
- HPLC Method Development: Practical Approaches for Identifying Equivalent and Orthogonal Columns
- LC Chiral Theory and Method Development
- LC Chiral Common Chiral Separation Examples



GC

- Introduction to Gas Chromatography and Method Development
- Troubleshooting for Gas Chromatography
- Gas Chromatography Tips and Tricks

Sample Preparation

- Overview of Sample Preparation and Introduction to Filtration
- QuEChERS Background and Updates
- Dealing with Proteins and Phospholipids: Advances using Simplified Liquid Extraction
- Solid Phase Extraction Introduction and Theory
- Solid Phase Extraction Method Development
- Solid Phase Extraction Troubleshooting Tips and Tricks

Prodigy 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 150Å	—	00G-3301-Y0	—	—	AJ0-4289	AJ0-4290
ODS-2 150Å	—	—	00F-3300-R0	00G-3300-R0	AJ0-4286	AJ0-4287
ODS-3 100Å	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 150Å	00A-3301-E0	00B-3301-E0	00D-3301-E0	00F-3301-E0	00G-3301-E0	AJ0-4290
5 µm ODS-2 150Å	00A-3300-E0	—	00D-3300-E0	00F-3300-E0	00G-3300-E0	AJ0-4287
5 µm Silica 100Å	—	—	—	—	00G-4098-E0	AJ0-4348
5 µm ODS-3 100Å	00A-4097-E0	00B-4097-E0	00D-4097-E0	00F-4097-E0	00G-4097-E0	AJ0-4287
5 µm Phenyl-3 (PH-3) 100Å	—	—	—	00F-4298-E0	00G-4298-E0	AJ0-4351
10 µm Silica-3 100Å	—	—	—	—	00G-4245-E0	AJ0-4348
10 µm ODS-3 100Å	—	—	—	—	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
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 pages 150-154.

Carbohydrate and Organic Acid Analysis

- **Excellent resolution and column-to-column reproducibility**
- **Easy, accurate quantitation from sharper peak shapes**
- **Longer column lifetimes and faster run time capability from lower backpressures**
- **Baseline separation of critical sample components due to higher efficiencies**

Rezex HPLC columns achieve reproducible, accurate separations based on multiple modes of interaction. Available in 4 % and 8 % cross-linked sulfonated styrene-divinylbenzene (SDVB) and multiple ionic forms (calcium, sodium, hydrogen, potassium, lead, and silver) for a wide range of selectivities. USP L17, L19, L22, L34, and L58 packings available.

Use Rezex for carbohydrate, oligosaccharide, and organic acid separations:

- Drug formulation and excipient analysis
- Food and beverage quality control testing
- Fermentation reaction monitoring and recovery testing for biofuels

Recommended alternative to Bio-Rad® Aminex®, Supelco® SUPELCOGEL™, and Waters® Sugar-Pak™ (see page 149).

Find the Column For Your Application

Phases Available	Description	Applications	Additional Notes
RCM-Monosaccharide (L19 packing)*	8 % cross-linked resin **CALCIUM** ionic form	Monosaccharides and sugar alcohols from sweeteners and corn and cane sugars; Class separation of di-, tri-, and tetra-	– Our most commonly used column type – Easy regeneration with calcium nitrate solutions
RHM-Monosaccharide (L17 packing)*	8 % cross-linked resin **HYDROGEN** ionic form	Monosaccharides in combination with organic acids, fatty acids, alcohols, ketones, neutral compounds, or inorganic salts	– Versatile column, generally run with a mobile phase of deionized water
RSO-Oligosaccharide	4 % cross-linked resin **SILVER** ionic form	High resolution of oligosaccharides up to 18 degrees of polymerization (Dp)	– Guard column is recommended to protect the ionic integrity of the matrix
RPM-Monosaccharide (L34 packing)*	8 % cross-linked resin **LEAD** ionic form	Monosaccharides and sugar alcohol analysis. Cellobiose, glucose, xylose, arabinose, mannose and other cellulose products	
RNM-Carbohydrate (L58 packing)*	8 % cross-linked resin **SODIUM** ionic form	For matrices which contain high concentration of inorganic sodium, i.e. molasses	– Easily regenerated to the original ionic strength
ROA-Organic Acid (L22 packing)*	8 % cross-linked resin **HYDROGEN** ionic form	Organic acids alone or in combination with carbohydrates, alcohols, fatty acids, or neutral compounds; Amino sugars; Ethanol, acetic acid, glycerol, and standard alcohol mixtures	– Selectivity can be altered by changing the pH as well as the type of dilute mineral acid used as the mobile phase
RFQ-Fast Acid	8 % cross-linked resin **HYDROGEN** ionic form	Rapid screening of fruit quality; Ethanol, acetic acid, glycerol, and standard alcohol mixtures	– Analytes are routinely chromatographed under 5 minutes
RKP-Potassium	8 % cross-linked resin **POTASSIUM** ionic form	Analysis of glyphosate	
RCU-USP Sugar Alcohols (L19 packing)*	8 % cross-linked resin **CALCIUM** ionic form	For sugar analysis according to the USP procedures	– Sorbitol and mannitol can be resolved using simple isocratic conditions

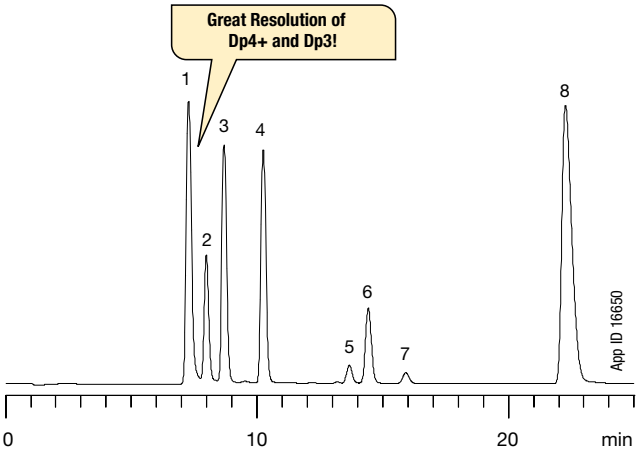
* United States Pharmacopeia (USP)

Bioethanol Fermentation Monitoring

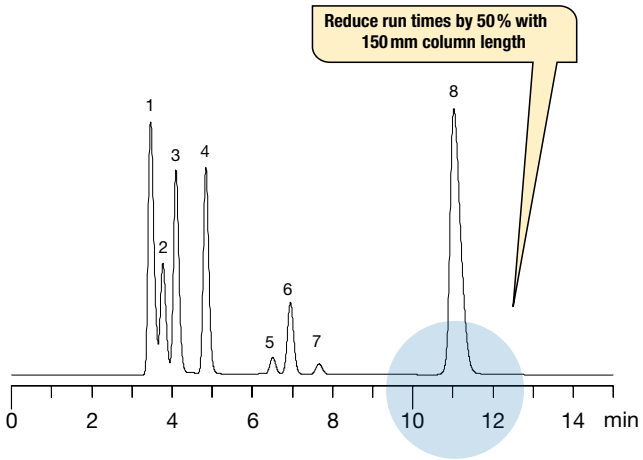
- **Easy quantitation of ethanol fermentation broth components**
- **Monitor starches, sugars, organic acids, and ethanol in one run**
- **Reliable lactic acid and acetic acid monitoring**
- **Increase throughput by reducing run times 50 % with 150 mm column length**

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
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 60 °C
Detection: RI @ 40 °C
System: Shimadzu® Prominence® LC-20A System
Sample:
1. Dp4+
2. Dp3
3. Maltose
4. Glucose
5. Lactic Acid
6. Glycerol
7. Acetic Acid
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
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 60 °C
Detection: RI @ 40 °C
System: Shimadzu Prominence LC-20A System
Sample:
1. Dp4+
2. Dp3
3. Maltose
4. Glucose
5. Lactic Acid
6. Glycerol
7. Acetic Acid
8. Ethanol

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.

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.

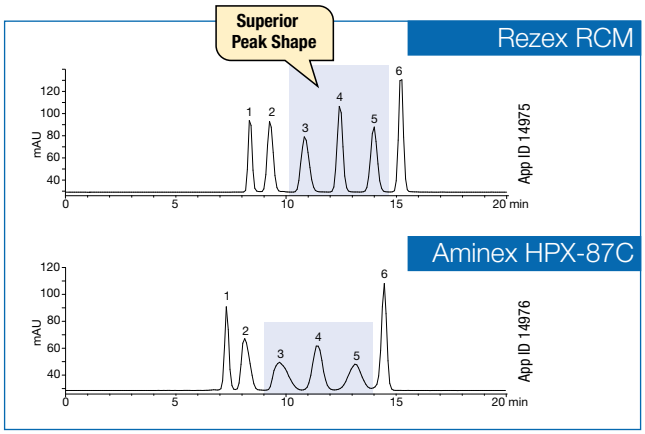
Easier, Accurate Quantitation

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
Temperature: 80 °C
Detection: ELSD
Sample:
1. Melezitose
2. Maltose
3. Glucose
4. Mannose
5. Fructose
6. Ribitol



Comparative separations may not be representative of all applications.

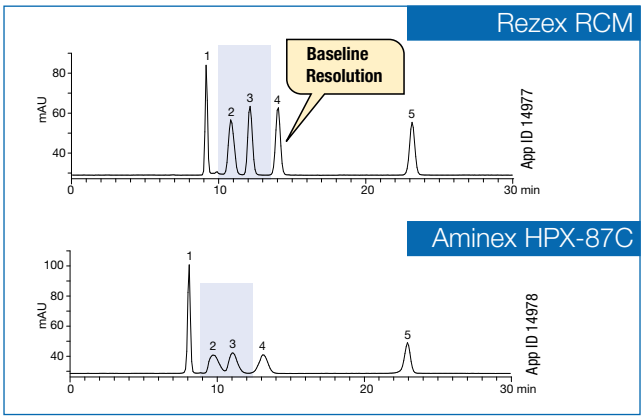
Baseline Separation of Critical Sample Components

Due to improved resolution

Sugars

Conditions for both columns:

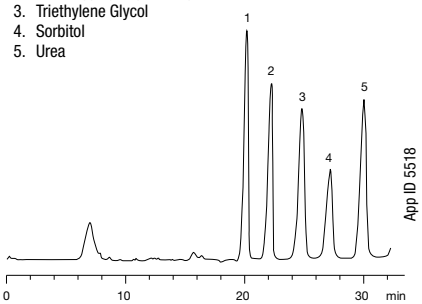
Column: Rezex RCM-Monosaccharide
Aminex HPX-87C
Dimensions: 300 x 7.8 mm
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Temperature: 80 °C
Detection: ELSD
Sample:
1. Sucrose
2. Glucose
3. Galactose
4. Fructose
5. Sorbitol



Applications

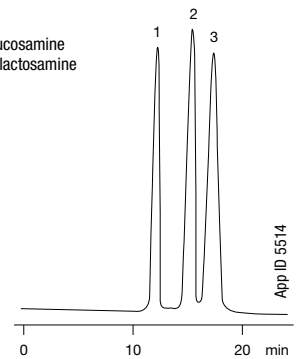
Food Softeners

Column: Rezex RCM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-0130-K0
Mobile Phase: Water
Flow Rate: 0.5 mL/min
Temperature: 60 °C
Detection: RI
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.: 00H-0138-K0
Mobile Phase: 1 % Phosphoric Acid
Flow Rate: 0.6 mL/min
Temperature: Ambient
Detection: RI
Sample:
1. Glucose
2. N-Acetylglucosamine
3. N-Acetylgalactosamine

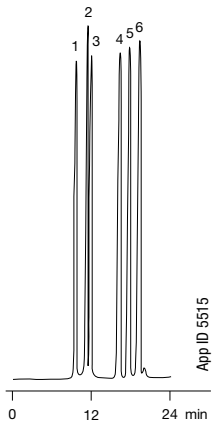


Rezex Organic Acid and Carbohydrate Columns *(cont'd)*

Rezex™ Carbohydrate & Organic Acid LC

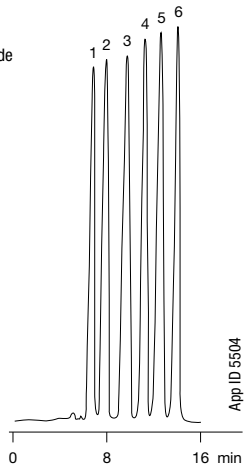
Organic Acids

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: 0.5 mL/min
Detection: UV @ 210 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 55 °C
Sample: 1. Oxalic
2. Citric
3. Tartaric
4. Succinic
5. Formic
6. Acetic



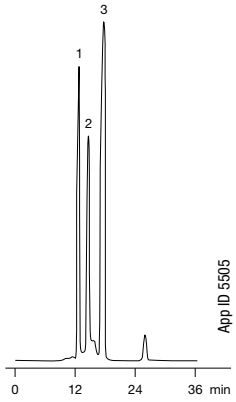
Saccharides

Column: Rezex RCM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-0130-K0
Guard Cartridge: AJ0-4493
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: RI
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 85 °C
Sample: 1. Melezitose
2. Maltose
3. Glucose
4. Mannose
5. Fructose
6. Ribitol



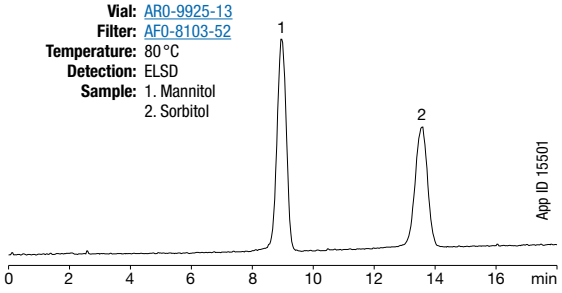
Apple Juice

Column: Rezex RCM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-0130-K0
Guard Cartridge: AJ0-4493
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 75 °C
Detection: RI
Sample: 1. Sucrose
2. Glucose
3. Fructose



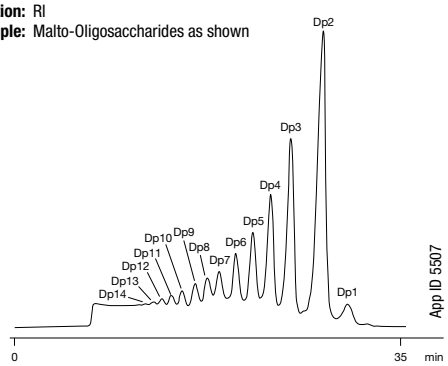
Mannitol and Sorbitol

Column: Rezex RPM-Monosaccharide
Dimensions: 100 x 7.8 mm
Part No.: 00D-0135-K0
Guard Cartridge: AJ0-4492
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 80 °C
Detection: ELSD
Sample: 1. Mannitol
2. Sorbitol



Oligosaccharides

Column: Rezex RSO-Oligosaccharide
Dimensions: 200 x 10 mm
Part No.: 00P-0133-N0
Mobile Phase: Water
Flow Rate: 0.3 mL/min
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 75 °C
Detection: RI
Sample: Malto-Oligosaccharides as shown

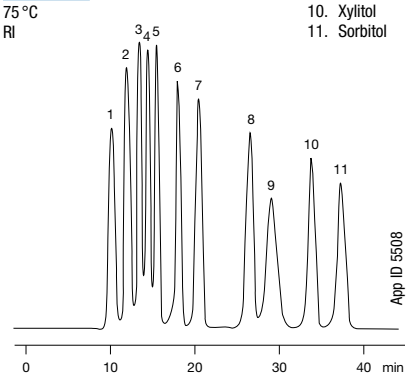


Dp refers to Degree of polymerization

Saccharides

Column: Rezex RPM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-0135-K0
Guard Cartridge: AJ0-4492
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 75 °C
Detection: RI

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 *(cont'd)*

Rezex™ Carbohydrate & Organic Acid LC

Specifications and Operating Recommendations

	RCM-Monosaccharide	RSO-Oligosaccharide	RNM-Carbohydrate	RPM-Monosaccharide	RHM-Monosaccharide
Part Number	00H-0130-K0	00P-0133-N0	00H-0136-K0	00H-0135-K0	00H-0132-K0
Ionic Form	Calcium	Silver	Sodium	Lead	Hydrogen
Standard Dimensions	300 x 7.8 mm	200 x 10 mm	300 x 7.8 mm	300 x 7.8 mm	300 x 7.8 mm
Matrix	Sulfonated Styrene Divinyl Benzene				
Cross Linking	8 %	4 %	8 %	8 %	8 %
Particle Size	8 µm	12 µm	8 µm	8 µm	8 µm
Min. Efficiency (p/m) based on last peak	35,000	N/A	30,000	35,000	35,000
Typical Pressure (psi @ Testing Flow Rate)	260	115	170	190	275
Max. Pressure (psi @ Max Flow Rate)	1,000	300	1,000	1,000	1,000
Max. Flow Rate (mL/min)	1.0 (see pressure)	0.3	1.0	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	1-8
Guard Column Part No.	03B-0130-K0	03R-0133-N0	03B-0136-K0	03B-0135-K0	03B-0132-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 % Lead Nitrate	5 % HNO_3, H_3PO_4
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-Lead Salts/ Metal Ions, >30 % Acetonitrile	Acids, Bases, 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	0.4	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 $Pb(NO_3)_2$	0.025 M H_2SO_4
Flow Rate (mL/min)	0.2	0.1	0.2	0.2	0.2
Duration (hrs)	4-16	4-16	4-16	4-16	4-16
Ship/Storage Solvent	Water	Water	Water	Water	Water

	ROA-Organic Acid	RFQ-Fast Acid	RCU-Sugar Alcohols
Part Number	00H-0138-K0	00D-0223-K0	00G-0130-D0
Ionic Form	Hydrogen	Hydrogen	Calcium
Standard Dimensions	300 x 7.8 mm	100 x 7.8 mm	250 x 4.0 mm
Matrix	Sulfonated Styrene Divinyl Benzene		
Cross Linking	8 %	8 %	8 %
Particle Size	8 µm	8 µm	8 µm
Min. Efficiency (p/m) based on last peak	50,000 (Acetic Acid)	30,000	12,000
Typical Pressure (psi @ Testing Flow Rate)	580	365	90
Max. Pressure (psi @ Max Flow Rate)	1,000	1,000	1,000
Max. Flow Rate (mL/min)	1.0	1.0	0.5
Max. Temperature (°C)	85	85	85
Typical Mobile Phase	0.005 N H_2SO_4	0.005 N H_2SO_4	Water
pH Range	1-8	1-8	Neutral
Guard Column Part No.	03B-0138-K0	03B-0223-K0	03A-0130-D0
Cleaning, Regeneration and Storage			
Organic Modifiers (Max)		5 % Methanol, IPA, EtOH	
Inorganic Modifiers	5 % HNO_3, H_3PO_4	5 % HNO_3, H_3PO_4	5 % $CaSO_4$, $Ca(NO_3)_2$, $CaCl_2$
Avoid	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
Flow Rate(mL/min)	0.4	0.4	0.1
Temperature (°C)	85	85	85
Duration (hrs)	12	12	12
Regeneration Solvent	0.025 M H_2SO_4	0.025 M H_2SO_4	0.1 M $Ca(NO_3)_2$
Flow Rate (mL/min)	0.2	0.2	0.1
Duration (hrs)	4-16	4-16	4-16
Ship/Storage Solvent	0.005 N H_2SO_4	0.005 N H_2SO_4	Water

Rezex Organic Acid and Carbohydrate Columns *(cont'd)*

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)	4 x 3.0* /10pk
RCM-Monosaccharide	00F-0130-K0	8 %	Calcium	150 x 7.8	03B-0130-K0	50 x 7.8	AJ0-4493
RCM-Monosaccharide	00H-0130-K0	8 %	Calcium	300 x 7.8	03B-0130-K0	50 x 7.8	AJ0-4493
RHM-Monosaccharide	00H-0132-K0	8 %	Hydrogen	300 x 7.8	03B-0132-K0	50 x 7.8	AJ0-4490
RSO-Oligosaccharide	00P-0133-N0	4 %	Silver	200 x 10.0	03R-0133-N0	60 x 10.0	—
RPM-Monosaccharide	00H-0135-K0	8 %	Lead	300 x 7.8	03B-0135-K0	50 x 7.8	AJ0-4492
RPM-Monosaccharide	00D-0135-K0	8 %	Lead	100 x 7.8	03B-0135-K0	50 x 7.8	AJ0-4492
RNM-Carbohydrate	00H-0136-K0	8 %	Sodium	300 x 7.8	03B-0136-K0	50 x 7.8	—
ROA-Organic Acid	00F-0138-E0	8 %	Hydrogen	150 x 4.6	—	—	AJ0-4490
ROA-Organic Acid	00G-0138-E0	8 %	Hydrogen	250 x 4.6	—	—	AJ0-4490
ROA-Organic Acid	00F-0138-K0	8 %	Hydrogen	150 x 7.8	03B-0138-K0	50 x 7.8	AJ0-4490
ROA-Organic Acid	00H-0138-K0	8 %	Hydrogen	300 x 7.8	03B-0138-K0	50 x 7.8	AJ0-4490
RKP-Potassium	00H-3252-K0	8 %	Potassium	300 x 7.8	—	—	—
RFQ-Fast Acid	00D-0223-K0	8 %	Hydrogen	100 x 7.8	03B-0223-K0	50 x 7.8	AJ0-4490
RCU-USP Sugar Alcohols	00G-0130-D0	8 %	Calcium	250 x 4.0	03A-0130-D0	30 x 4.0	AJ0-4493

for ID: 3.2-8.0 mm

*SecurityGuard Analytical Cartridges require universal holder Part No.: KJ0-4282

For Column Heater, see page 205.

For our full line of Column Performance Check Standards, see pages 208-209.

SecurityGuard Standard

SecurityGuard™ Column Protection

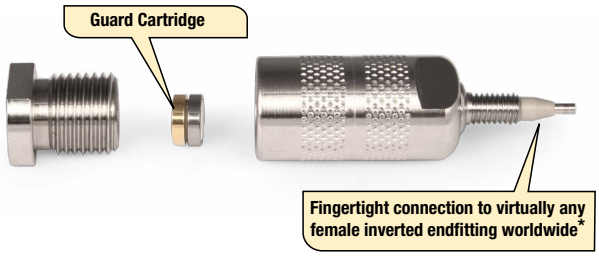
Column Protection for UHPLC, HPLC, SFC to PREP

Your Results and Your Column are Too Important Not to Protect

2014 Laboratory Equipment Readers' Choice WINNER

- **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.

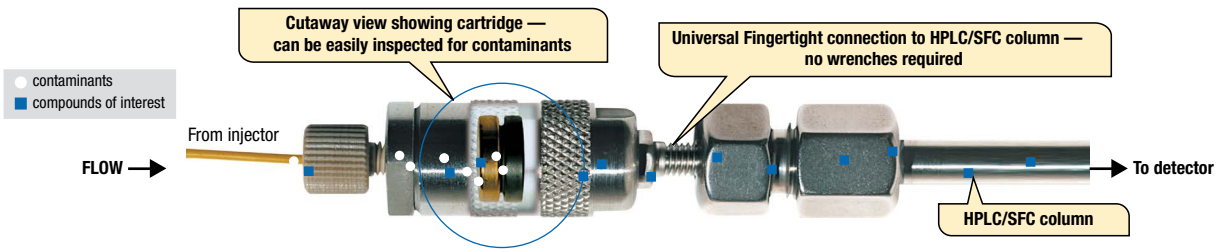


See SecurityGuard Standard in action video:
www.phenomenex.com/SecurityGuardInstallation

A Universal Guard Cartridge System

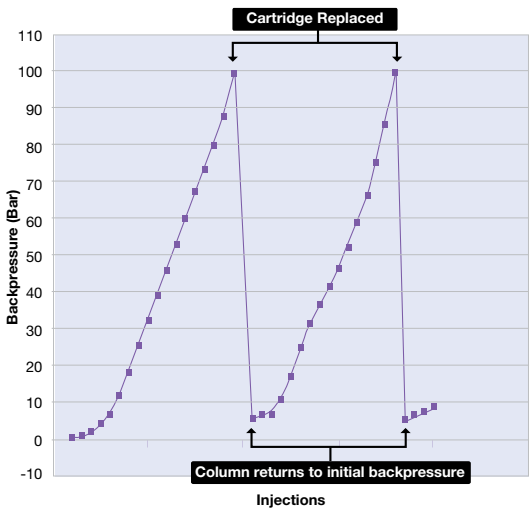
How SecurityGuard Standard Works*

The SecurityGuard Standard analytical cartridge holder (patented) directly finger-tightens into virtually any manufacturer's non core-shell and ≥ 3 µm 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.



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.

The SecurityGuard Standard holder and cartridges are pressure rated to 5000 psi (345 bar).
For all core-shell and / or < 3 µm particle columns, and all applications at higher pressures, use SecurityGuard ULTRA, see page 150. For available Semi-Preparative and PREP sizes, see pages 152-154. For preparative SFC applications, use holder AJ0-8617 for 15 x 21.2 mm cartridges or AJ0-8618 for 15 x 30 mm cartridges. For Kinetex and Aeris Core-Shell SecurityGuard SemiPrep and PREP cartridges, see page 154.

*Feature applies to traditional analytical-sized guard system only, and does not apply to SemiPrep or PREP guard cartridges.

SecurityGuard Standard *(cont'd)*

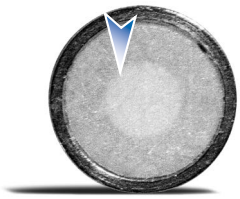
SecurityGuard™ Column Protection

"See Your Dirt" Feature

The "see your dirt" feature lets you know exactly when it's time to replace your cartridge.

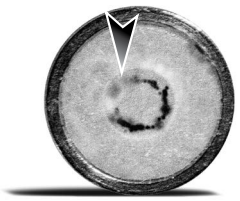
Visually inspect the surface of the cartridge's packing material any time, without disturbing the packing bed. Now you can easily monitor visual contaminant build-up, and change your guard cartridge before it's too late!

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.

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

Try it today at:
www.phenomenex.com/GuardIT

Analytical HPLC/SFC Holder Kit and Replacement Accessories

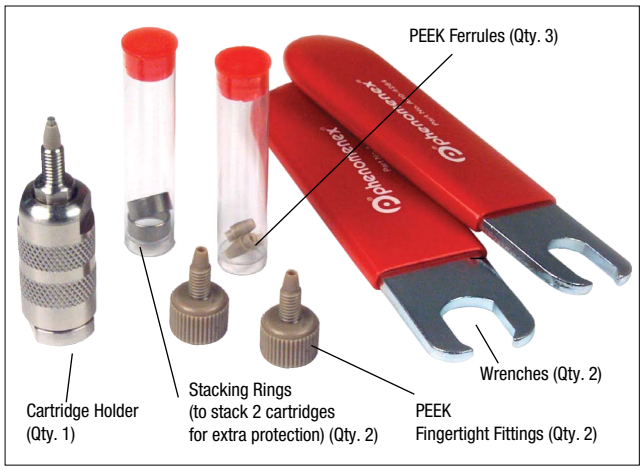
For 2.0 and 3.0 mm ID cartridges, use with 2.0 to 8.0 mm ID columns

Ordering Information

Analytical Kit	
Part No.	**Description**
KJ0-4282	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

***Kit KJ0-4282 Includes:**



SecurityGuard PREP

Semi-Preparative HPLC/SFC Holder

For 10.0 mm ID cartridges, use with 9 to 16 mm ID columns

Ordering Information

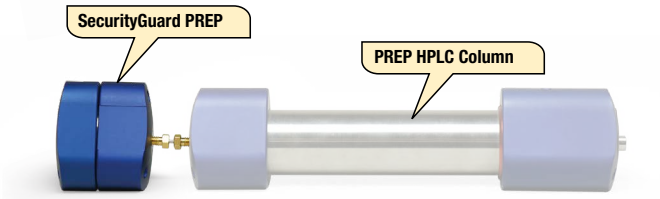
SecurityGuard SemiPrep Guard Cartridge Holder		
Part No.	**Description**	**Unit**
AJ0-9281	Holder for 10.0 mm ID cartridges	ea

Accessories		
Part No.	**Description**	**Unit**
Nut and Ferrule		
AQ0-3018	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea
Sure-Lok™ Fingertight Fittings		
AQ0-1388	PEEK Sure-Lok Male Nut	ea
AQ0-1389	PEEK Sure-Lok Male Nut	10/pk
Sure-Lok 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
SemiPrep Guard Holder Wrench		
AQ0-8904	Wrench, Open End, 1/2 x 9/16 in.	ea

For Semi-Preparative and Preparative Cartridges, see pages 153-154.

Holder

Cartridge
(10 x 10 mm ID)



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 5/16 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

SecurityGuard™ Column Protection

Cartridges and Holders

Step 1: Choose column ID

Step 2: Match column phase

Choose your HPLC Column Internal Diameter, ID (mm):

2.0 - 3.0	3.2 - 8.0	9.0 - 16.0	18.0 - 29.0	30.0 - 49.0
Analytical	Analytical	SemiPrep	PREP HPLC or SFC	PREP HPLC or SFC
Use Cartridges (mm):				
4.0 x 2.0	4.0 x 3.0	10 x 10.0	15 x 21.2	15 x 30.0

Ordering Information

Material	Description	pH Stability	4.0 x 2.0 /10pk	4.0 x 3.0 /10pk	10 x 10.0 /3pk	15 x 21.2 ea	15 x 30.0 ea
Cartridges for General Purpose/Pharmaceutical							
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
PFP(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	—	AJ0-8595	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**
For use with chiral columns, such as Lux™ Cellulose-1, -2, -3, -4, i-Cellulose-5, i-Amylose-1, -3, & Amylose-1, (Phenomenex); CHIRALCEL® OD-H®, OJ-H®& CHIRALPAK® AD®-H, IA®, IC®, IG® (DAICEL Corporation)							
Lux i-Amylose-1	Amylose tris (3, 5-dimethyl-phenylcarbamate)	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-dichloro-phenylcarbamate)	2 - 9	AJ0-8631	AJ0-8632	AJ0-8633	AJ0-8634	—
Lux Cellulose-1	Cellulose tris (3, 5-dimethyl-phenylcarbamate)	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-dimethyl-phenylcarbamate)	2 - 9	AJ0-9337	AJ0-9336	AJ0-9344	AJ0-9338	AJ0-9339
Lux AMP	—	1 - 11.5	AJ0-8475	AJ0-8476	—	—	—
HPLC Guard Cartridge Holders (one-time purchase only)			**/kit**		**/holder**	**/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 < 3 µm particle columns use 2.1 to 4.6 mm ID SecurityGuard ULTRA Holder and Cartridges, see page 155.

SecurityGuard™ Column Protection

Cartridges and Holders

Step 1: Choose column ID

Step 2: Match column phase

Choose your HPLC Column Internal Diameter, ID (mm):

2.0 - 3.0	3.2 - 8.0	9.0 - 16.0	18.0 - 29.0	30.0 - 49.0
Analytical	Analytical	SemiPrep	PREP HPLC or SFC	PREP HPLC or SFC
Use Cartridges (mm):				
4.0 x 2.0	4.0 x 3.0	10 x 10.0	15 x 21.2	15 x 30.0

Ordering Information *(continued)*

Material	Description	pH Stability	4.0 x 2.0	4.0 x 3.0	10 x 10.0	15 x 21.2	15 x 30.0
Cartridges for Core-Shell Media			—	—	/3pk	ea	ea
For core-shell media columns, such as Kinetex™ and Aeris™ (Phenomenex).							
EVO C18	(ODS, Octadecyl)	1 - 12	*	*	AJ0-9306	AJ0-9304	AJ0-9305
C18	(ODS, Octadecyl)	1.5 - 8.5	*	*	AJ0-9278	AJ0-9145	AJ0-9204
C8	(MOS, Octyl)	1.5 - 8.5	*	*	—	AJ0-9205	—
PFP	(Pentafluorophenyl)	1.5 - 8.5	*	*	—	AJ0-9146	—
F5	(Pentafluorophenylpropyl)	1.5 - 8.5	*	*	AJ0-9323	AJ0-9324	—
Phenyl-Hexyl	(Phenylhexyl)	1.5 - 9	*	*	—	AJ0-9147	AJ0-9216
Biphenyl	(Biphenyl)	1.5 - 8.5	*	*	AJ0-9280	AJ0-9272	—
HILIC	(HILIC)	2 - 7.5	*	*	—	AJ0-9277	—
C18-Peptide	(ODS, Octadecyl)	1.5 - 9	*	*	AJ0-9317	AJ0-9318	—
Cartridges for Protein and Polypeptide Reversed Phase			/10pk	/10pk	/3pk	ea	ea
For use with silica columns for separation of proteins & peptides, such as Jupiter™ (Phenomenex) and other widepore or 300 Å brands.							
Widepore C18	(ODS, Octadecyl)	1.5 - 10	AJ0-4320	AJ0-4321	AJ0-7224	AJ0-7230	AJ0-8313
Widepore C5	(Pentyl)	1.5 - 10	AJ0-4326	AJ0-4327	AJ0-7371	—	—
Widepore C4	(Butyl)	1.5 - 10	AJ0-4329	AJ0-4330	AJ0-7225	AJ0-7231	AJ0-8314
For use with columns like Biozen™ (Phenomenex).							
Peptide PS-C18 3 µm	(Positive Functional C18)	1.5 - 8.5	AJ0-7605	AJ0-7606	—	—	—
Ion-Exchange	(Weak Cation Exchanger)	2 - 12	AJ0-9401	AJ0-9400	—	—	—
Cartridges for Synthetic DNA / RNA Analysis			/10pk	/10pk	/3pk	ea	ea
For use with columns like Clarity™ (Phenomenex).							
Oligo-RP™	(C18 Twin Technology)	1 - 12	AJ0-8134	AJ0-8135	AJ0-8136	AJ0-8210	—
Oligo-XT	(ODS, Octadecyl)	1 - 12	*	*	AJ0-9516	AJ0-9517	AJ0-9518
Cartridges for Silica GFC (Gel Filtration Chromatography)			—	/10pk	—	ea	—
(Aqueous SEC) For use with silica GFC columns, such as Yarra™ and BioSep™ (Phenomenex); ZORBAX™ GF-Series (Agilent); Bio-Sil® (Bio-Rad®).							
GFC-2000	—	2 - 7.5	—	AJ0-4487	—	AJ0-8588	—
GFC-3000	—	2 - 7.5	—	AJ0-4488	—	AJ0-8589	—
	—	2 - 7.5	—	AJ0-4489	—	AJ0-8590	—
Cartridges for Polymer GPC (Gel Permeation Chromatography)			—	/3pk	—	—	—
(Organic GPC) For use with polymer GPC columns, such as Phenogel™ (Phenomenex); PLgel™ (Agilent®); SDV® (PSS); Styragel® (Waters®); GPC Series (Shodex®); TSKgel® (Tosoh Bioscience®)							
GPC***	—	0 - 14	—	AJ0-9292	—	—	—
Cartridges for Carbohydrate/Organic Acid			—	/10pk	—	—	—
For organic acid and carbohydrate analysis, such as Rezex™ (Phenomenex); Aminex® (Bio-Rad); Sugar-Pak™ (Waters).							
Carbo-H^+	—	1 - 8	—	AJ0-4490	—	—	—
Carbo-Ag^{+**}	—	Neutral	—	AJ0-4491	—	—	—
Carbo-Pb^{+2}	—	Neutral	—	AJ0-4492	—	—	—
Carbo-Ca^{+2}	—	Neutral	—	AJ0-4493	—	—	—
HPLC Guard Cartridge Holders (one-time purchase only)			/kit		/holder	/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 < 3 µm particle columns use 2.1 to 4.6 mm ID SecurityGuard ULTRA Holder and Cartridges, see page 155.

**For use with saccharide and oligosaccharide columns in Ag^+ form.

***Not compatible with HFIP solvent.

SecurityGuard ULTRA

UHPLC Column Protection

- **Extends HPLC, core-shell, and < 3 µm particle column lifetime**
- **Virtually no change in chromatography**
- **Pressure rated to 20000 psi (1378 bar)**
- **Simple to use**

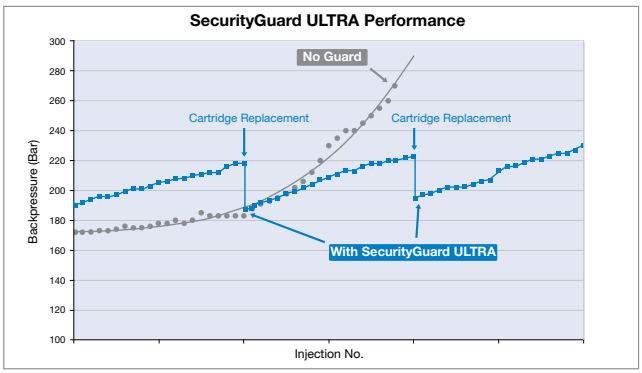
Universal Fit

Use SecurityGuard ULTRA with virtually all UHPLC columns 2.1 to 4.6 mm 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!

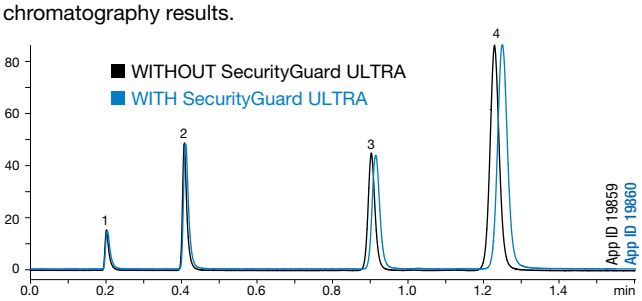
When contaminates and particulates build up at the head of your column or on the guard cartridge, system backpressures can increase dramatically. By simply replacing the SecurityGuard ULTRA cartridge, instead of your column, you are able to regain normal operating conditions and reclaim original column performance.

Accelerated lifetime test using endogenous biological matrix on Kinetex 2.6 µm 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 1.7 µm 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

See SecurityGuard ULTRA in action:
www.phenomenex.com/SecurityGuardULTRA

SecurityGuard ULTRA UHPLC Column Protection

2014 Laboratory Equipment Readers' Choice WINNER

2012 R&D 100 Award Recipient
50th ANNIVERSARY

SecurityGuard ULTRA Cartridges

Ordering Information

Material	Description	pH Stability	Column ID (mm) 2.1 /3pk	3.0 /3pk	4.6 /3pk
Cartridges for General Purpose/ Pharmaceutical					
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 Aeris™ (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 1.6 µm	(Positive Functional C18)	1.5 – 8.5*	AJ0-9803	—	—
Peptide XB-C18	(ODS, Octadecyl)	1.5 – 9.0**	AJ0-9806	—	AJ0-9808
WidePore C4	(Butyl)	1.5 – 9.0**	AJ0-9816	—	AJ0-9818
Intact XB-C18	(MOS, Octyl)	1.5 – 9.0**	AJ0-9812	—	AJ0-9814
Oligo	(ODS, Octadecyl)	1.0 – 12.0	AJ0-9820	—	AJ0-9822
SEC-2	(Diol)	1.5 – 8.5	—	—	AJ0-9850
SEC-3	(Diol)	1.5 – 8.5	—	—	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 ⅜ in. wrench (AQ0-8959; fits Kinetex, Aeris, and Oligo-MS column end-fittings), and two 5⁄16 in. wrenches (AQ0-8903; fits ULTRA cartridge and holder). See page 155. Installation instructions are included in the packaging or chat with our technical team for help at www.phenomenex.com/chat.

Shodex

By Showa Denko K.K.

- **High efficiency polymer columns**
- **Wide application range**

Guide for Shodex Column Selection

Solubility	Molecular Weight	Separation Mode	Column	Page
Water-insoluble	over 2000	SEC	Inquire	
Water-insoluble	under 2000	SEC	Inquire	
Water-insoluble	under 2000	RPC	RSpak DE-413, 413L, DM-614	340
Sample	over 2000	SEC	OHpak SB-803-806HQ, SUGAR KS-803-804, PROTEIN KW-802.5-804	339
Sample	over 2000	IEC	IEC QA-825, DEAE-825, SP-825, CM-825	340
Water-soluble	under 2000	SEC	SB-802-802.5HQ, SUGAR KS-801, 803-804	339
Water-soluble	under 2000	LEC	SUGAR SC1011, SP0810	340
Water-soluble	under 2000	IEX	RSpak KC-811, SUGAR SH1011, SUGAR SH1821	339, 340
Water-soluble	under 2000	IC	IC SI-90 4E, SI-50 4E, IC I-524A, YK-421	340
Water-soluble	under 2000	RPC	RSpak DE-613, 413	340
Water-soluble	under 2000	NPC	SUGAR SZ5532	340

Shodex *(cont'd)*

By Showa Denko K.K.

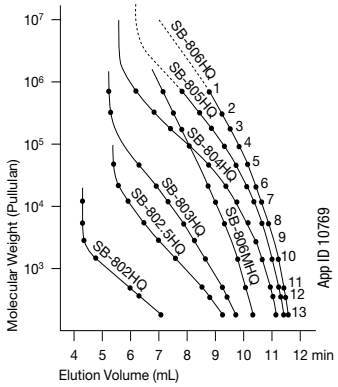
GFC (Aqueous GPC) Columns

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

Column Type/ Part No.	ID x Length (mm)	Plate Number	Exclusion Limit
OHpak SB-802.5HQ	8 x 300	>15,000	1 x 104
OHpak SB-803HQ	8 x 300	>15,000	1 x 105
OHpak SB-804HQ	8 x 300	>15,000	1 x 106
OHpak SB-806HQ	8 x 300	>10,000	(2 x 107)
OHpak SB-806MHQ	8 x 300	>10,000	(2 x 107)
SUGAR KS-801 (Na+)	8 x 300	>15,000	1 x 103
SUGAR KS-803 (Na+)	8 x 300	>15,000	5 x 104
SUGAR KS-804 (Na+)	8 x 300	>15,000	4 x 105
PROTEIN KW-802.5	8 x 300	>20,000	5 x 104
PROTEIN KW-803	8 x 300	>20,000	1.5 x 105

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.

Shodex *(cont'd)*

Shodex™

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 (SO4)	PVA	Quaternary ammonium	Inorganic anions and organic acids
IC SI-90 G	4.6 x 10	(Guard)	—	—	(General purpose)
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

*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 DEAE-825	8 x 75	>2,000	PHM gel	Diethylaminoethyl (weak anion)

Columns for Sugar Analysis

Ordering Information

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 + LEC
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 page 116.

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-G (DE-613P)	(guard column)	4.6 x 10
RSpak DM-614	>4,000	6.0 x 150

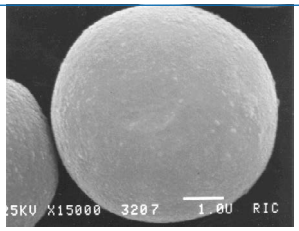
Guaranteed Replacement to Spherisorb®

- **Highly reproducible**
- **Long column life**
- **Mimics performance of Waters® Spherisorb®**
- **Economically priced**

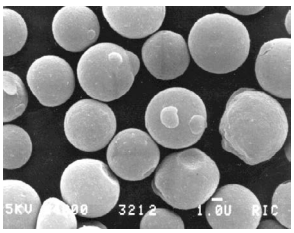
Phenomenex SphereClone columns have been developed to provide chromatographic behavior that mimics that of Waters Spherisorb columns. For comparative applications, please contact your local Phenomenex representative.

SphereClone VS. Spherisorb®†

SEM of Base Silica



Surface
15,000x Magnification

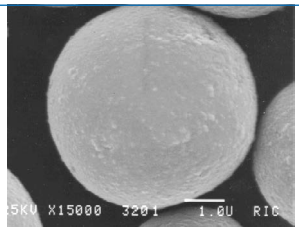


Physical Mass Distribution and Shape
4,000x Magnification

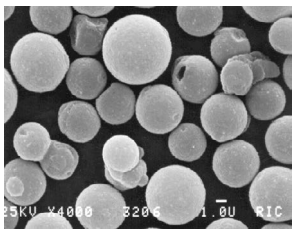
Material Characteristics

SphereClone™		Spherisorb®†
3, 5, 10 µm	Particle Size	3, 5, 10 µm
80 Å	Pore Size	80 Å
200 m^2/g	Surface Area	200 m^2/g
	Carbon Load	
—	Silica	—
6%	C6	6%
6%	C8	6%
7%	ODS(1)	6.2%
12%	ODS(2)	12%
2%	NH_2	2%

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
NH_2	—	—	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
NH_2	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 pages 150-154.

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.

Synergi™
Full Range Selectivity LC

Full Range Selectivity for Reversed Phase Separation

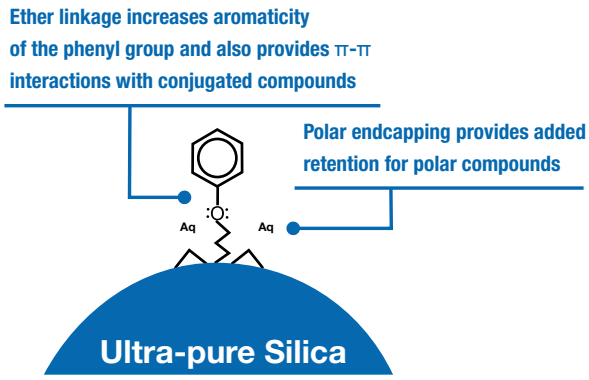
SFC APPROVED

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

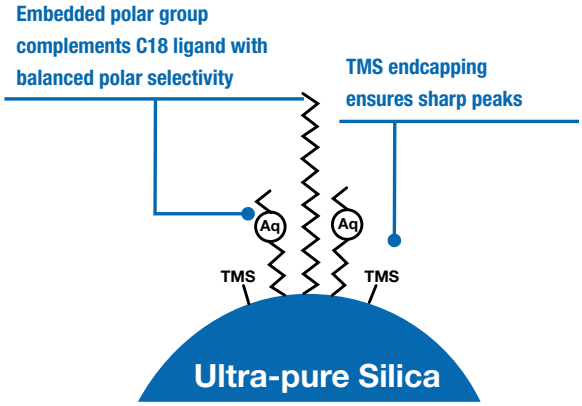
For polar and aromatic mixtures



Synergi Fusion-RP

C18 Polar Embedded

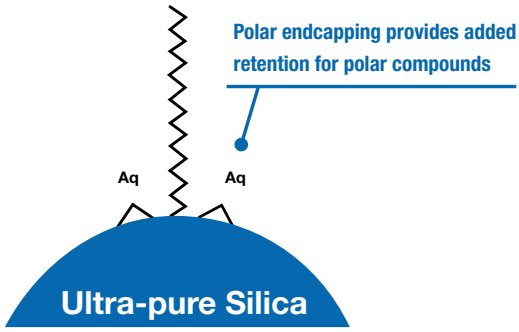
Balanced non-polar and polar performance



Synergi Hydro-RP

C18 Polar Endcapped

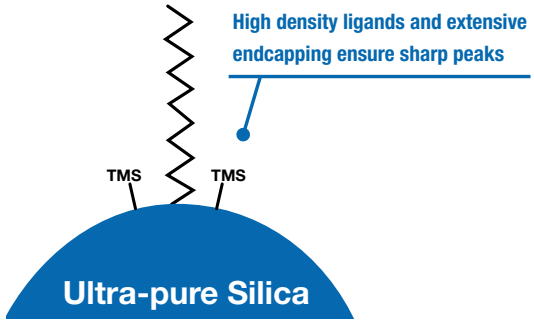
Strong non-polar and polar retention



Synergi Max-RP

C12 TMS Endcapped

Excellent for basic compounds at neutral pH



Material Characteristics

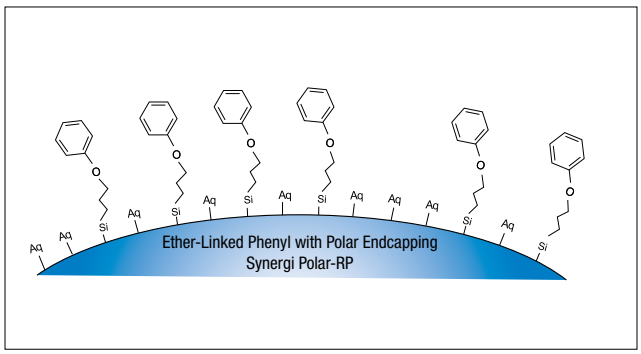
Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m^2)	End Capping
Synergi Max-RP	Spher. 2.5	100	—	400	17	—	TMS
Synergi Hydro-RP	Spher. 2.5	100	—	400	19	—	Hydrophilic
Synergi Polar-RP	Spher. 2.5	100	—	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™ Full Range Selectivity LC

SFC APPROVED

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

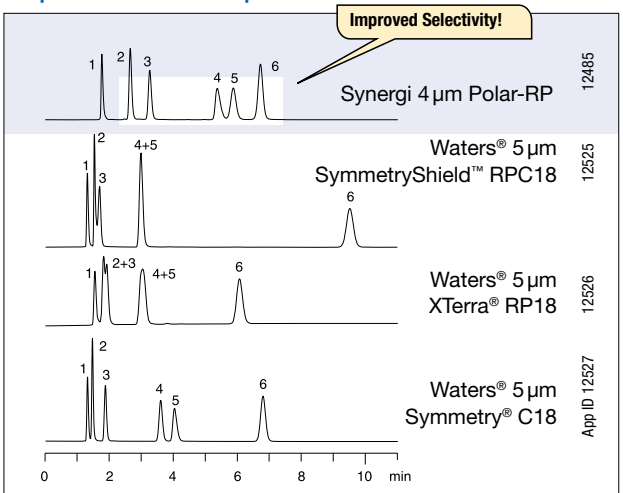
Sample Challenge:

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

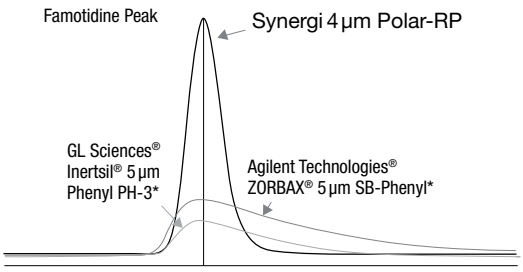


Conditions for all columns:

Columns: Synergi 4 µm Polar-RP
Waters 5 µm SymmetryShield RPC18
Waters 5 µm Symmetry C18
Waters 5 µm XTerra RP18
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate pH 3 / Methanol (50:50)
Flow Rate: 1.0 mL/ min
Detection: UV @ 230 nm
Temperature: Ambient
Injection: 2 µL
Sample:
1. Metaproterenol (0.4 µg)
2. Pindolol (0.6 µg)
3. Metoprolol (0.15 µg)
4. Alprenolol (0.3 µg)
5. Propranolol (0.04 µg)
6. Ethylparaben (0.4 µg)

Comparative separations may not be representative of all applications.

Improve peak symmetry of polar compounds with Synergi Polar-RP compared to other phenyl phases



Conditions for all columns:

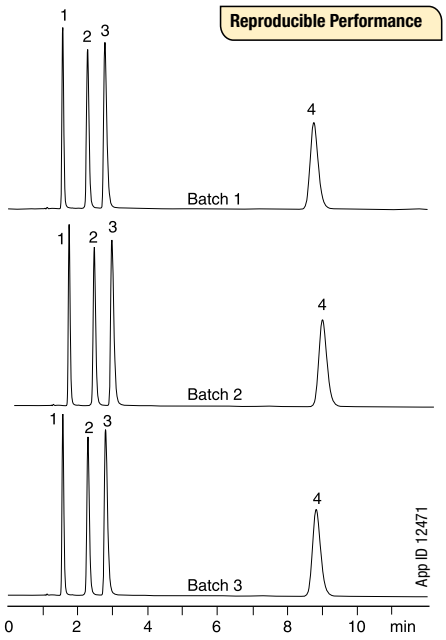
Columns: Synergi 4 µm Polar-RP
ZORBAX 5 µm SB-Phenyl
Inertsil 5 µm Phenyl PH-3
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate pH 7.0/Acetonitrile (80:20)
Flow Rate: 1.0 mL/ min
Detection: UV @ 254 nm
Temperature: 25 °C
Sample: Famotidine

Synergi™ Full Range Selectivity LC

Synergi Polar-RP

SFC APPROVED

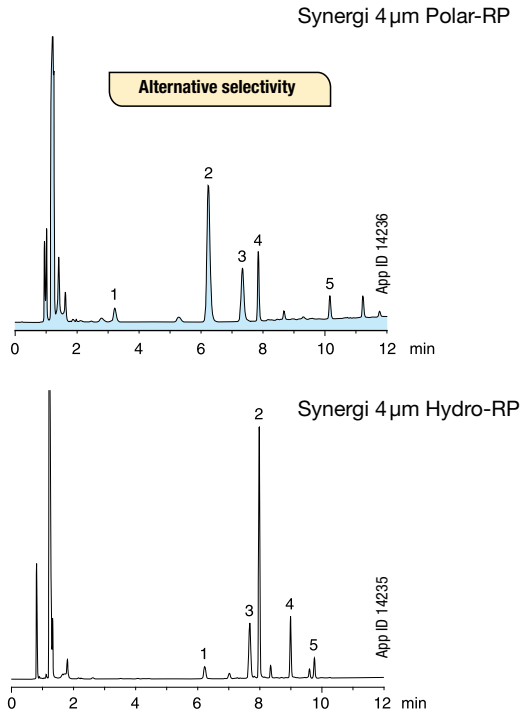
Synergi Polar-RP is highly reproducible



Conditions for all columns:

Column: Synergi 4 µm Polar-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4336-E0
Guard Cartridge: AJ0-6076
Guard Holder: KJ0-4282
Mobile Phase: Methanol/20 mM Potassium Phosphate pH 6.5 (35:65)
Flow Rate: 1.5 mL/ min
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection: 1 µL
Temperature: 22 °C
Detection: UV @ 210 nm
Sample: 1. Phenylephrine (1 µg)
2. Phenylpropanolamine (1 µg)
3. Pseudoephedrine (1 µg)
4. Methylparaben (1 µg)

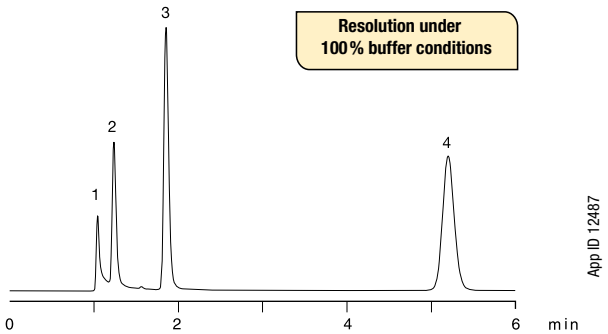
The selectivity of Synergi Polar-RP can provide differences in peak elution order for confirmation or better separation



Conditions for all columns:

Dimensions: 150 x 4.6 mm
Mobile Phase: A: 20 mM KH_2PO_4 + 0.1 % Hexane Sulfonate, pH 3.0
B: Acetonitrile
Gradient: A/B (97:3) for 3 minutes, then to A/B (50:50) in 15 minutes
Flow Rate: 1.5 mL/ min
Temperature: 22 °C
Detection: UV @ 210 nm
Sample: 1. Pantothenic acid
2. Pyridoxine
3. p-Aminobenzoic acid
4. Thiamine
5. Riboflavin

100 % buffer mobile phase stability allows for separation of extremely polar compounds, like nucleic acid bases, on Synergi Polar-RP



Nucleic Acid Bases

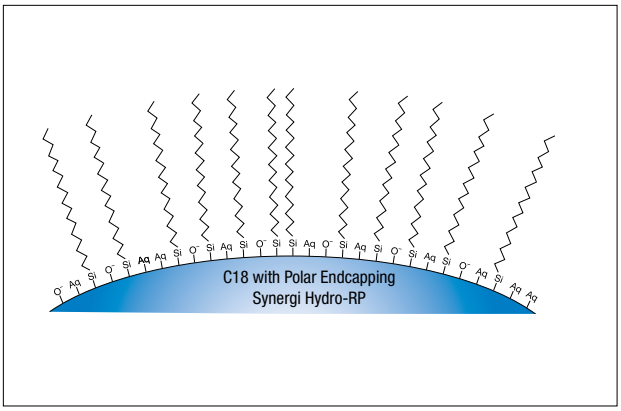
Column: Synergi 4 µm Polar-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4336-E0
Guard Cartridge: AJ0-6076
Guard Holder: KJ0-4282
Mobile Phase: 20 mM Potassium phosphate pH 2.7
Flow Rate: 2.0 mL/ min
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection: 2.5 µL
Temperature: 22 °C
Detection: UV @ 254 nm
Sample: 1. Thymidine triphosphate (TTP) (1.25 µg)
2. Thymidine diphosphate (TDP) (1.25 µg)
3. Thymidine monophosphate (TMP) (1.25 µg)
4. Thymidine (1.25 µg)

Synergi™
Full Range Selectivity LC

SFC APPROVED

Synergi Hydro-RP

A Polar Endcapped C18 Column



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

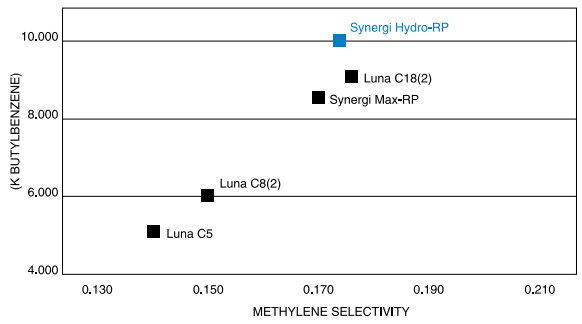
Sample Challenge:

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.

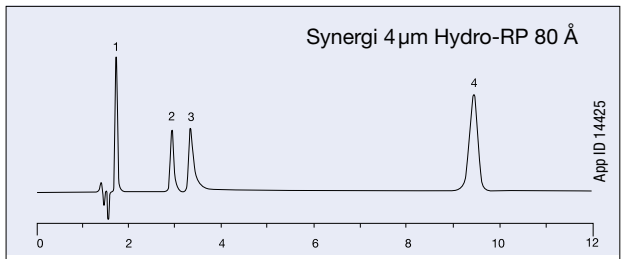
Extreme hydrophobic retention relative to other hydrophobic selectivity phases

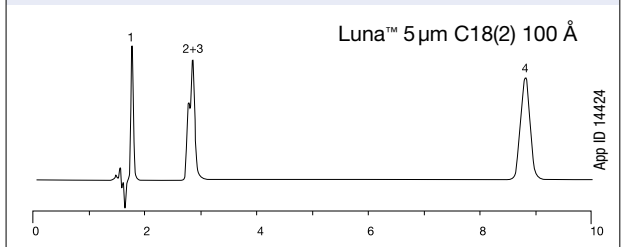


Conditions for all columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: Acetonitrile/20 mM Potassium phosphate pH 7.0 (65:35)
Flow Rate: 1.5 mL/ min
Temperature: Ambient
Sample: 1. Butylbenzene
2. Amylbenzene

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





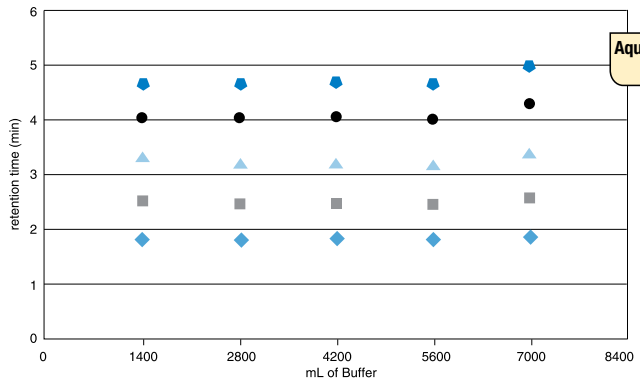
Conditions for all columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate, pH 7.0 /Methanol (60:40)
Flow Rate: 1 mL/ min
Temperature: 22 °C
Detection: UV @ 210 nm
Sample: 1. Phenylephrine
2. Phenylpropanolamine
3. Pseudoephedrine
4. Methylparaben

Synergi™ Full Range Selectivity LC

Synergi Hydro-RP

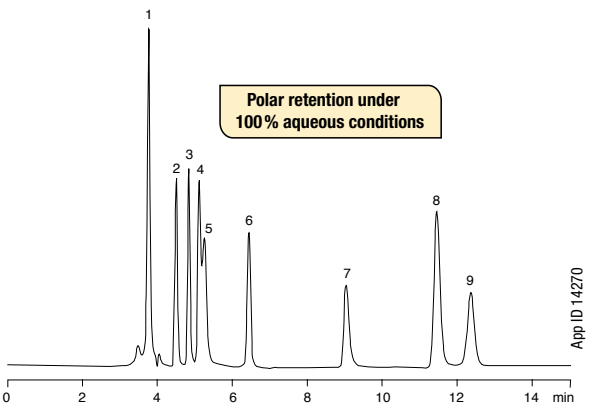
SFC APPROVED

Synergi Hydro-RP is stable in 100% aqueous mobile phase, providing improved retention of extremely polar compounds



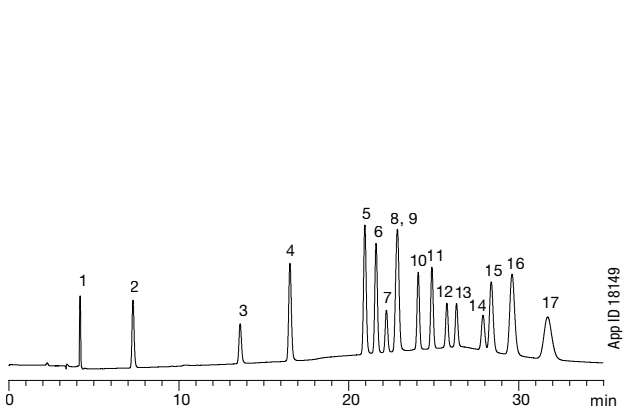
Column: Synergi 4 µm Hydro-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4375-E0
Guard Cartridge: AJ0-7511
Guard Holder: KJ0-4282
Mobile Phase: 20 mM Potassium phosphate, pH 2.5
Flow Rate: 1.0 mL/min
Temperature: 35 °C
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection: 5 µL
Detection: UV @ 210 nm
Sample: 1. Norepinephrine (0.8 mg/mL)
2. Epinephrine (0.5 mg/mL)
3. Normetanephrine (0.6 mg/mL)
4. Dopamine (0.4 mg/mL)
5. L-DOPA (0.3 mg/mL)

Synergi Hydro-RP is able to separate very polar compounds, as well as, mixtures of polars and non-polars



Organic Acids

Column: Synergi 4 µm Hydro-RP
Dimensions: 250 x 4.6 mm
Part No.: 00G-4375-E0
Guard Cartridge: AJ0-4287
Guard Holder: KJ0-4282
Mobile Phase: 20 mM Potassium phosphate, pH 2.9
Flow Rate: 0.7 mL/min
Temperature: 22 °C
Detection: UV @ 220 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample: 1. Oxalic acid
2. Tartaric acid
3. Glycolic acid
4. Formic acid
5. Pyruvic acid
6. Malonic acid
7. Acetic acid
8. Maleic acid
9. Citric acid



Explosives

Column: Synergi 4 µm Hydro-RP
Dimensions: 250 x 4.6 mm
Part No.: 00G-4375-E0
Mobile Phase: A: Methanol
B: Water

Gradient:	**Time (min)**	**% B**
	0	45
	2	45
	22	25
	22.01	45
	25	45

Flow Rate: 1 mL/min
Temperature: 22 °C
Detection: UV @ 254 nm / 220 nm (ambient)
Sample: 1. Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
2. Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
3. 1,3,5-Trinitrobenzene
4. Methyl-2,4,6-trinitrophenylnitramine (Tetryl)
5. 1,3-Dinitrobenzene
6. Nitrobenzene
7. Nitroglycerin
8. 2,4,6-Trinitrotoluene (TNT)
9. 3,5-Dinitroaniline
10. 4-Amino-2,6 dinitrotoluene
11. 2 Amino-4,6 dinitrotoluene
12. 2,6-Dinitrotoluene
13. 2,4-Dinitrotoluene
14. Pentaerythritol tetranitrate (PETN)
15. 2-Nitrotoluene
16. 4-Nitrotoluene
17. 3-Nitrotoluene

Synergi™ Full Range Selectivity LC

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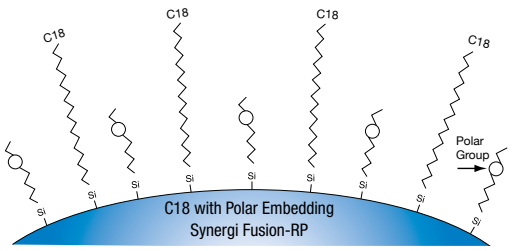
Synergi Fusion-RP

A Polar Embedded C18 Column



NON-NITROGEN Polar Infused 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:

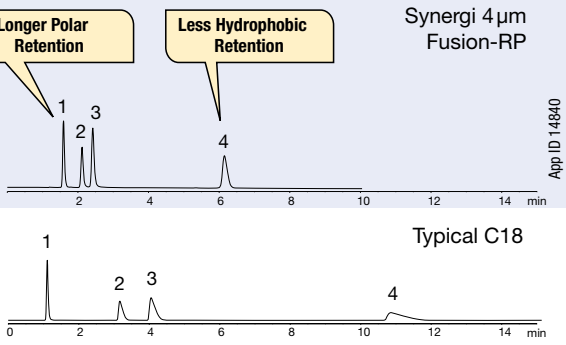
You need greater separation of compounds that exhibit moderately polar and hydrophobic characteristics.

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.

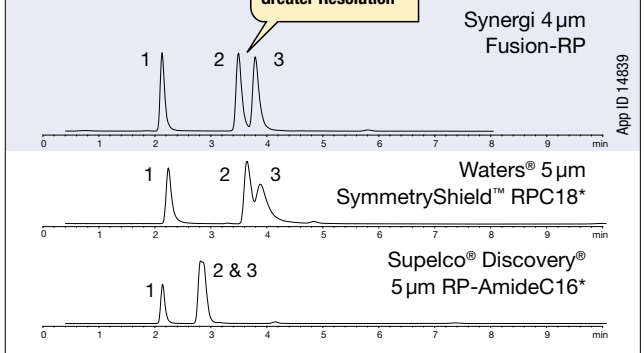
Balanced Polar and Hydrophobic Retention Allows for Superior Selectivity

Hydrophobic Basic Compounds



Conditions for all columns:
Columns: Synergi 4 µm Fusion-RP
Typical C18
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mm Potassium Phosphate, pH 2.5 / Acetonitrile (75:25)
Flow Rate: 1.0 mL/ min
Detection: UV @ 210 nm
Sample: 1. Maleic acid
2. Chlorpheniramine
3. Triprolidine
4. Diphenhydramine

Antihistamines



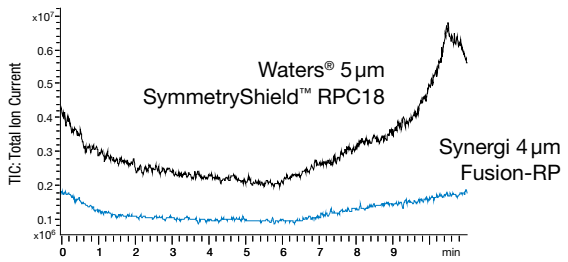
Conditions for all columns:
Columns: Synergi 4 µm Fusion-RP
Waters 5 µm SymmetryShield™ RPC18
Supelco Discovery® 5 µm RP-AmideC16
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mm Potassium Phosphate, pH 2.5 / Methanol (70:30)
Flow Rate: 1.0 mL/ min
Detection: UV @ 210 nm
Sample: 1. Phenylephrine
2. Phenylpropanolamine
3. Pseudoephedrine

Synergi™ Full Range Selectivity LC

Synergi Fusion-RP

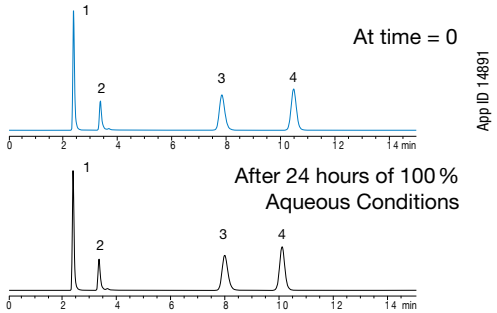
SFC APPROVED

Synergi Fusion-RP has negligible MS bleed compared to other polar modified C18 columns



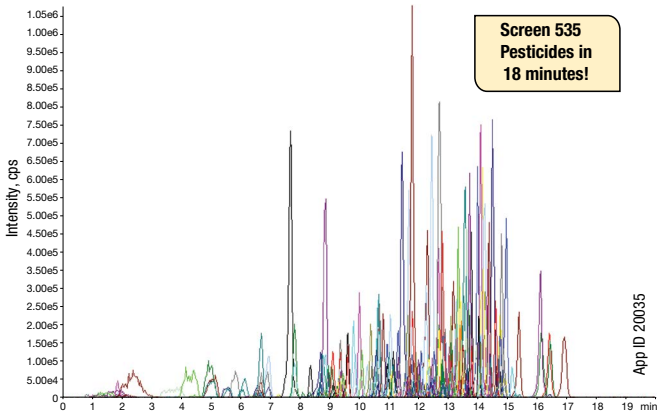
Conditions for all columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: A: 0.1 % CH_3COOH in Water
B: 0.1 % CH_3COOH in Methanol
Gradient: 95:5 (A/B) linear to 5:95 over 8 min, hold for 5 min
Flow Rate: 0.5 mL/ min
Detection: Bruker-Daltonics Esquire 2000 IT
Ion Source: ESI
Scan Rate: 13000 m/z/s
Scan Range: 50-1000

100 % aqueous stable for added method flexibility



Column: Synergi 4 µm Fusion-RP
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate buffer pH 2.5
Flow Rate: 1.0 mL/ min
Injection: 1 µL
Temperature: 30 °C
Detection: UV @ 254 nm
Sample: 1. Thiourea
2. Adenine
3. Guanosine-5-monophosphate
4. Thymine

Excellent Multi-Compound Screening Ability



Column: Synergi 2.5 µm Fusion-RP 100 Å
Dimensions: 50 x 2.0 mm
Part No.: 00B-4423-B0
Mobile Phase: A: Water/Methanol (90:10) + 5 mm Ammonium formate
B: Methanol/Water (90:10) + 5 mm Ammonium formate
Gradient:

Time (min)	% B
0	0
1	0
15	100
18	100
18.05	0
20	0

Flow Rate: 400 µL/min
Temperature: 40 °C
Vial: AR0-9925-13
Filter: AF0-8203-52
Detector: SCIEX API 3200™ System
Detection: Tandem Mass Spectrometer (MS/MS) (400 °C)
Sample: Multi-Residue Screening in Foods of Plant Origin
See full list of analytes online at www.phenomenex.com

*Comparative separations may not be representative of all applications.

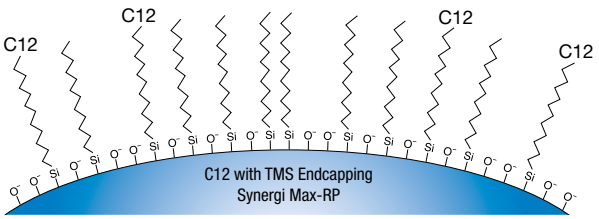
Columns used for comparison studies were manufactured by and purchased from Agilent Technologies Inc., Waters Corporation, GL Sciences Inc., Macherey-Nagel, and Sigma-Aldrich Co., LLC..

Synergi™
Full Range Selectivity LC

SFC APPROVED

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.

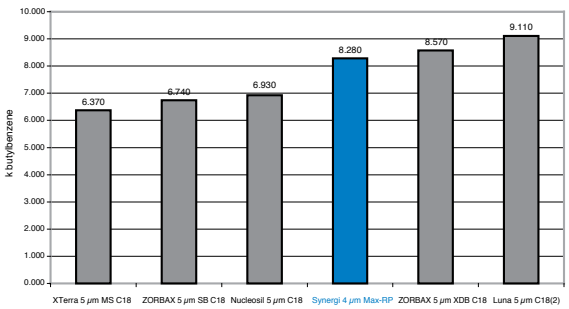
Sample Challenge:

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.

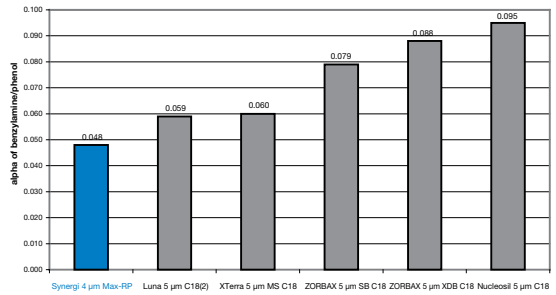
Hydrophobic Retention: Synergi Max-RP (C12) Performs Like a C18



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
Injection: 1 µL
Temperature: Ambient
Detection: UV @ 254 nm
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
Injection: 5 µL
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Benzylamine
2. Phenol

Comparative separations may not be representative of all applications.

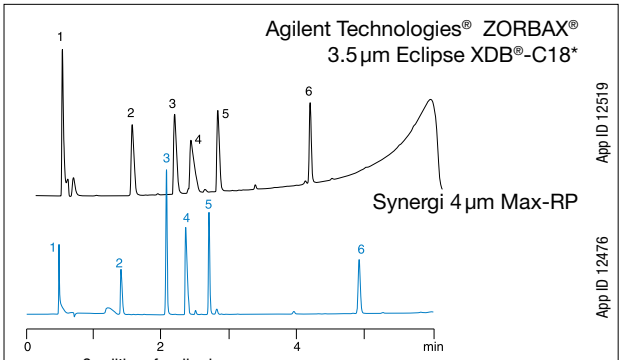
Synergi™ Full Range Selectivity LC

Synergi Max-RP *(cont'd)*

SFC APPROVED

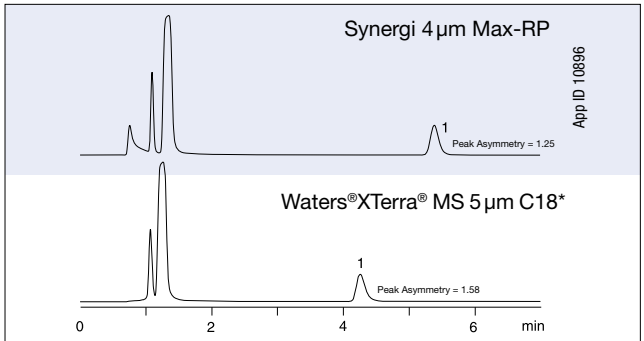
Sharper Peaks

The Synergi Max-RP C12 ligands are densely bound to silica surface, significantly decreasing the number of active silanol groups, which cause peak tailing



Conditions for all columns:

Columns: Synergi 4 µm Max-RP
Agilent Technologies ZORBAX 3.5 µm Eclipse XDB-C18
Dimensions: 50 x 4.6 mm
Mobile Phase: A: Water with 0.1 % Formic acid
B: Acetonitrile with 0.1 % Formic acid
Gradient: A/B (95:5) to 100 **% B** in 5 min
Flow Rate: 1.5 mL/ min
Injection: 5 µL
Temperature: 30 °C
Detection: UV @ 254 nm
Sample:
1. Thiourea (0.25 µg)
2. Codeine (1 µg)
3. Chlorpheniramine (2 µg)
4. Propranolol (6 µg)
5. Desipramine (0.5 µg)
6. Ibuprofen (6 µg)



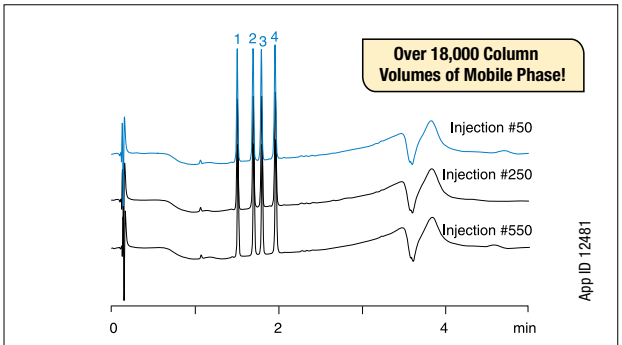
Conditions for all columns:

Columns: Synergi 4 µm Max-RP
Waters XTerra MS 5 µm C18
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate pH 7 / Acetonitrile / Methanol (50:25:25)
Flow Rate: 1.5 mL/ min
Injection: 1 µL
Temperature: 30 °C
Detection: UV @ 210 nm
Sample: Methanol extract from Chlortrimeton Allergy Pills
1. Chlorpheniramine

*See p. 349 for disclaimer information. Comparative separations may not be representative of all applications.

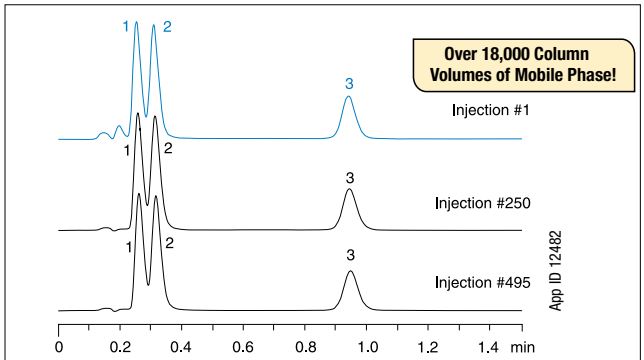
Achieve Reproducibility and Long Column Lifetimes Even at pH Extremes with Synergi Max-RP

Stability @ pH 1.5



Column: Synergi 4 µm Max-RP
Dimensions: 30 x 2.0 mm
Part No.: 00A-4337-B0
Mobile Phase: A: Water with 0.1 % TFA
B: Acetonitrile with 0.1 % TFA
Gradient: A/B (95:5) to
A/B (5:95) in 3 min
Flow Rate: 1.0 mL/ min
Injection: 1 µL
Temperature: 30 °C
Detection: UV @ 254 nm
Sample: Precipitated porcine serum (2:1 Acetonitrile:serum) containing:
1. Oxazepam (50 ng)
2. Temazepam (50 ng)
3. Nordiazepam (50 ng)
4. Diazepam (50 ng)

Stability @ pH 10.0



Column: Synergi 4 µm Max-RP
Dimensions: 30 x 2.0 mm
Part No.: 00A-4337-B0
Mobile Phase: Water with 0.1 % Ammonium hydroxide, pH 10 / Acetonitrile with 0.1 % Ammonium hydroxide, pH 10 (50:50)
Flow Rate: 0.5 mL/ min
Injection: 5 µL
Temperature: 30 °C
Detection: UV @ 254 nm
Sample:
1. Pyridine
2. Phenol
3. Toluene

Synergi™ Full Range Selectivity LC

Fast LC Solutions

SFC APPROVED

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**	**20 x 2.0**	**20 x 4.0**	**20 x 2.0**	**20 x 4.0**
Max-RP	—	00M-4372-B0-CE	00M-4372-D0-CE	—	—
Hydro-RP	—	—	—	—	—
Polar-RP	00N-4371-B0-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**
CH0-7187	10 mm direct-connect holder
CH0-7188	20 mm direct-connect holder

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pages 206-207.

Part No.	**Description**
CH0-5846	10 mm standard holder
CH0-5845	20 mm standard holder

Micro LC Columns

Ordering Information

4 µm Synergi Micro LC Columns (mm)					
Phases	**50 x 0.3**	**150 x 0.3**	**50 x 0.5**	**150 x 0.5**	**250 x 0.5**
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	—

For information on Micro LC Columns, Traps, and Fittings, see pages 175-177.

Synergi *(cont'd)*

Synergi™ Full Range Selectivity LC

HPLC Columns

SFC APPROVED

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-A0	—	00A-4337-B0	00B-4337-B0	00C-4337-B0	00F-4337-B0	—	AJ0-6073
Hydro-RP	00B-4375-A0	00F-4375-A0	00A-4375-B0	00B-4375-B0	00C-4375-B0	00F-4375-B0	00G-4375-B0	AJ0-7510
Polar-RP	—	—	00A-4336-B0	00B-4336-B0	00C-4336-B0	00F-4336-B0	00G-4336-B0	AJ0-6075
Fusion-RP	00B-4424-A0	00F-4424-A0	00A-4424-B0	00B-4424-B0	00C-4424-B0	00F-4424-B0	00G-4424-B0	AJ0-7556
								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-Y0	00F-4337-Y0	00G-4337-Y0	AJ0-6073
Hydro-RP	—	00B-4375-Y0	00F-4375-Y0	00G-4375-Y0	AJ0-7510
Polar-RP	00A-4336-Y0	00B-4336-Y0	00F-4336-Y0	00G-4336-Y0	AJ0-6075
Fusion-RP	—	00B-4424-Y0	00F-4424-Y0	00G-4424-Y0	AJ0-7556
					for ID: 2.0-3.0 mm

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pages 210-211.

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	AJ0-6074
Hydro-RP	00A-4375-E0	00B-4375-E0	00C-4375-E0	00F-4375-E0	00G-4375-E0	AJ0-7511
Polar-RP	—	00B-4336-E0	00C-4336-E0	00F-4336-E0	00G-4336-E0	AJ0-6076
Fusion-RP	—	00B-4424-E0	00C-4424-E0	00F-4424-E0	00G-4424-E0	AJ0-7557
						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					/ea
Max-RP	—	—	00F-4337-P0-AX	00G-4337-P0-AX	AJ0-7842
Hydro-RP	00B-4375-P0-AX	—	00F-4375-P0-AX	00G-4375-P0-AX	AJ0-7843
Polar-RP	00B-4336-P0-AX	00D-4336-P0-AX	00F-4336-P0-AX	00G-4336-P0-AX	AJ0-7845
Fusion-RP	—	00D-4424-P0-AX	00F-4424-P0-AX	00G-4424-P0-AX	AJ0-7844
10 µm					/ea
Hydro-RP	—	—	Inquire	00G-4376-P0-AX	AJ0-7843
Polar-RP	—	—	Inquire	00G-4351-P0-AX	AJ0-7845
Fusion-RP	—	—	00F-4425-P0-AX	00G-4425-P0-AX	AJ0-7844
					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		/ea
Max-RP	00G-4337-U0-AX	AJ0-8304
		for ID: 30-49 mm

Ordering Information

4 µm Semi-Prep Columns (mm)		SecurityGuard Cartridges (mm)
Phases	250 x 10	10 x 10‡
		/3pk
Max-RP	00G-4337-N0	AJ0-7275
Hydro-RP	00G-4375-N0	AJ0-7512
Polar-RP	00G-4336-N0	AJ0-7276
Fusion-RP	00G-4424-N0	AJ0-7558
		for ID: 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

For more dimensions and phases of Axia packed preparative columns, see pages 11-21, or contact your Phenomenex Technical Consultant

Pilot Scale Columns and Bulk Material

Ordering Information

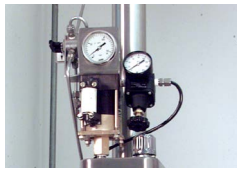
10 µm Analytical and Semi-Prep Columns (mm)				SecurityGuard Cartridges (mm
Phases	250 x 4.6	250 x 10	4 x 3.0*	10 x 10‡
			/10pk	/3pk
Max-RP	—	00G-4350-N0	AJ0-6074	AJ0-7275
Hydro-RP	00G-4376-E0	00G-4376-N0	AJ0-7511	AJ0-7512
Polar-RP	00G-4351-E0	00G-4351-N0	AJ0-6076	AJ0-7276
Fusion-RP	00G-4425-E0	00G-4425-N0	AJ0-7557	AJ0-7558
			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™

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
					/10pk
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

SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282

*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.

Ultremex™

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
			/10pk
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

Yarra 3 µm Aqueous GFC/SEC Columns

Yarra™ Ultra-High Efficiency GFC/SEC

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.

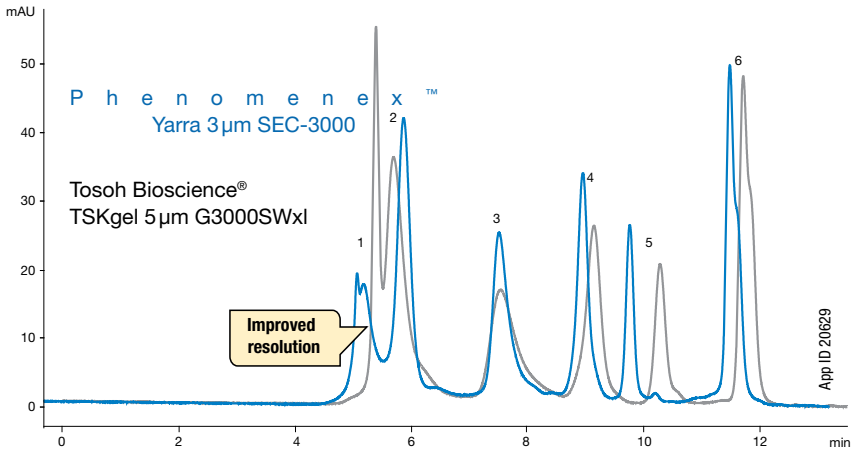
Higher Efficiency, Much Lower Price Compared to TSKgel®— GUARANTEED!

Yarra VS. **TSKgel*†**

Yarra 300 x 7.8 mm				TSKgel 300 x 7.8 mm		
				G2000SWxl	G3000SWxl	G4000SWxl
3	3	3	**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

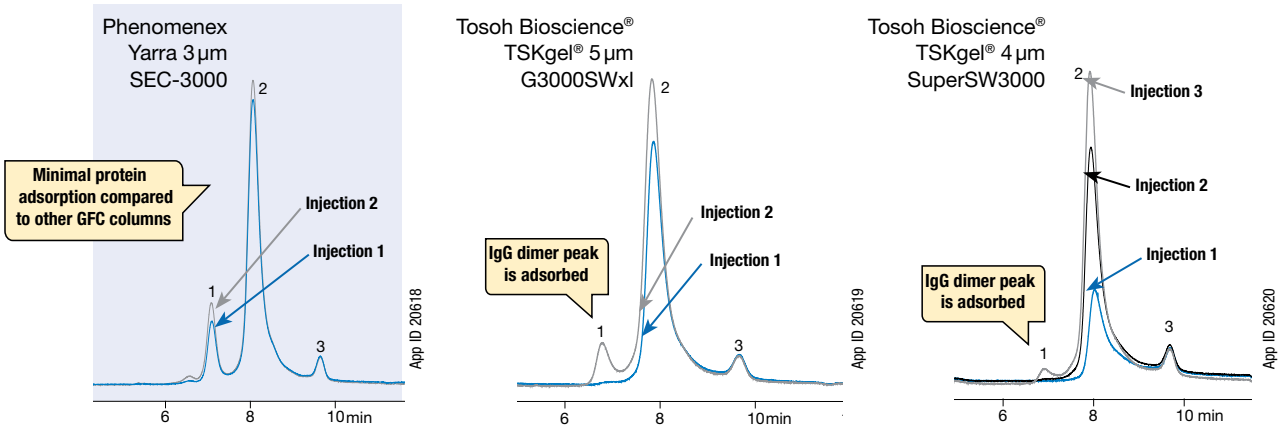
Yarra 3 µm Aqueous GFC/SEC Columns *(cont'd)*

Yarra™ Ultra-High Efficiency GFC/SEC

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

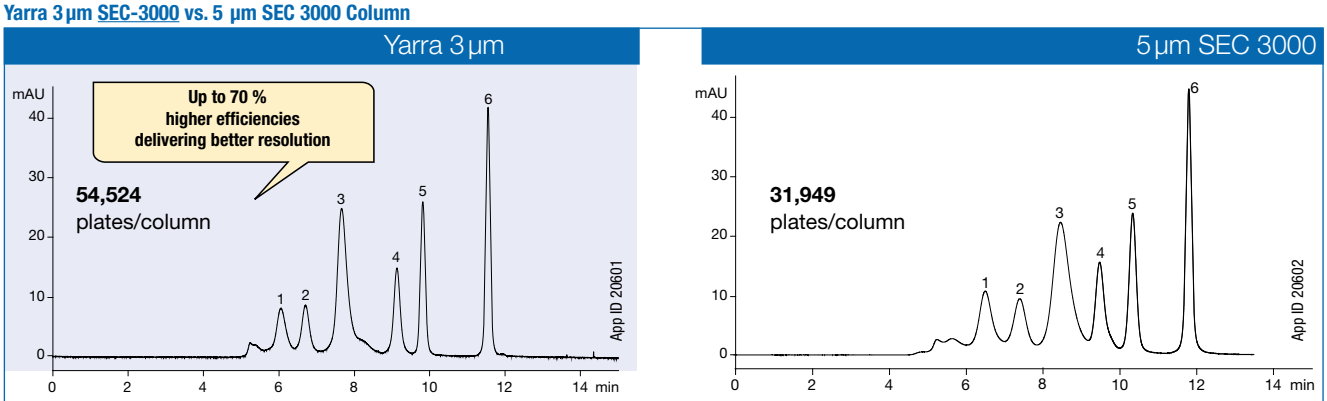


Conditions for all columns (except where noted):

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



Conditions for both columns:

Columns: Yarra 3 µm SEC-3000
5 µm SEC 3000 Column
Dimensions: 300 x 7.8 mm
Mobile Phase: 100 mM Sodium Phosphate in Water pH 6.8 + 0.025 % NaN_3
Flow Rate: 1 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

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*
				/10pk
Yarra 3 µm SEC-2000	00H-4512-E0	00F-4512-K0	00H-4512-K0	AJ0-4487
Yarra 3 µm SEC-3000	00H-4513-E0	00F-4513-K0	00H-4513-K0	AJ0-4488
Yarra 3 µm SEC-4000	00H-4514-E0	—	00H-4514-K0	AJ0-4489

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282 for ID: 4.6 - 7.8 mm

For information on SecurityGuard column protection, see pages 150-154.

Yarra 3 µm Aqueous GFC/SEC Columns *(cont'd)*

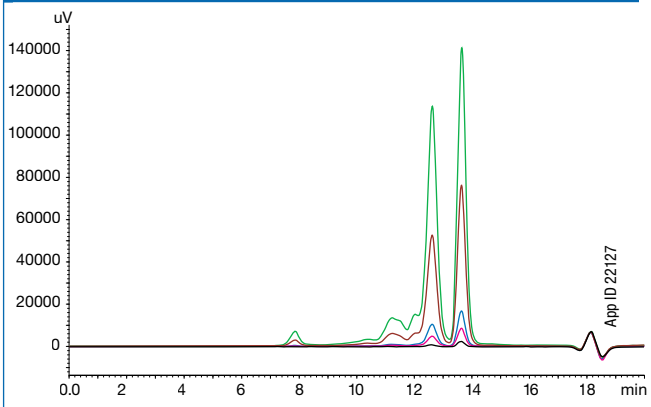
Yarra™ Ultra-High Efficiency GFC/SEC

Higher Performance for Preparative BioSeparations at a Lower Price

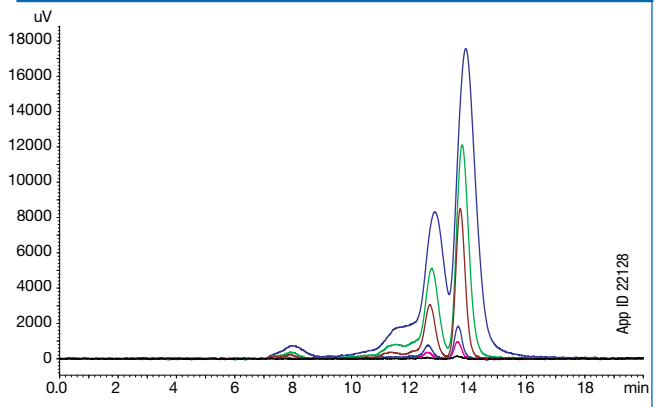
Enjoy the same selectivity and ultra-high efficiency of Yarra 3 µm for your preparative gel filtration applications. Yarra SEC PREP features a 5 µm particle size format of the original Yarra 3 µm particle with the same chemistry on a 21.2 mm ID column for preparative purification, desalting, and characterization 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

Increasing sample concentrations with fixed injection volume



Increasing injection volumes with fixed sample concentration



Injection Volume: 100 µL
0.1 mg/mL - 0.01 mg
0.5 mg/mL - 0.05 mg
1 mg/mL - 0.10 mg
5 mg/mL - 0.50 mg
10 mg/mL - 1.0 mg

Conditions for both applications:
Columns: Yarra 5 µm SEC-2000 PREP
Dimensions: 300 x 21.2 mm
Part No: 00H-4619-P0
Mobile Phase: 100 mM Sodium Phosphate pH 6.8
Flow Rate: 5 mL/min
Temperature: Ambient
Detection: UV @ 280 nm (ambient)
Sample: 1. Bovine Serum Albumin (66 kDa)
2. Myoglobin (17 kDa)

Sample concentration: 1 mg/mL
10 µL - 0.01 mg
50 µL - 0.05 mg
100 µL - 0.1 mg
500 µL - 0.5 mg
1 mL - 1 mg
2 mL - 2 mg

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	AJ0-8588
Yarra 5 µm SEC-3000 PREP	00H-4620-P0	AJ0-8589
Yarra 5 µm SEC-4000 PREP	00H-4621-P0	AJ0-8590

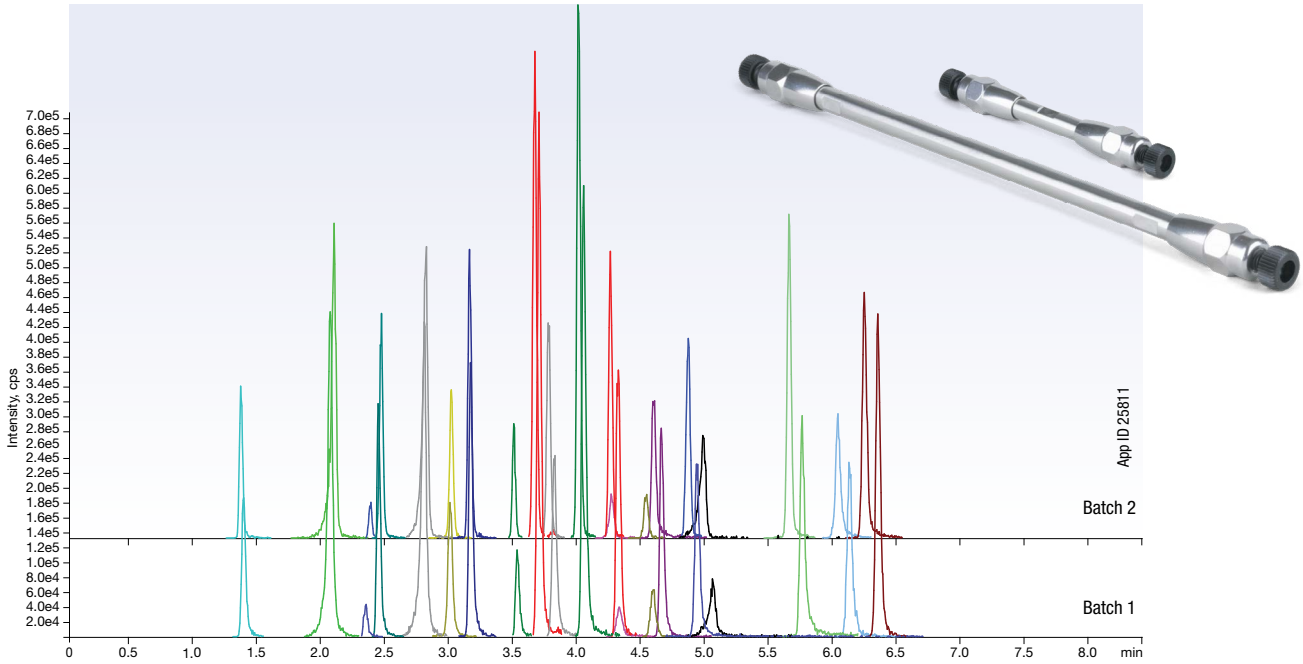
**PREP SecurityGuard™ Cartridges require holder, Part No.: AJ0-8223 for ID: 18 - 29 mm

Micro Flow LC Columns, Traps, and Fittings

Reproducible Micro Columns

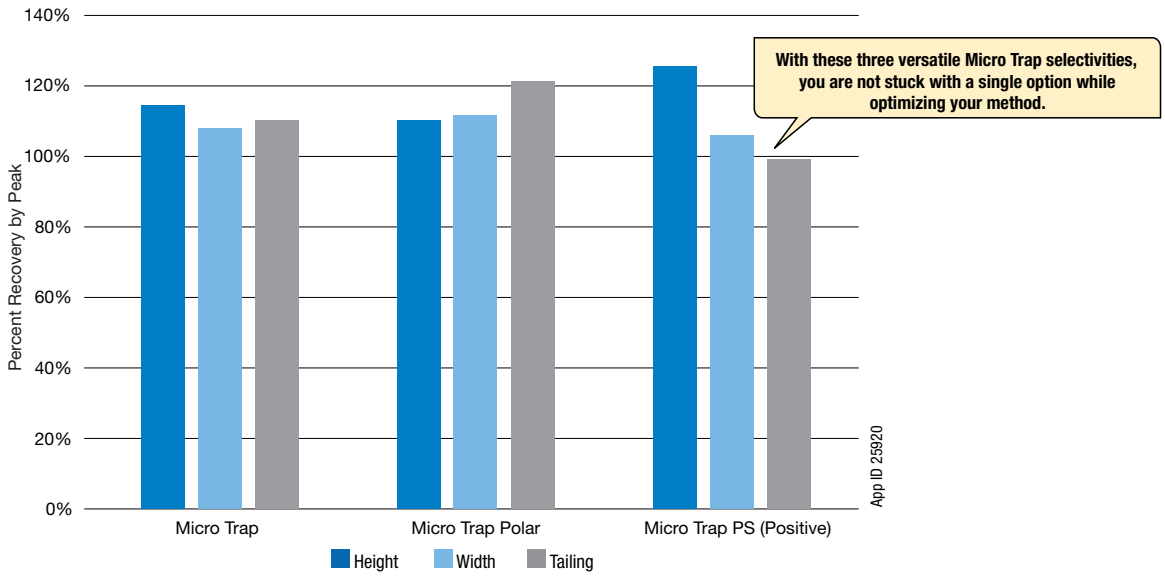
Our micro columns are manufactured with hardware and surface chemistries that are designed to be consistent analytical tools for your analysis. They undergo extensive quality testing to ensure dependability and reproducibility to bring confidence to your application.

Micro LC Kinetex™ Batch-to-Batch Reproducibility: 20 Stable-Isotope-Labeled (SIL) Peptides



Complementary Micro LC Column and Trap Selectivity

Luna™ Omega Polar Column with Micro Trap C18, MicroTrap Polar, or MicroTrap PS

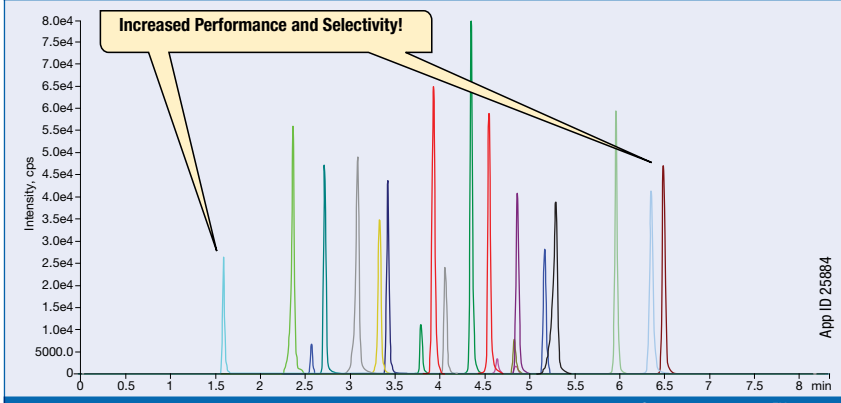


Micro Trap Phases & Dimension			
Micro Trap C18	10 x 0.15 mm	10 x 0.3 mm	10 x 0.5 mm
Micro Trap Polar	10 x 0.15 mm	10 x 0.3 mm	10 x 0.5 mm
Micro Trap PS	10 x 0.15 mm	10 x 0.3 mm	10 x 0.5 mm

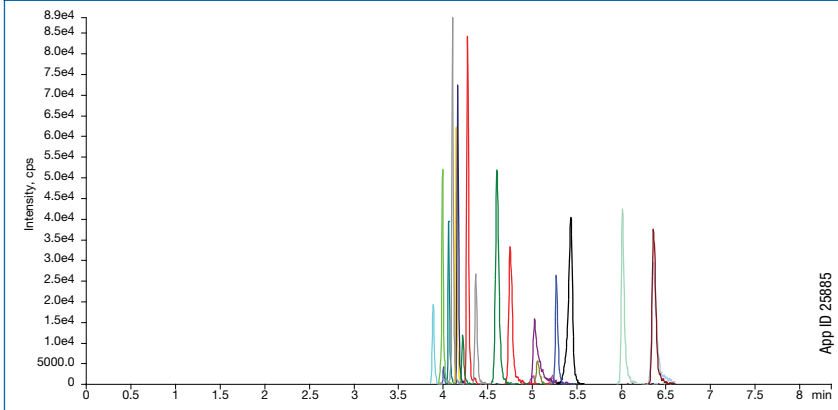
Bring Diverse Micro Selectivity and Improved Performance to Your Lab!

Kinetex Core-Shell Technology packed in a highly compatible micro LC column hardware makes choosing easy; now you get both selectivity and performance gains.

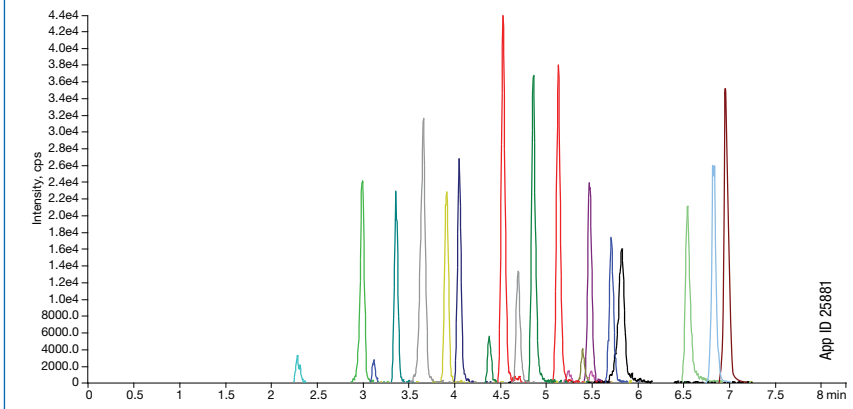
Kinetex™ XB-C18 2.6 µm



Waters® nanoEase™ M/Z Peptide BEH C18 1.7 µm



Thermo Scientific™ Acclaim™ PepMap™ C18 2 µm



Micro LC Conditions for all columns:

Columns: As noted
Dimension: 50 x 0.3 mm
Mobile Phase: A: Water with 0.1 % Formic Acid
B: Acetonitrile with 0.1 % Formic Acid

Gradient: Time (min)	% B
0	3
10	40
12	80
14	80
15	3
20	3

Flow Rate: 10 µL/min
Temperature: Ambient (25 °C)
Injector Temp.: 4 °C
Column Temp.: 25 °C
Injection Volume: 1 µL
Detection: MS/MS SCIEX® QTRAP® 5500
Sample: 20 stable-isotope-labeled (SIL) peptide mix

Micro Flow LC Columns, Traps, and Fittings *(cont'd)*

Micro LC Columns

Ordering Information

2.6 µm Micro LC Columns (mm)						
Phase	**30 x 0.3**	**50 x 0.3**	**100 x 0.3**	**150 x 0.3**	**50 x 0.5**	**150 x 0.5**
Kinetex™ Biphenyl 100Å	—	00B-4622-AC	—	00F-4622-AC	00B-4622-AF	—
Kinetex C18 100Å	00A-4462-AC	00B-4462-AC	—	00F-4462-AC	00B-4462-AF	—
Kinetex EVO C18 100Å	—	00B-4725-AC	—	00F-4725-AC	00B-4725-AF	—
Kinetex F5 100Å	—	00B-4723-AC	00D-4723-AC	00F-4723-AC	00B-4723-AF	—
Kinetex XB-C18 100Å	00A-4496-AC	00B-4496-AC	00D-4496-AC	00F-4496-AC	00B-4496-AF	00F-4496-AF

3 µm Micro LC Columns (mm)							
Phase	**30 x 0.3**	**50 x 0.3**	**100 x 0.3**	**150 x 0.3**	**50 x 0.5**	**100 x 0.5**	**150 x 0.5**
Luna™ C8(2)100Å	—	00B-4248-AC	—	—	00B-4248-AF	—	—
Luna C18(2) 100Å	—	00B-4251-AC	00D-4251-AC	00F-4251-AC	00B-4251-AF	00D-4251-AF	00F-4251-AF
Luna NH_2 100Å	—	—	—	00F-4377-AC	—	—	—
Luna HILIC 200Å	—	—	—	—	00B-4449-AF	—	—
Luna Phenyl-Hexyl 100Å	—	—	00D-4256-AC	—	—	00D-4256-AF	—
Luna Omega C18	00A-4784-AC						
Luna Omega PS C18 100Å	—	00B-4758-AC	00D-4758-AC	00F-4758-AC	00B-4758-AF	00D-4758-AF	00F-4758-AF
Luna Omega Polar C18 100Å	—	00B-4760-AC	00D-4760-AC	00F-4760-AC	00B-4760-AF	00D-4760-AF	00F-4760-AF
Gemini™ C18 110Å	—	00B-4439-AC	—	00F-4439-AC	00B-4439-AF	—	—

4 µm Micro LC Columns (mm)						
Phase	**50 x 0.3**	**150 x 0.3**	**250 x 0.3**	**50 x 0.5**	**150 x 0.5**	**250 x 0.5**
Synergi™ Max-RP 80Å	—	—	—	00B-4337-AF	00F-4337-AF	—
Synergi Hydro-RP 80Å	00B-4375-AC	00F-4375-AC	00G-4375-AC	00B-4375-AF	—	00G-4375-AF
Synergi Fusion-RP 80Å	—	00F-4424-AC	—	—	00F-4424-AF	—
Synergi Polar-RP 80Å	—	—	—	—	00F-4336-AF	—
Jupiter™ Proteo 90Å	00B-4396-AC	00F-4396-AC	—	—	00F-4396-AF	—

5 µm Micro LC Columns (mm)					
Phase	**50 x 0.3**	**150 x 0.3**	**50 x 0.5**	**150 x 0.5**	**250 x 0.5**
Luna C8(2) 100Å	—	00F-4249-AC	—	—	—
Luna C18(2)100Å	—	00F-4252-AC	—	00F-4252-AF	00G-4252-AF
Luna Phenyl-Hexyl 100Å	00B-4257-AC	—	00B-4257-AF	—	—
Luna Omega Polar C18 100Å	00B-4760-AC	00F-4760-AC	00B-4760-AF	00F-4760-AF	—
Luna Omega PS C18 100Å	00B-4758-AC	00F-4758-AC	00B-4758-AF	00F-4758-AF	—
Jupiter C18 300Å	00B-4053-AC	—	00B-4053-AF	00F-4053-AF	—
Jupiter C4 300Å	00B-4167-AC	—	00B-4167-AF	—	—

Micro LC Trap Selectivities

Ordering Information

Trap Fittings			
Part No.	**Description**	**Dimensions (length x ID mm)**	**Unit**
06N-4252-AG	Micro Trap Column C18	10 x 0.150 mm	2/pk
06N-4753-AG	Micro Trap Column PS	10 x 0.150 mm	2/pk
06N-4754-AG	Micro Trap Column Polar	10 x 0.150 mm	2/pk
06N-4252-AC	Micro Trap Column C18	10 x 0.30 mm	2/pk
06N-4753-AC	Micro Trap Column PS	10 x 0.30 mm	2/pk
06N-4754-AC	Micro Trap Column Polar	10 x 0.30 mm	2/pk
06N-4167-AC	Micro Trap Column Widepore C4	10 x 0.30 mm	2/pk
06N-4252-AF	Micro Trap Column C18	10 x 0.50 mm	2/pk
06N-4754-AF	Micro Trap Column Polar	10 x 0.50 mm	2/pk

Part No.	**Description**	**Unit**
AJ2-9000	SecurityLINK ET Tightening Tool	Ea

Ordering Information

Micro Traps Fittings		
Part No.	**Description**	**Unit**
AQ0-7602	PEEKLok™ fittings with 6-40 thread for $^1/_{32}$" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQ0-7603	PEEKLok fittings with 6-32 thread for $^1/_{32}$" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQ0-7601	PEEKLok fittings with 10-32 thread for $^1/_{16}$" OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea

It's recommended that you optimize the selectivity between your Micro LC trap and column configuration to maximize your separation performance.

Columns, Scout and Preparative

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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 m^2/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 m^2/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-PREP (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-PREP (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-PREP (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-PREP (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-PREP (bulk)	0.58	Pharmaceuticals, Peptides, Estrogens, Basic Compounds, General Reversed Phase Applications
	Luna C8(2)	100	400	1.5 – 10	10 µm (bulk) 10-PREP (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-PREP (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-PREP (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-PREP (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_2 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

Columns, Scout and Preparative *(cont'd)*

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Scout Columns

Ordering Information

Luna™ (100 Å)		
Phases	**250 x 4.6 mm**	**250 x 10 mm**
10 µm-*PREP*		
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

Additional scout columns available. Contact us for 3 µm, 4 µm, 5 µm, and 10 µm media scout columns.

Process Chromatography

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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 10µm or 15µm preparative column with equivalent resolution, selectivity, and proportional mass loading.

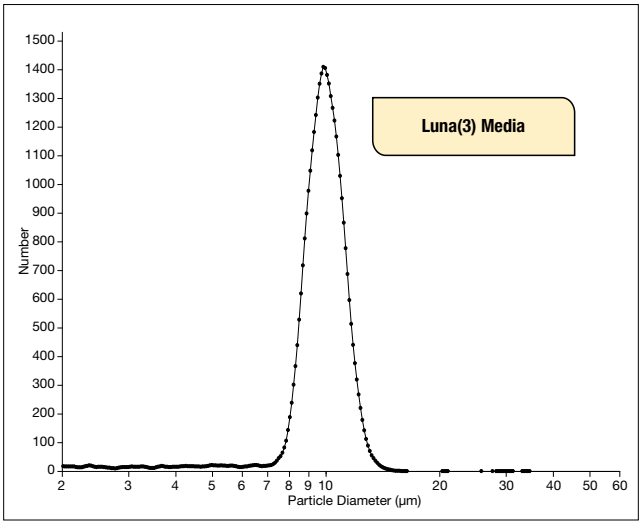
Mechanically Strong Media

- 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)

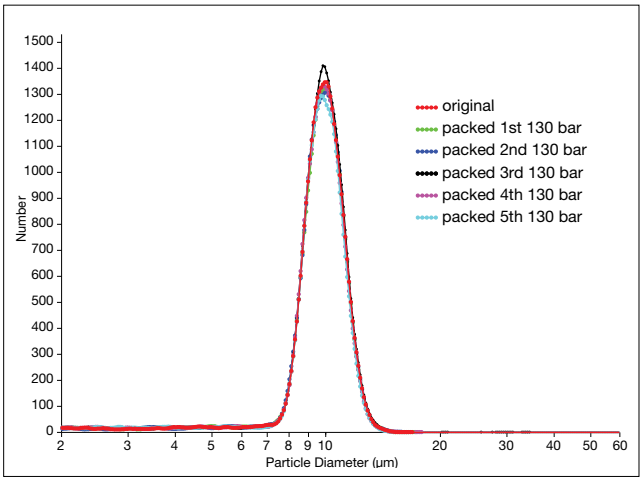
Withstand Multiple Repacking in Dynamic Axial Compression (DAC) Systems

Dynamic Axial Compression (DAC) systems apply high mechanical stress on the packing media. This, along with high flow rates and backpressures can crack or sheer low mechanical strength silica particles, creating silica fines, which will rapidly degrade column efficiency and clog frits. Luna, and Jupiter 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 *(cont'd)*

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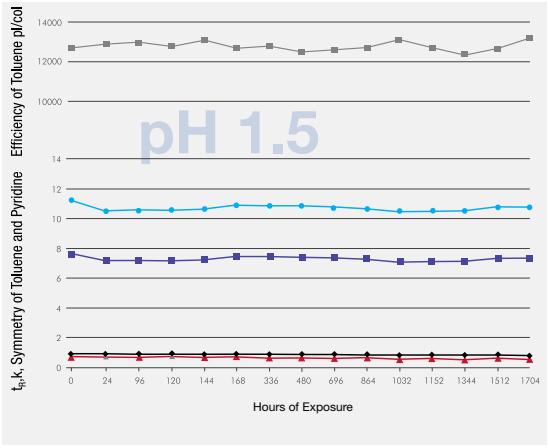
Chemically Stable Media

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

Luna™ 5µm C18(2) 100 Å, pH Stable (1.5-10)

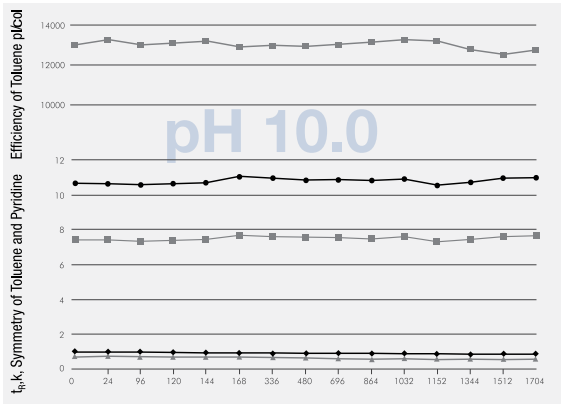


Test Conditions: Column stability tested under highly acidic conditions.
Continuous flush in 0.1 % TFA (pH 1.5) in Water/Acetonitrile, 50:50.

KEY:
Efficiency, Plates for Toluene; t_R of Toluene (min); k of Toluene; Symmetry of Toluene; Symmetry of Pyridine

Extended Media Lifetime even Under Caustic Washes

Luna 5µm C18(2) 100 Å, pH Stable (1.5-10)



Test Conditions: Column stability tested under highly basic conditions
Continuous flush in 20 mM Na_2HPO_4 (pH 10.0) in Water/Acetonitrile, 50:50.

KEY:
Efficiency, Plates for Toluene; t_R of Toluene (min); k of Toluene; Symmetry of Toluene; Symmetry of Pyridine

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

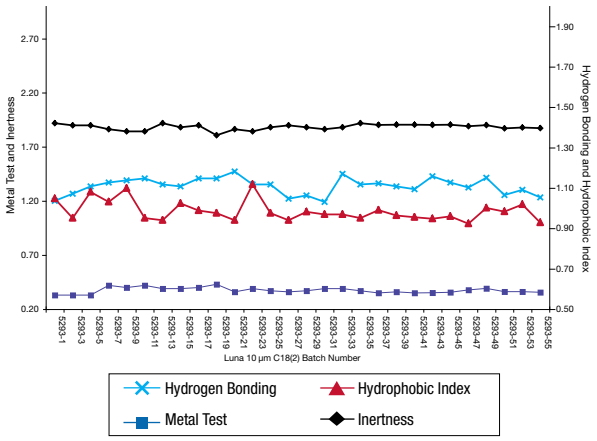
The development, production, and marketing of Phenomenex Bulk Media follow ISO 9001 guidelines.

Product Quality

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. 433-434 for exact pH limits of each phase.

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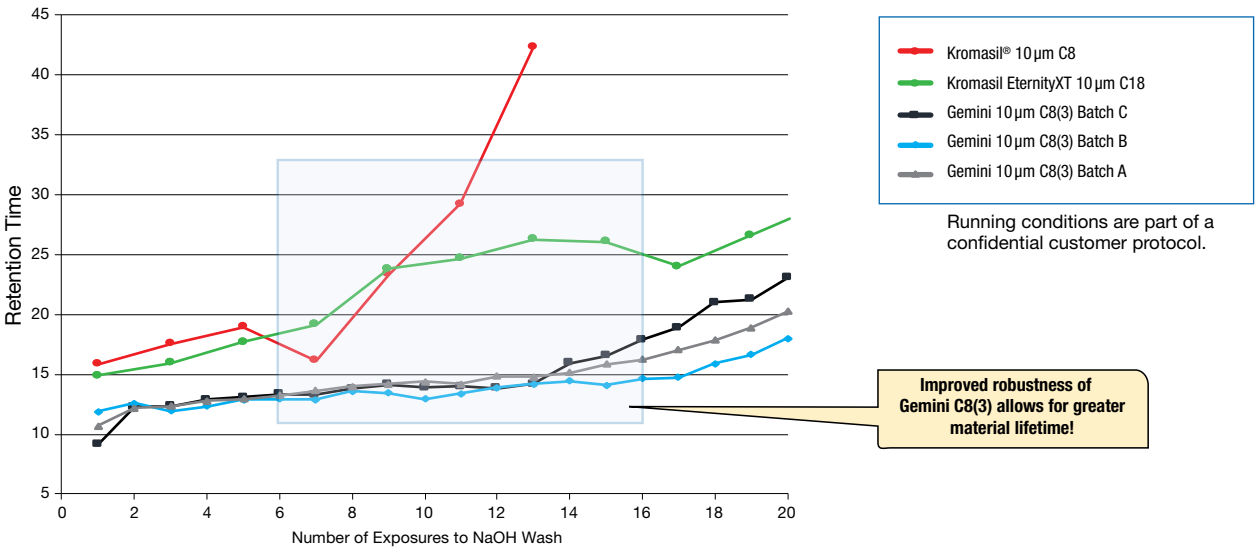
Gemini C8(3)

The Material Developed for High pH Insulin Purification

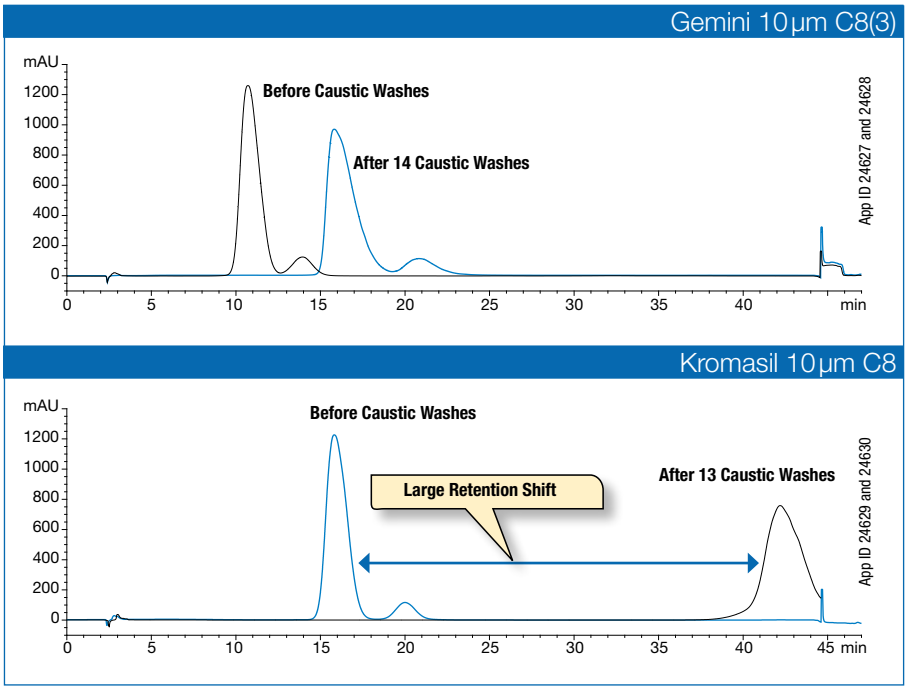
Many products can separate human insulin and its degradant, while few can withstand high pH caustic washes for aggregate removal. Now, there is a clear media choice. Gemini™ C8(3) provides the needed separation, the needed low/high pH robustness, and the overall consistency in terms of efficiency and 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



Running conditions are part of a confidential customer protocol.

Insulin Retention Comparison



Comparative separations may not be representative of all applications.

Process Chromatography *(cont'd)*

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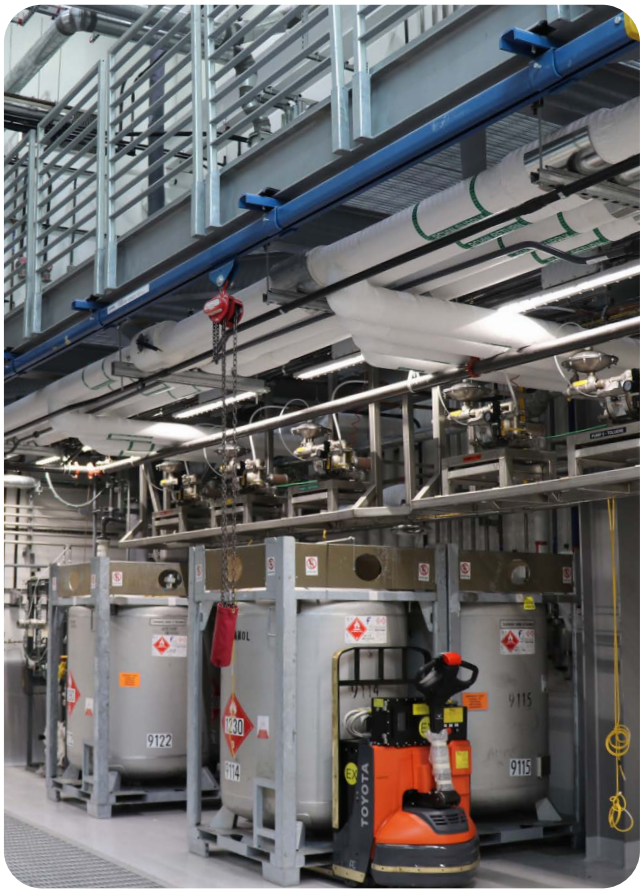
Bulk HPLC Media

Ordering Information

Luna™ (100 Å)				
Phases	**100 g**	**1 kg**	**5 kg**	**10 kg**
10 µm-*PREP*				
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



Contact your Phenomenex technical consultant or local distributor for additional bulk packings and quantities not listed.

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 (2.0 mm – 50.0 mm ID)**

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.

Chiral columns

5 Coated Lux Polysaccharide Chiral Stationary Phases

- **Lux™ Amylose-1**
- **Lux Cellulose-1**
- **Lux Cellulose-2**
- **Lux Cellulose-3**
- **Lux Cellulose-4**

3 Immobilized Lux Phases

- **Lux i-Amylose-1**
- **Lux i-Amylose-3**
- **Lux i-Cellulose-5**

Achiral columns

- **Kinetex™ Phenyl-Hexyl**
- **Kinetex F5**
- **Kinetex Biphenyl**
- **Kinetex HILIC**
- **Luna HILIC**
- **Luna PFP(2)**
- **Luna™ NH_2**
- **Luna Si**
- **Luna CN**
- **Synergi™ Polar-RP**

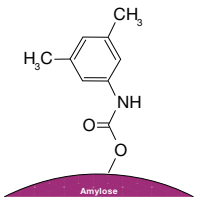
*Not all media available in a full range of particle sizes, please inquire.

Lux™ Chiral LC

Chiral SFC Media

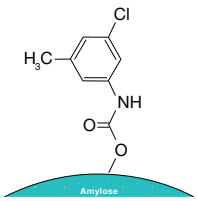
SFC APPROVED

Three Robust Immobilized Chiral Columns



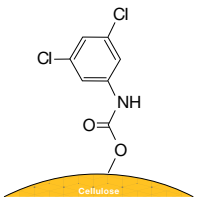
Lux i-Amylose-1

Amylose tris
(3,5-dimethylphenylcarbamate)



Lux i-Amylose-3

Amylose tris
(3-chloro-5-methylphenylcarbamate)

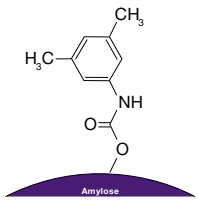


Lux i-Cellulose-5

Cellulose tris
(3,5-dichlorophenylcarbamate)

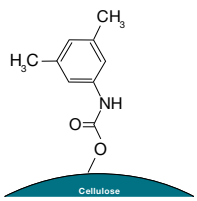
See pages 120-131, for additional information on Immobilized and Coated Lux Polysaccharide Chiral Phases.

Combined with Six Coated Lux Polysaccharide LC/SFC Chiral Stationary Phases



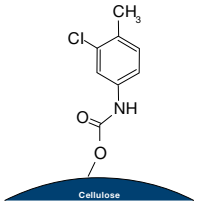
Lux Amylose-1

Amylose tris
(3,5-dimethylphenylcarbamate)



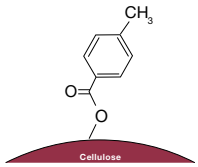
Lux Cellulose-1

Cellulose tris
(3,5-dimethylphenylcarbamate)



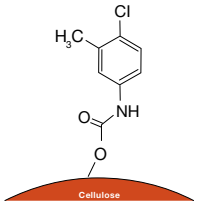
Lux Cellulose-2

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)
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

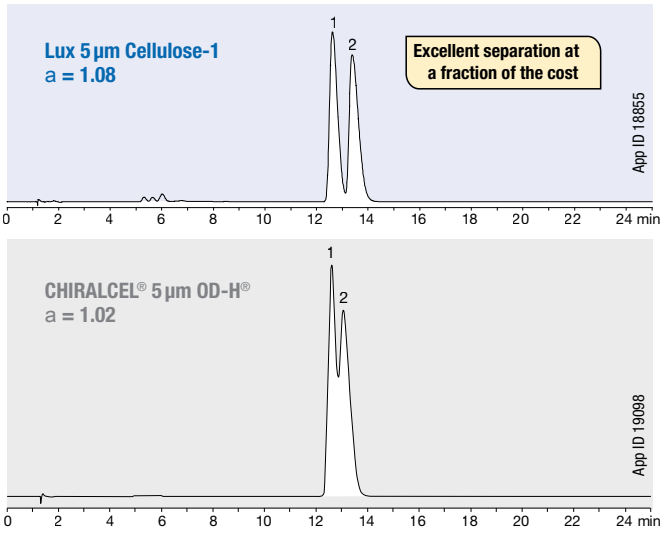
Exceptional Stability and Separating Power under SFC Conditions

- **Multiple complementary polysaccharide stationary phases**
- **High efficiency and loading capacity**
- **Pressure stability up to 300 bar**
- **3 µm, 5 µm packed columns**

Extreme Stability and Separating Power under SFC Conditions.

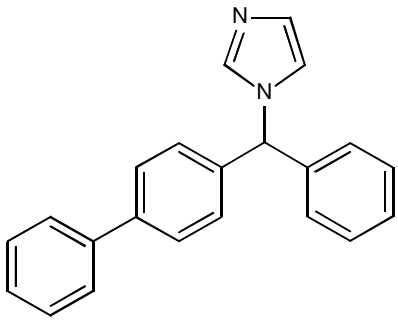
Never fear crushed media or loss in efficiency again. With a pressure stability up to 300 bar (4350 psi), you can feel confident about running at high operating pressures (if necessary). Lux™ media is SFC approved and versatile enough to satisfy all of your chiral separation needs.

Bifonazole



Conditions for both columns:

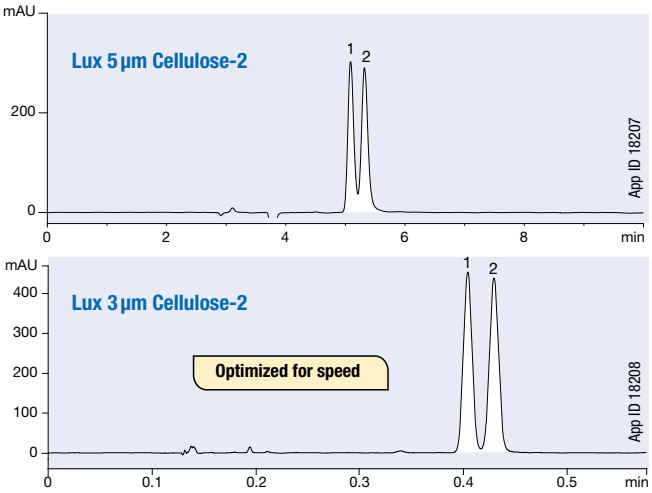
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Methanol / Carbon Dioxide (15:85)
Flow Rate: 2.5 mL/min
Temperature: 35 °C
Detection: Diode Array Detector



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.

Lux™ Chiral LC

Chiral SFC Media

SFC APPROVED

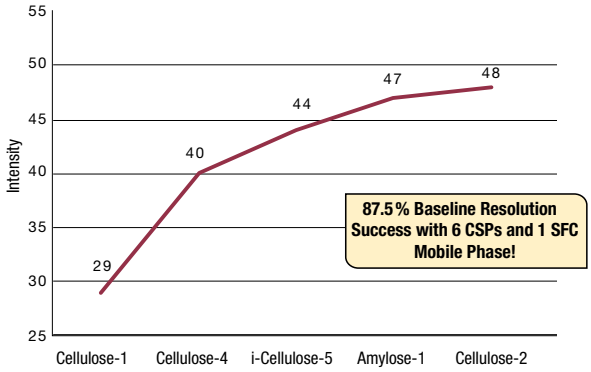
Eight distinct yet complementary Lux™ CSPs allow for excellent success rate over reversed phase, polar organic, normal phase, and SFC conditions, with the i-Amylose-3, i-Cellulose-5, and i-Amylose-1, adding strong solvent capability to this versatile family of products.

For SFC, having this breadth of selectivities is incredibly useful for 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).

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**

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

Dimensions: 250 x 4.6 mm

Conditions for all columns:

Mobile Phase: 80 % CO_2 / 20 % Methanol + 0.1 % Isopropylamine and 0.1 % TFA

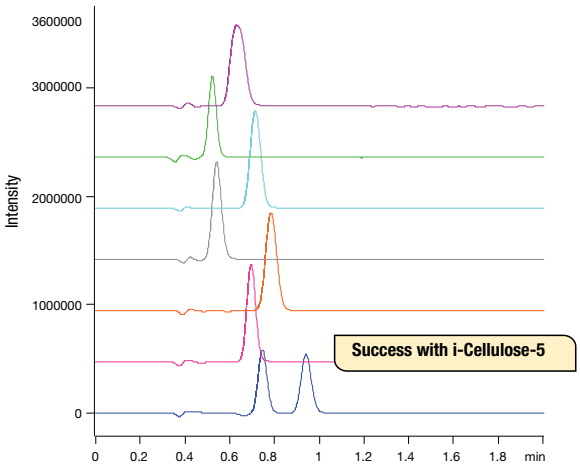
Flow Rate: 3 mL/min

Detection: UV @ 220 nm

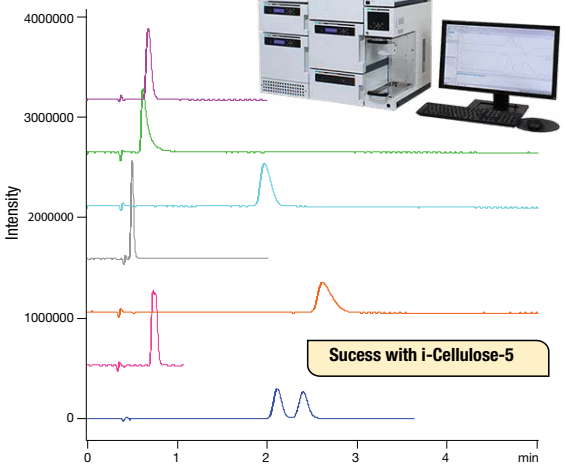
Temperature: 30 °C

System: JASCO® 4000 Series Analytical SFC

Nimopidine



Acebutolol



Nimopidine and Acebutolol

Columns: 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

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.

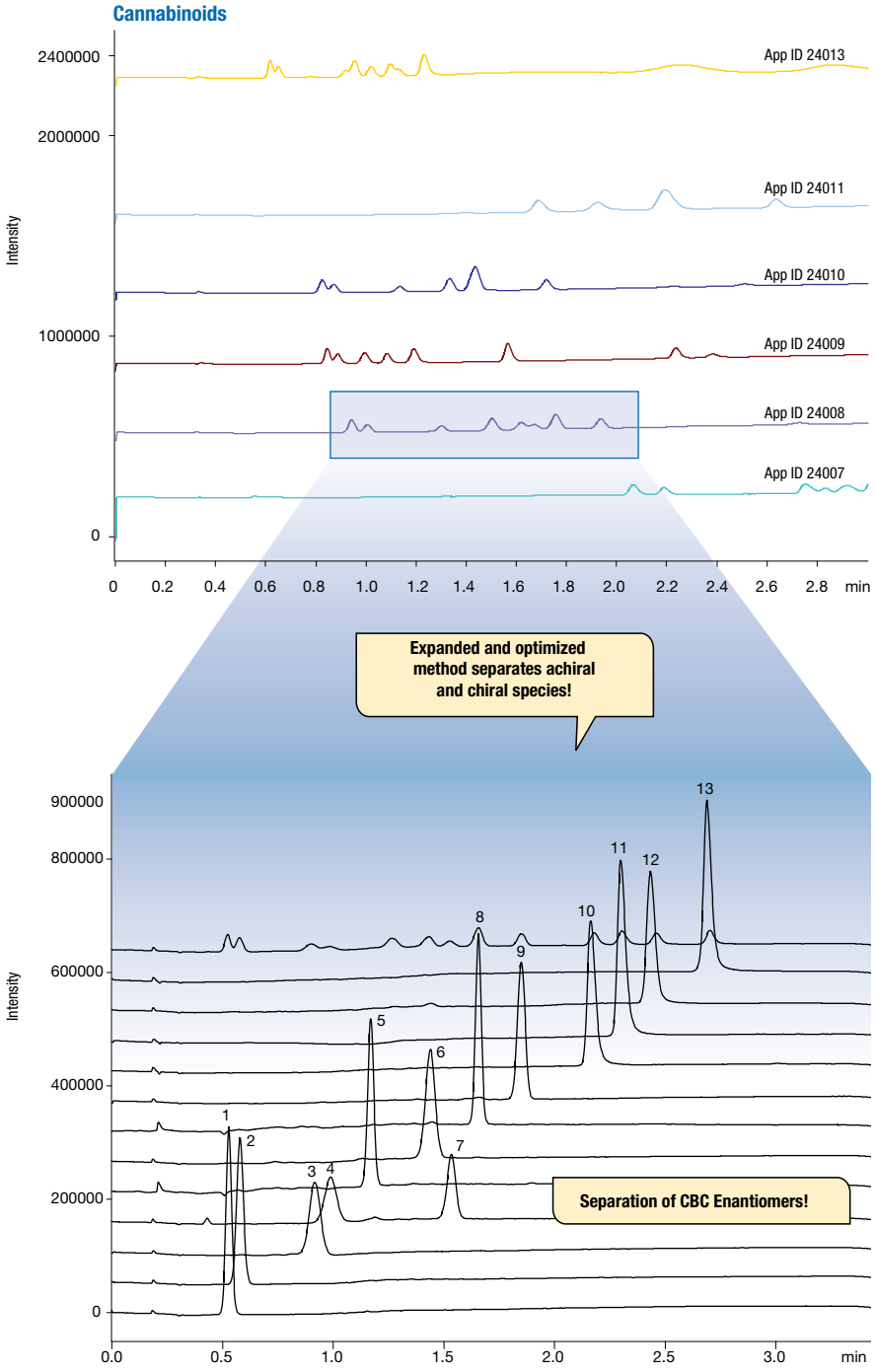
Lux™ Chiral LC

Chiral SFC Media

SFC APPROVED

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 µm i-Cellulose-5
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
2. CBN
3. Delta-8-THC
4. CBC (Enantiomer 1)
5. CBD
6. Delta-9-THC
7. CBC (Enantiomer 2)
8. THCV
9. CBG
10. CBDA
11. CBDVA
12. THCA
13. CBGA

Chiral SFC Media

Chiral Material Characteristics

Packing Material Porous	Particle Size (µm)	Pressure Stability (bar)	pH Stability
Lux™ Cellulose	3, 5	300	2.0 - 9.0
Lux Amylose	3, 5	300	2.0 - 9.0

3.0 mm ID Lux Screening Columns

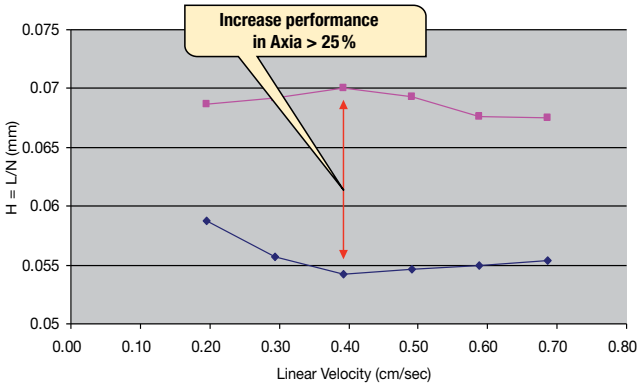
Ordering Information

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
i-Amylose-3	00F-4778-Y0	AJ0-8651
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
	for ID:	2.0–3.0 mm

† Additional dimensions available upon request.
* SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282

SFC Preparative Advantage Using Axia™ Packed Technology

Expect up to 25 % higher resolution when using the same material packing in Axia versus standard hardware.



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
†Additional dimensions available upon request.			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.

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
†Additional dimensions available upon request.			for ID:	18-29 mm	30-49 mm

**SFC PREP 21.2 mm ID SecurityGuard Cartridges require holder, Part No.: AJ0-8617.

♦SFC PREP 30.0 mm ID SecurityGuard Cartridges require holder, Part No.: AJ0-8618.

For all other SecurityGuard Cartridge Holders and Cartridges, see pages 150-154.

SFC APPROVED

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

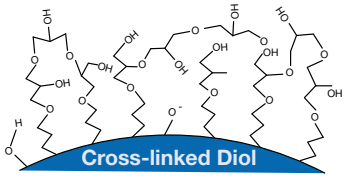
Utilizing differences in surface chemistries will ensure that you achieve a successful separation for any given project, as in the example below. Once the ideal column phase is identified, you have the ability to optimize for additional improvements in performance:

- **Changing retention**
- **Altering selectivity**
- **Increasing efficiency**
- **Reversing elution orders**

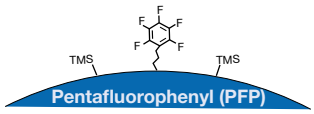
These optimization steps can easily be achieved by adjusting a few simple parameters. For instance, you can try different modifiers and/or additives, change the percent concentration of your modifier, or you can simply change your pressure, temperature, and/or flow rate.

Fully Porus Particles

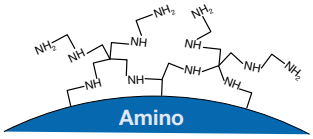
Luna™ HILIC



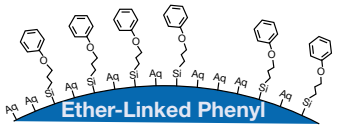
Luna PFP(2)



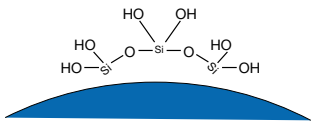
Luna NH_2



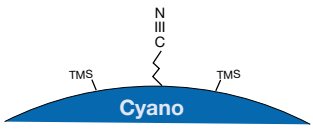
Synergi™ Polar-RP



Luna Si(2)

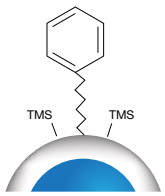


Luna CN

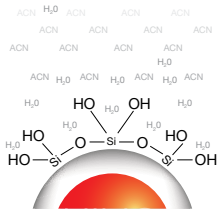


Core-Shell Particles

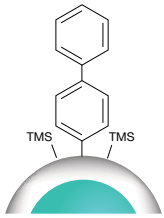
Kinetex™ Phenyl-Hexyl



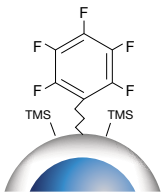
Kinetex HILIC



Kinetex Biphenyl

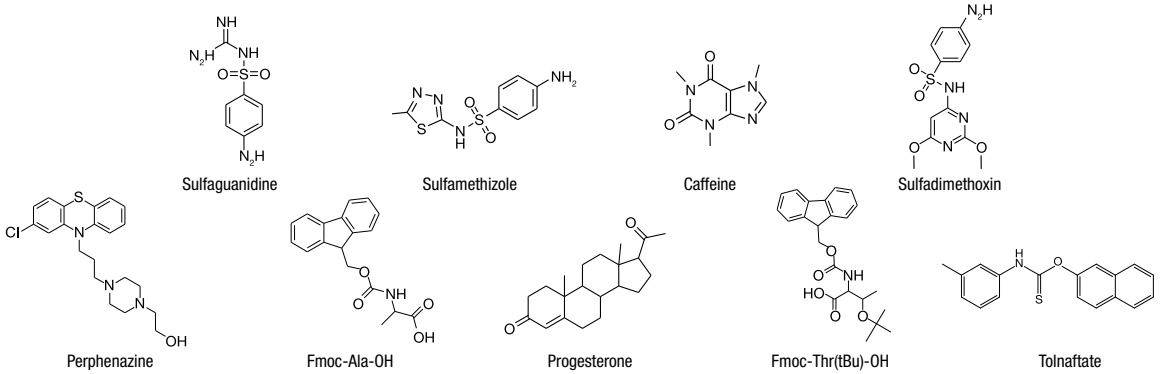


Kinetex F5



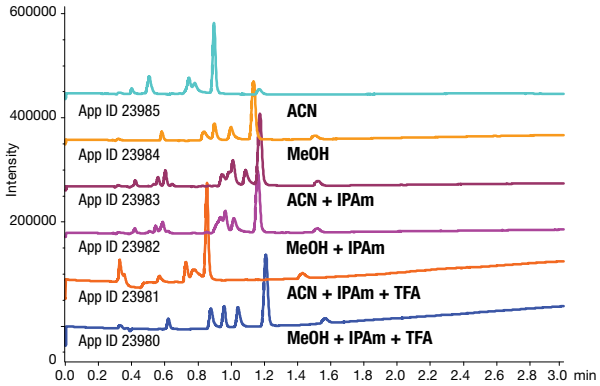
Achiral SFC Media

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 µm 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

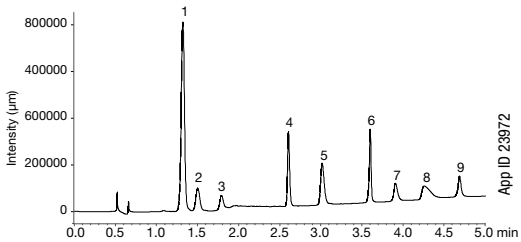
- If all of the peaks are early, lower the final gradient % co-solvent
- If all of the peaks are late, raise the initial gradient % co-solvent
- If the peaks are very close, extend the gradient over a longer period of time

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



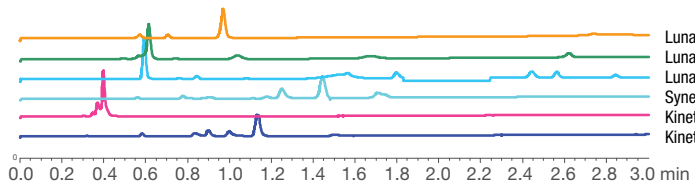
Column: Luna™ 3 µm HILIC
Dimensions: 150 x 3.0 mm
Part No.: 00F-4449-Y0
Mobile Phase: A: Carbon Dioxide
B: Methanol

Gradient:	Time (min)	% B
	0	1
	1	1
	5	40

Flow Rate: 3 mL/min
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. Sulfaguanidine

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	200	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 2.5 µm Synergi Polar-RP

Ordering Information

Supercritical Fluid Chromatography (SFC) Columns (mm)				Axia™ Packed Preparative Columns		SecurityGuard™ Cartridges (mm)			
Phase	**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
for ID:	3.2-8.0 mm						9-16 mm	18-29 mm	30-49 mm

†Additional phases and dimensions available upon request.

+ 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 page 64.

Bulk SFC media is available. Please contact your Phenomenex representative for more information.

Seamlessly Upgrade from Traditional Columns to CLARICEP Flash

Bonna-Agela Technologies have developed a technology that effectively deactivates the silica surface. As a result, CLARICEP Flash columns have less surface activity than ordinary silica columns and demonstrate significantly improved chromatographic performance.

Consistently High Performance: High loading capacity (high surface area > 350 m^2/g) combined with good resolution for tight band definition (no tailing)

Wide Range of Selectivities: Variety of sorbents to meet any separation needs -(Silica (Si), C18, C8, AQ C18, Phenyl, Cyano (CN), Diol (OH), Amino (NH_2) and HILIC (Urea) along with a large variety of cartridge sizes from 4 g to several kilograms allows for purification scale-up from milligrams to kilograms.

High Pressure Tolerance: Exceptional durability to withstand high pressures due to closed-top spin-welded technology on standard hardware sizes that allows for pressure up to 12 bar (180 PSI).

Excellent Hardware: Universal luer fittings for compatibility with any flash system for great compound purity & recovery and 100% guaranteed leak-free.

High Quality: Consistent homogeneous packing allows for no channeling and creates reproducible high plate count (N).

Traditional Column

- **High surface activity that causes instability of certain compounds**
- **Unwanted tailing or overly long retention of basic compounds due to secondary ionic reactions or metal chelating effects**
- **Poor reproducibility**
- **Limited selectivity range**
- **Pressure limited**

Vs.

CLARICEP Column

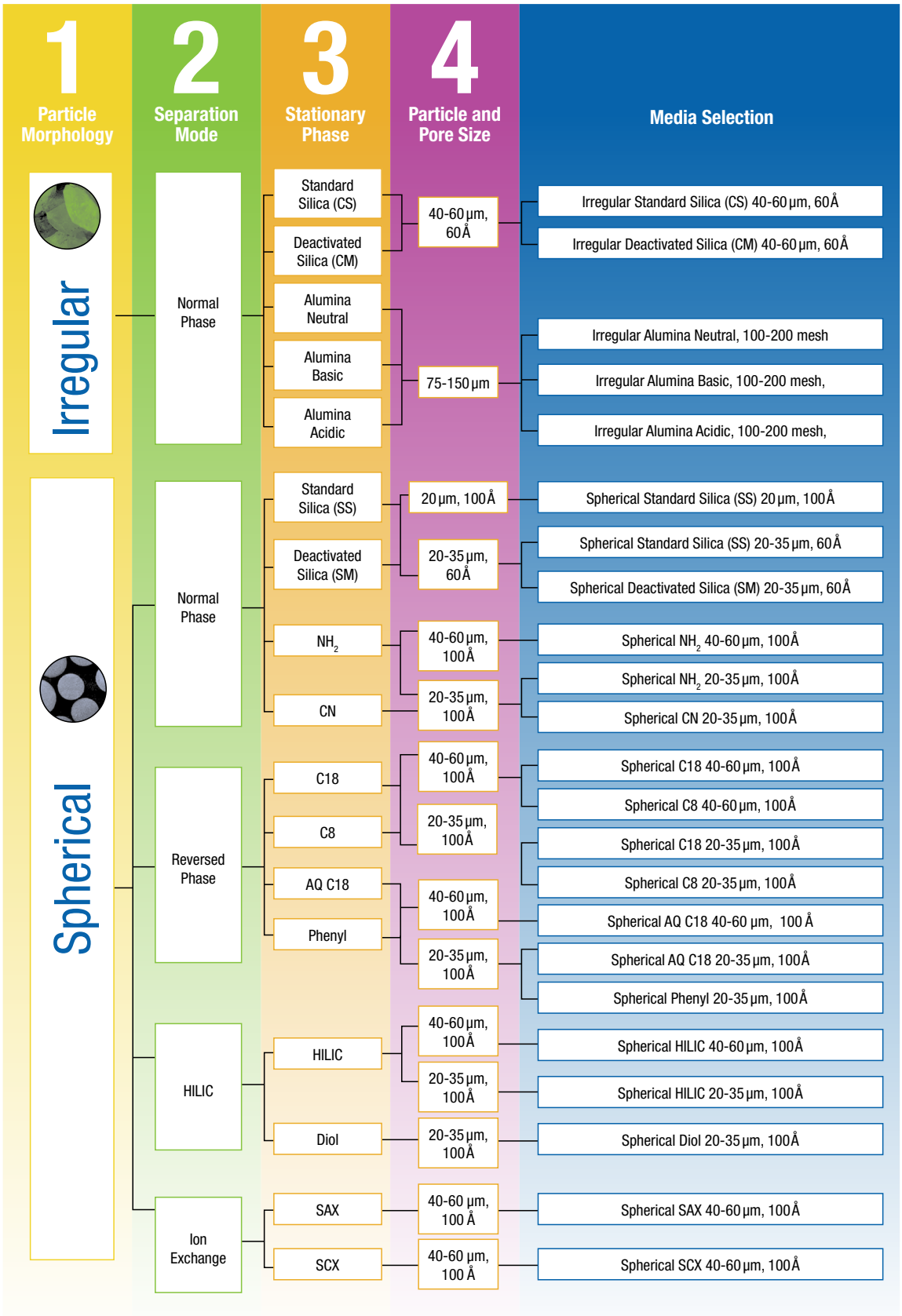
- **Deactivated silica surface promotes compound stability**
- **Excellent peak shape and performance for both acidic and basic compounds**
- **High quality and reproducibility**
- **Wide range of selectivities**
- **High pressure tolerance**

Chemistry Options	
Irregular	**Spherical**
CS Silica	SS Silica
CM Silica	SM Silicia
Alumina-Basic	SAX
Alumina-Neutral	SCX
Alumina-Acidic	C18
	AQ C18
	C8
	Diol
	HILIC
	Phenyl
	CN
	NH_2

Flash Chromatography *(cont'd)*

Claricep™

Flash Column Selector



CLARICEP
Irregular CS Silica Columns

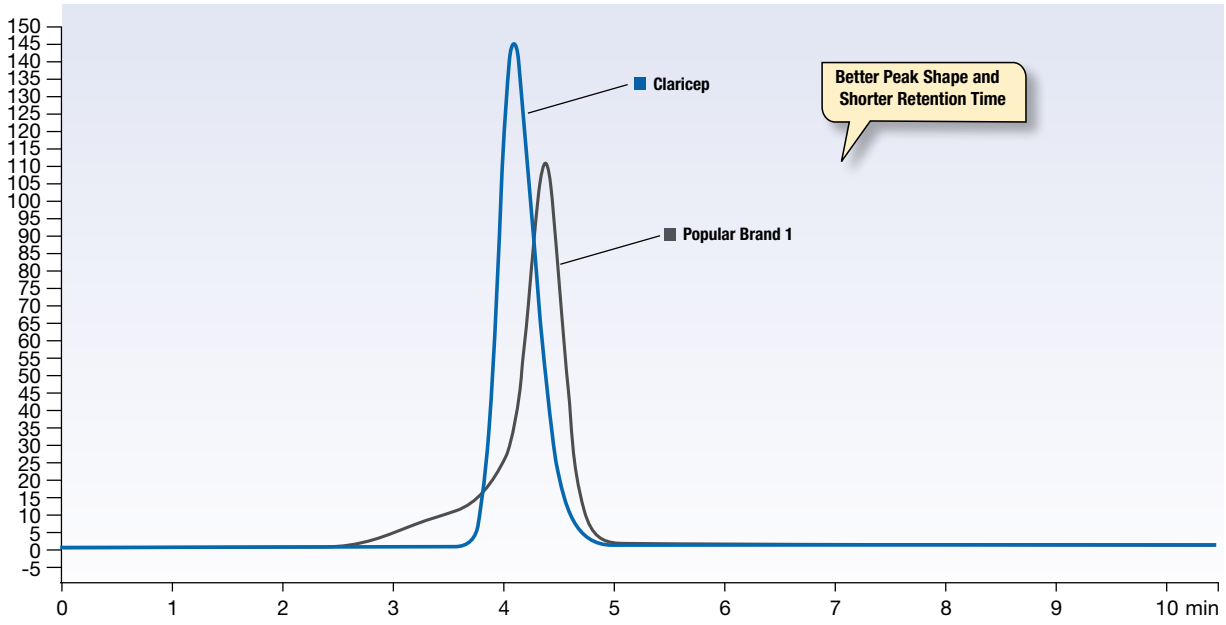
- **Ultra pure silica packing**
- **Additional acid and deionized water wash**
- **Narrow particle size range**
- **Carefully controlled water content**

Technical Specifications

Surface Area:	480 m^2/g
Surface pH:	6.3-7.2
Water Content:	3.0-5.0 %
Averge Particle Size:	40-60 µm
Average Pore Size:	60 Å

Improved Peak Shape and Faster Analysis

Aniline Peak Symmetry and Retention Test



Flash Conditions:

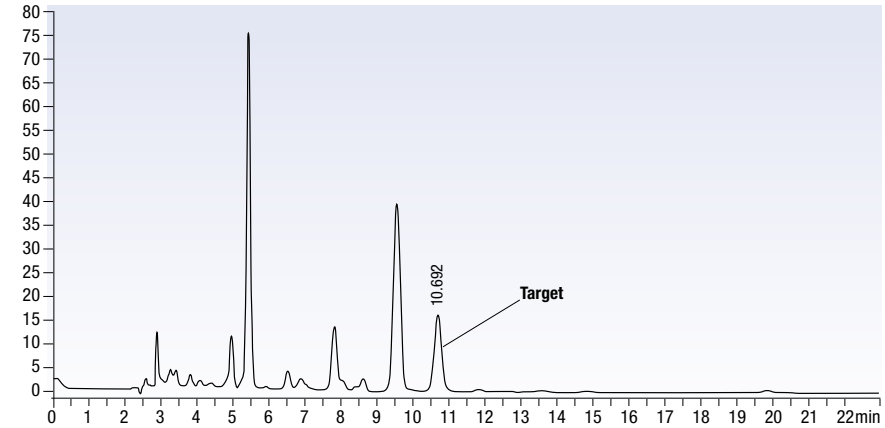
Column: Claricep Irregular Silica CS (40-60 µm, 60Å, 40 g)
Brand I: Flash Irregular Silica (40 g)
Mobile Phase: Dichloromethane/ Methanol (99 : 1)
Flow Rate: 20 mL/min
Detector: UV @ 254 nm
Temperature: Ambient
Retention Time: CLARICEP CS: 4.090 min
Brand I: 4.373 min
Sample: Aniline

Comparative separations may not be representative of all applications.

CLARICEP
Irregular CS Silica Columns

The Purity of Sesamol in Sesame Oil
Comparing Separation Techniques

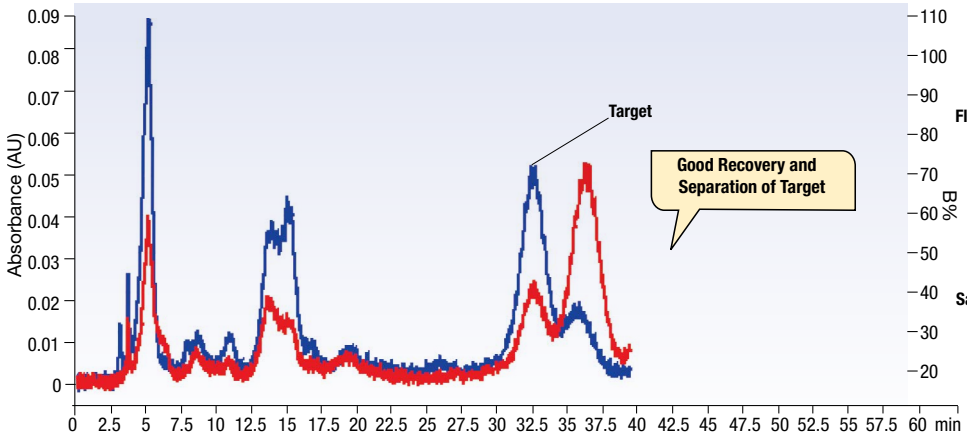
HPLC Analysis



HPLC Conditions:

Column: Fully Porous, 5 µm, C18 Column
Dimensions: 4.6 x 150 mm
Mobile Phase: Methanol/Water (75:25)

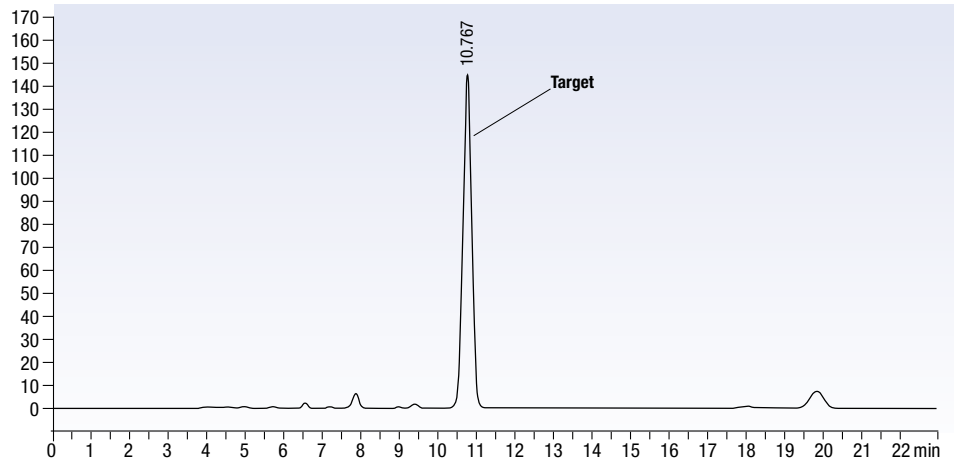
Flash Purification



Flash Conditions:

Column: Claricep™ Irregular Silica CS (40-60 µm, 60 Å, 12 g)
Part No.: CS140012-0
Mobile Phase: Acetic ether/ Petroleum ether (12:88)
Flow Rate: 18 mL/min
Injection Volume: 4 mL
Sample Concentration: 400 mg/20 mL
Instrument: CHEETAH™ MP 100

Purity Confirmation



CLARICEP
Irregular CM Silica Columns

- **Significantly improved performance over regular flash columns**
- **Silica deactivated by proprietary process**
- **Alternative selectivity for complex purification requirements**

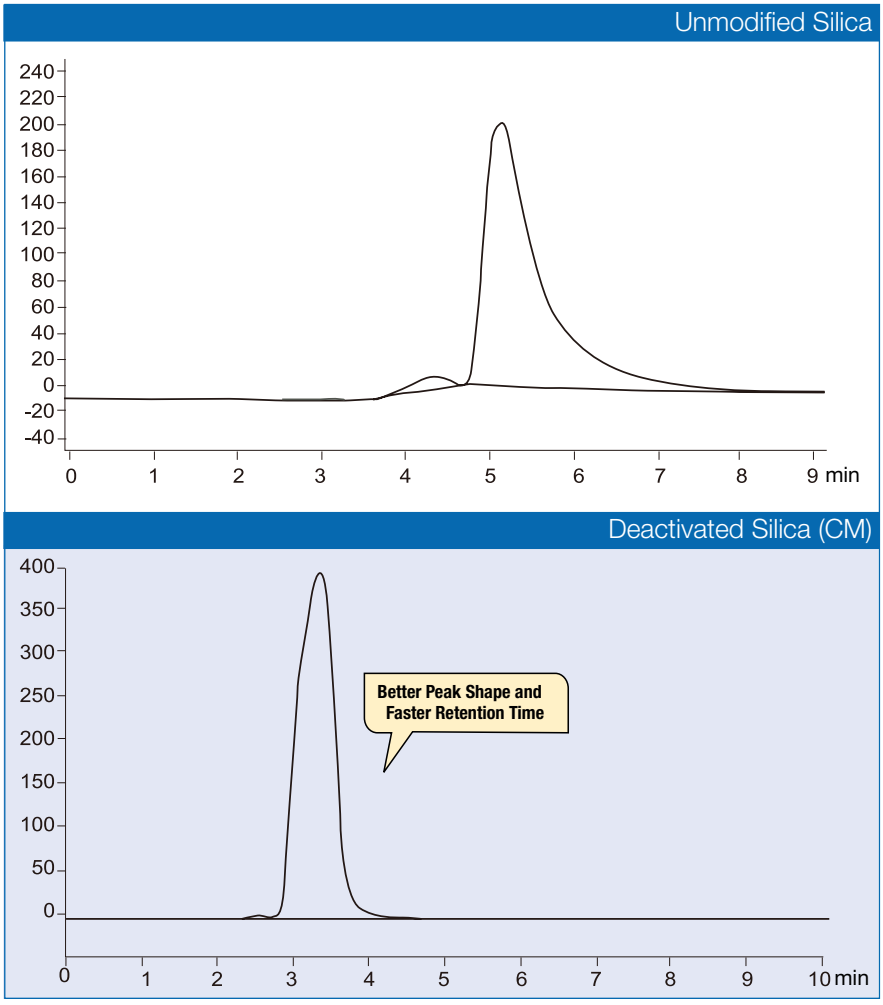
Technical Specifications

Averge Particle Size:	40-60 µm
Average Pore Size:	60 Å
Surface Area:	480 m^2/g

Better Peak Shape With CM Silica

HPLC Test:

Unmodified and Deactivated Silica were packed into individual stainless steel columns (4.6 x 150 mm) and then evaluated on a HPLC System



HPLC Conditions:

Dimensions:	150 x 4.6 mm
Mobile Phase:	Dichloromethane/Methanol (98:2)
Flow Rate:	1.8 mL/min
Injection Volume:	5 µL
Temperature:	30 °C
Detector:	UV @ 254 nm
Sample:	Catechol 100 µg/mL

CLARICEP
Spherical Silica Columns

Technical Specifications

Average Particle Size:	20 µm	20-35 µm	
Surface Area:	320 m^2/g	480 m^2/g	320 m^2/g
Water Content:	3.0 - 5.0 %	3.0 - 5.0 %	3.0 - 5.0 %
Average Pore Size:	100 Å	60 Å	100 Å
	• Higher Resolution • Better Purification	• Lower Backpressure • Faster Flow Rate • Higher Loading Capacity	• Lower Backpressure • Faster Flow Rate

Purification of a Sample with Methacrylic Acid Ester Target Compound

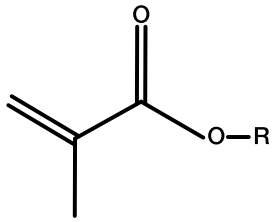
Sample Information:

The sample is colorless liquid, with about 60 % target compound by weight

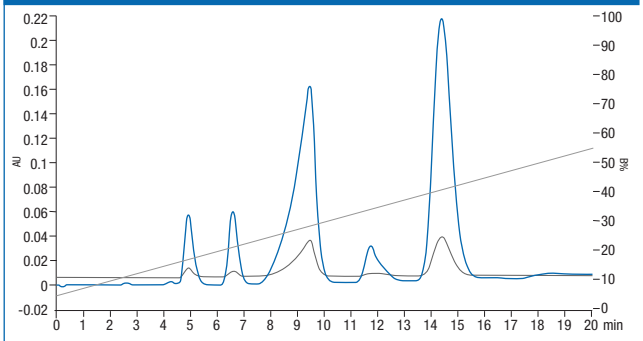
Dissolve 0.2 mL of sample into 1.5 mL ethanol sonication

Structure:

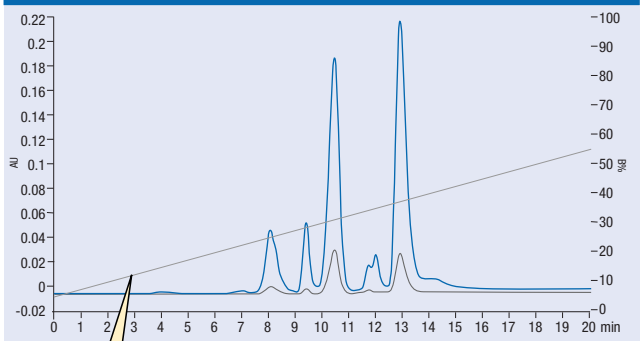
Small molecular weight with UV absorption of methacrylic acid ester R: no UV absorption



Column A: Claricep 20-35 µm



Column B: Claricep 20 µm



Claricep Flash silica 20 µm is a better choice for complex sample polarity. It provides higher resolution and better purification performance.

Flash Conditions:

Column A: Claricep Spherical Silica (20-35 µm, 100 Å, 12 g, 2 columns in tandem)
Column B: Claricep Spherical Silica (20 µm, 100 Å, 12 g, 2 columns in tandem)
Part Nos.: Column A: SS130012-0
Column B: SS120012-0
Mobile Phase: A: Hexane B: Ethanol
Gradient:

Time/min	B %
0	5
20	55

Flow Rate: 12 mL/min
Detector: UV @ 254/220 nm
Sample Loading: 0.2 mL

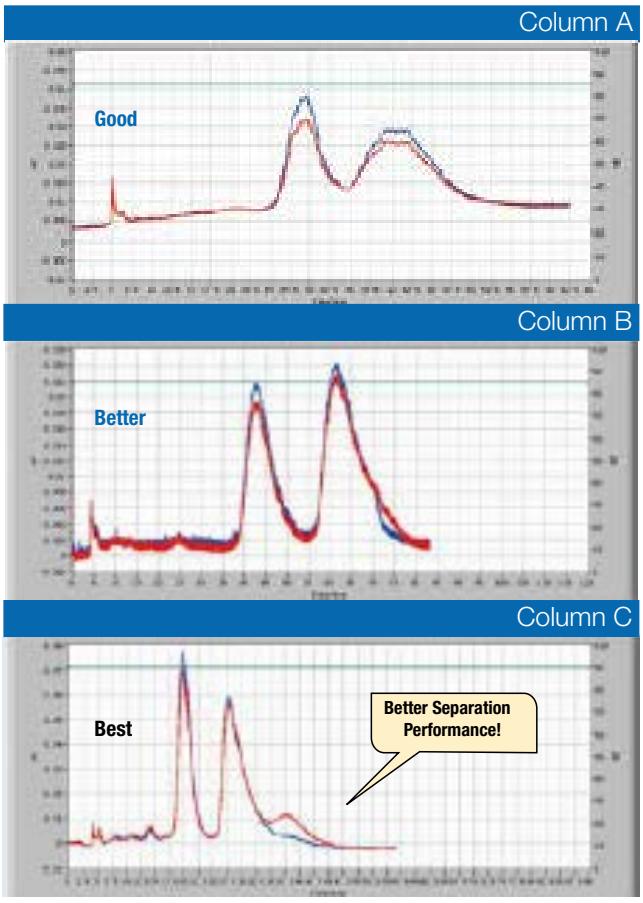
CLARICEP
Spherical C18 Columns

- **Significantly improved performance over regular flash columns**
- **Silica deactivated by proprietary process**
- **Alternative selectivity for complex purification requirements**

Technical Specifications

Average Particle Size:	20 - 35 µm		40 - 60 µm
Average Pore Size:	60Å	100Å	100Å
Carbon Loading:	15%	14%	14%

Tetrandrine Extracted from Natural Products, Formulation



Flash Conditions:

Column A: Brand X Flash Irregular C18 (40-60 µm 100Å, 12 g, 3 columns in tandem)
Column B: Claricep Spherical C18 (20-35 µm 100Å, 12 g, 3 columns in tandem)
Column C: Claricep Spherical C18 (20 µm 100Å, 12 g, 3 columns in tandem)
Part Nos.: Column B: SO230012-0
Column C: C-SO120012-0
Mobile Phase: A: Water
B: Methanol with 0.06% diethylamine

Gradient:

Time/min	% B
0	85
100	85

Detector: UV @ 254/282 nm
Sample: Tetrandrine

Did You Know?

Flash Chromatography also known as medium pressure chromatography is:

- A pressure driven hybrid for medium and short column chromatography optimized for rapid separation
- Popularized years ago by Clark Still of Columbia University
- An alternative to slow and inefficient gravity-fed chromatography

Comparative separations may not be representative of all applications.

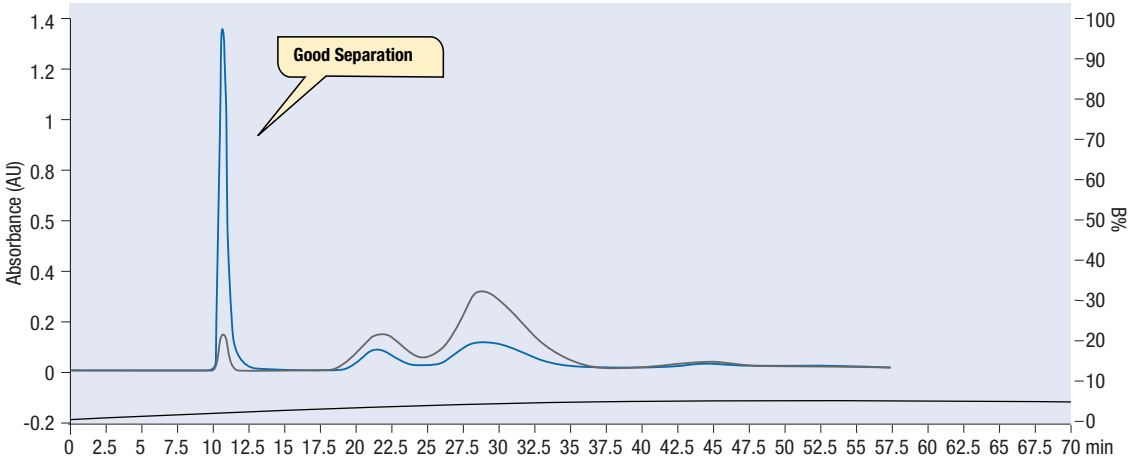
CLARICEP
Spherical AQ C18 Columns

- **Greater polar retention under reversed phase**
- **Applicable for both hydrophilic and hydrophobic compounds**
- **Useful for mixtures of compounds with varying polarities**

Technical Specifications

Surface Area:	300 m²/g	320 m²/g	320 m²/g
Averge Particle Size:	40-60 µm	20-35 µm	20 µm
Average Pore Size:	100Å	100Å	100Å
Carbon Loading:	14%	15%	15%

High Resolution Separation of Iridoids



Flash Conditions:

Column: Claricep Spherical AQ C18 (20-35 µm, 100Å)
Mobile Phase: Methanol/ Water/Formic Acid
Flow Rate: 26 mL/min
Detector: UV @ 231/214 nm
Sample: Iridoid Compounds

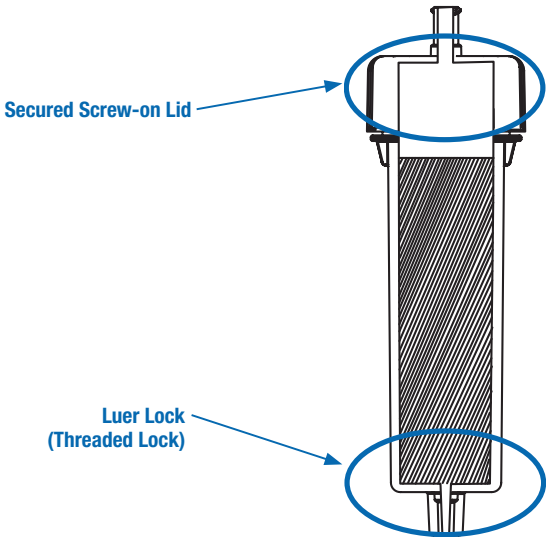
CLARICEP
Screw-on Flash Columns

This first series of Flash Screw-on is a new feature of Claricep columns that allows the user to load solid samples directly on the column.

i-Series

The i-Series features a managed column head space with a secured screw-on lid. This new design allows either loading of liquid samples directly onto the column head or loading of impregnated solid sample directly into the space. Users will benefit from:

- **Choice of loading method based on sample properties**
- **Narrow band for liquid samples because of wide loading area**
- **Dry-loading of solid impregnated samples minimizes band broadening**
- **Customized loading method upon user preference**
- **Higher load tolerance and reusable consumables**

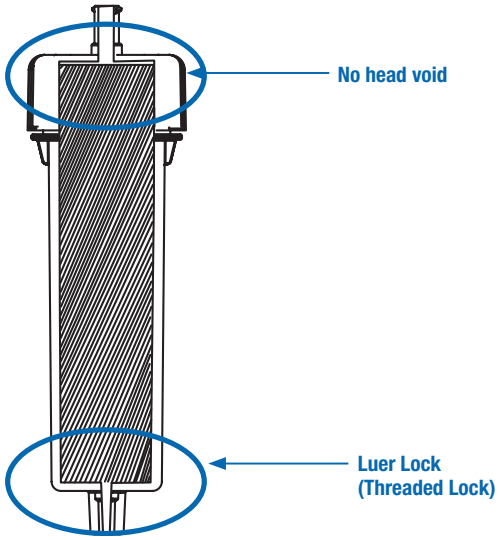


s-Series

The s-Series columns are fully packed without a head void and a secure screw-on lid. In addition, the Luer lock fittings for both inlet and outlet allows easy operation of tandem columns or the coupling of a loading cartridge.

Compatible with the following instrument:

- **Biotage**

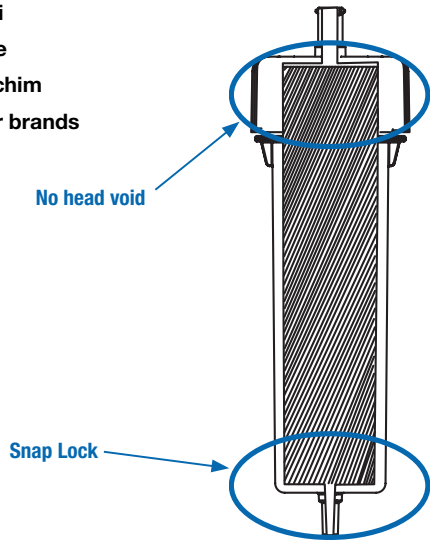


c-Series

The c-Series shares the same design, but the column outlet does not have a luer lock structure with a screw-on lid, this simplifies tubing connection across various flash systems.

Compatible with instruments from the following:

- **Teledyne ISCO**
- **Agela Technologies**
- **Buchi**
- **Grace**
- **Interchim**
- **Other brands**



Note: Request an external option to lead any dry sample loading via empty tubes (20/40/80/120g tube equivalent size) by contacting a Phenomenex representatve.

Easy to Order Screw-On Flash Columns

Ordering Information

Screw-On Flash Columns	
Part No.	**Description**
For i-series	
SN	Part Number starts with "SN". As an example, to order CS140012-0 in i-series, Part Number to order is SN-CS140012-0
For s-series	
S	Part Number starts with "S". As an example, to order CS140012-0 in s-series, Part Number to order is S-CS140012-0
For c-series	
C	Part Number starts with "C". As an example, to order CS140012-0 in c-series, Part Number to order is S-CS140012-0

Flash Chromatography *(cont'd)*

Claricep™

Ordering Information

				Regular Claricep											
				4 g (8 g for Alumina)	12 g (20 g for Alumina)	20 g (40 g for Alumina)	40 g (80 g for Alumina)	80 g (150 g for Alumina)	120 g	220 g (200 g for Alumina)	330 g (550 g for Alumina)	800 g (1300 g for Alumina)	1500 g (2500 g for Alumina)	3000 g	5000 g
Irregular	Normal Phase	Standard Silica (CS)	40-60 µm 60Å	CS140004-0	CS140012-0	CS140020-0	CS140040-0	CS140080-0	CS140120-0	CS140220-0	CS140330-0	CS140800-0	CS1401500-0	CS1403000-0	CS1405000-0
		Deactivated Silica (CM)		CM140004-0	CM140012-0	—	CM140040-0	CM140080-0	CM140120-0	—	CM140330-0	CM140800-0	CM1401500-0	CM1403000-0	CM1405000-0
		Alumina Neutral	75-150 µm	CA140004-N	CA140012-N	CA140020-N	CA140040-N	—	CA140120-N	—	CA140330-N	CA140800-N	CA1401500-N	—	—
		Alumina Basic		—	—	—	CA140040-B	CA140080-B	CA140120-B	—	CA140330-B	CA140800-B	CA1401500-B	—	—
		Alumina Acidic		CA140004-A	CA140012-A	CA140020-A	CA140040-A	CA140080-A	CA140120-A	—	CA140330-A	CA140800-A	CA1401500-A	—	—
Spherical	Normal Phase	Standard Silica (SM)	20 µm 100Å	SS120004-0	SS120012-0	SS120020-0	SS120040-0	SS120080-0	SS120120-0	SS120220-0	SS120330-0	SS120800-0	—	—	—
			20-35 µm 60Å	SS130004-0	SS130012-0	SS130020-0	SS130040-0	SS130080-0	SS130120-0	SS130220-0	SS130330-0	SS130800-0	SS1301500-0	SS1303000-0	SS1305000-0
		NH_2	40-60 µm 100Å	SN240004-0	SN240012-0	SN240020-0	SN240040-0	SN240080-0	SN240120-0	SN240220-0	SN240330-0	SN240800-0	SN2401500-0	SN2403000-0	SN2405000-0
			20-35 µm 100Å	SN230004-0	SN230012-0	SN230020-0	SN230040-0	SN230080-0	SN230120-0	SN230220-0	SN230330-0	SN230800-0	SN2301500-0	—	—
		CN	20-35 µm 100Å	SC230004-0	SC230012-0	SC230020-0	SC230040-0	SC230080-0	SC230120-0	—	SC230330-0	SC230800-0	SC2301500-0	—	—
	Reversed Phase	C18	40-60 µm 100Å	SO240004-0	SO240012-0	SO240020-0	SO240040-0	SO240080-0	SO240120-0	SO240220-0	SO240330-0	SO240800-0	SO2401500-0	SO2403000-0	—
			20-35 µm 100Å	SO230004-0	SO230012-0	SO230020-0	SO230040-0	SO230080-0	SO230120-0	SO230220-0	SO230330-0	SO230800-0	SO2301500-0	SO2303000-0	—
		AQ C18	20-35 µm 100Å	SQ230004-0	SQ230012-0	SQ230020-0	SQ230040-0	SQ230080-0	SQ230120-0	—	SQ230330-0	SQ230800-0	SQ2301500-0	—	SQ2305000-0
			40-60 µm 100Å	SQ240004-0	SQ240012-0	SQ240020-0	SQ240040-0	SQ240080-0	SQ240120-0	SQ240220-0	SQ240330-0	SQ240800-0	SQ2401500-0	—	—
		C8	40-60 µm 100Å	S8240004-0	S8240012-0	S8240020-0	S8240040-0	S8240080-0	S8240120-0	—	S8240330-0	S8240800-0	S82401500-0	—	—
			20-35 µm 100Å	S8230004-0	S8230012-0	S8230020-0	S8230040-0	S8230080-0	S8230120-0	—	S8230330-0	S8230800-0	S82301500-0	—	—
		Phenyl	20-35 µm 100Å	SP230004-0	SP230012-0	SP230020-0	SP230040-0	SP230080-0	SP230120-0	—	SP2301330-0	SP230800-0	SP2301500-0	—	—
	HILIC	Diol	20-35 µm 100Å	SD230004-0	SD230012-0	SD230020-0	SD230040-0	SD230080-0	SD230120-0	—	SD230330-0	SD230800-0	SD2301500	—	—
			40-60 µm 100Å	SD240004-0	SD240012-0	SD240020-0	SD240040-0	SD240080-0	SD240120-0	SD240220-0	SD240330-0	—	—	—	—
		HILIC	40-60 µm 100Å	SH240004-0	SH240012-0	SH240020-0	SH240040-0	SH240080-0	SH240120-0	—	SH240330-0	SH240800-0	SH2401500-0	—	SH2405000-0
			20-35 µm 100Å	SH230004-0	SH230012-0	SH230020-0	SH230040-0	SH230080-0	SH230120-0	—	SH230330-0	SH230800-0	—	—	—
	Ion Exchange	SAX	40-60 µm 100Å	SS240004-AX	SS240012-AX	SS240020-AX	SS240040-AX	SS240080-AX	SS240120-AX	—	SS240330-AX	SS240800-AX	SS2401500-AX	—	—
		SCX	40-60 µm 100Å	SS240004-CX	SS240012-CX	SS240020-CX	SS240040-CX	SS240080-CX	SS240120-CX	—	SS240330-CX	SS240800-CX	SS2401500-CX	—	—

				c-Series				i-Series				s-Series			
				20 g	40 g	80 g	120 g	20 g	40 g	80 g	120 g	20 g	40 g	80 g	120 g
Irregular	Normal Phase	Standard Silica (CS)	40-60 µm 60Å	C-CS140020-0	C-CS140040-0	C-CS140080-0	C-CS140120-0	SN-CS140020-0	SN-CS140040-0	SN-CS140080-0	SN-CS140120-0	S-CS140020-0	S-CS140040-0	S-CS140080-0	S-CS140120-0
		Deactivated Silica (CM)		—	—	—	—	—	—	—	—	—	—	S-CM140080-0	—
		Alumina Neutral	75-150 µm	C-CA140020-N	C-CA140040-N	—	C-CA140120-N	—	—	—	—	S-CA140020-N	—	—	S-CA140120-N
		Alumina Basic		C-CA140020-B	C-CA140040-B	—	—	—	—	—	—	—	—	—	—
Spherical	Normal Phase	Standard Silica (SM)	20 µm 100Å	C-SS120020-0	C-SS120040-0	—	C-SS120120-0	—	—	—	—	—	—	—	—
			20-35 µm 60Å	C-SS130020-0	C-SS130040-0	C-SS130080-0	C-SS130120-0	SN-SS130020-0	SN-SS130040-0	SN-SS130080-0	SN-SS130120-0	S-SS130020-0	S-SS130040-0	S-SS130080-0	S-SS130120-0
		(SM) Deactivated Silica	20-35 µm 60Å	C-SS120030-0	C-SS120040-0	C-SS130080-0	C-SS120120-0	SN-SS130020-0	SN-SS130040-0	SN-SS130080-0	SN-SS130120-0	—	—	S-SS130080-0	—
		NH_2	40-60 µm 100Å	C-SN240020-0	C-SN240040-0	C-SN240080-0	C-SN240120-0	SN-SN240020-0	SN-SN240040-0	SN-SN240080-0	SN-SN240120-0	S-SN240020-0	S-SN240040-0	S-SN240080-0	S-SN240120-0
			20-35 µm 100Å	C-SN230020-0	C-SN230040-0	C-SN230080-0	C-SN230120-0	SN-SN230020-0	—	—	—	S-SN230020-0	S-SN230040-0	S-SN230080-0	S-SN230120-0
	Reversed Phase	C18	40-60 µm 100Å	C-SO240020-0	C-SO240040-0	C-SO240080-0	C-SO240120-0	SN-SO240020-0	SN-SO240040-0	SN-SO240080-0	SN-SO240120-0	S-SO240020-0	S-SO240040-0	S-SO240080-0	S-SO240120-0
			20-35 µm 100Å	C-SO230020-0	C-SO230040-0	C-SO230080-0	C-SO230120-0	SN-SO230020-0	SN-SO230040-0	SN-SO230080-0	SN-SO230120-0	S-SO230020-0	S-SO230040-0	S-SO230080-0	S-SO230120-0
		AQ C18	20-35 µm 100Å	C-SQ230020-0	C-SQ230040-0	C-SQ230080-0	C-SQ230120-0	SN-SQ230030-0	SN-SQ230040-0	SN-SQ230080-0	SN-SQ230120-0	S-SQ230020-0	S-SQ230040-0	S-SQ230080-0	S-SQ230120-0
	HILIC	HILIC	40-60 µm 100Å	C-SH240020-0	C-SH240040-0	C-SH240080-0	C-SH240120-0	SN-SH240020-0	SN-SH240040-0	SN-SH240080-0	SN-SH240120-0	S-SH240020-0	S-SH240040-0	S-SH240080-0	S-SH240120-0
			20-35 µm 100Å	C-SH230020-0	C-SH230040-0	C-SH230080-0	C-SH230120-0	—	—	—	—	S-SH230020-0	S-SH230040-0	S-SH230080-0	S-SH230120-0

"Why isn't my column working?"

"What sample prep method should I start with?"

"Who can help me ID this peak?!"

"How can I optimize my resolution?"

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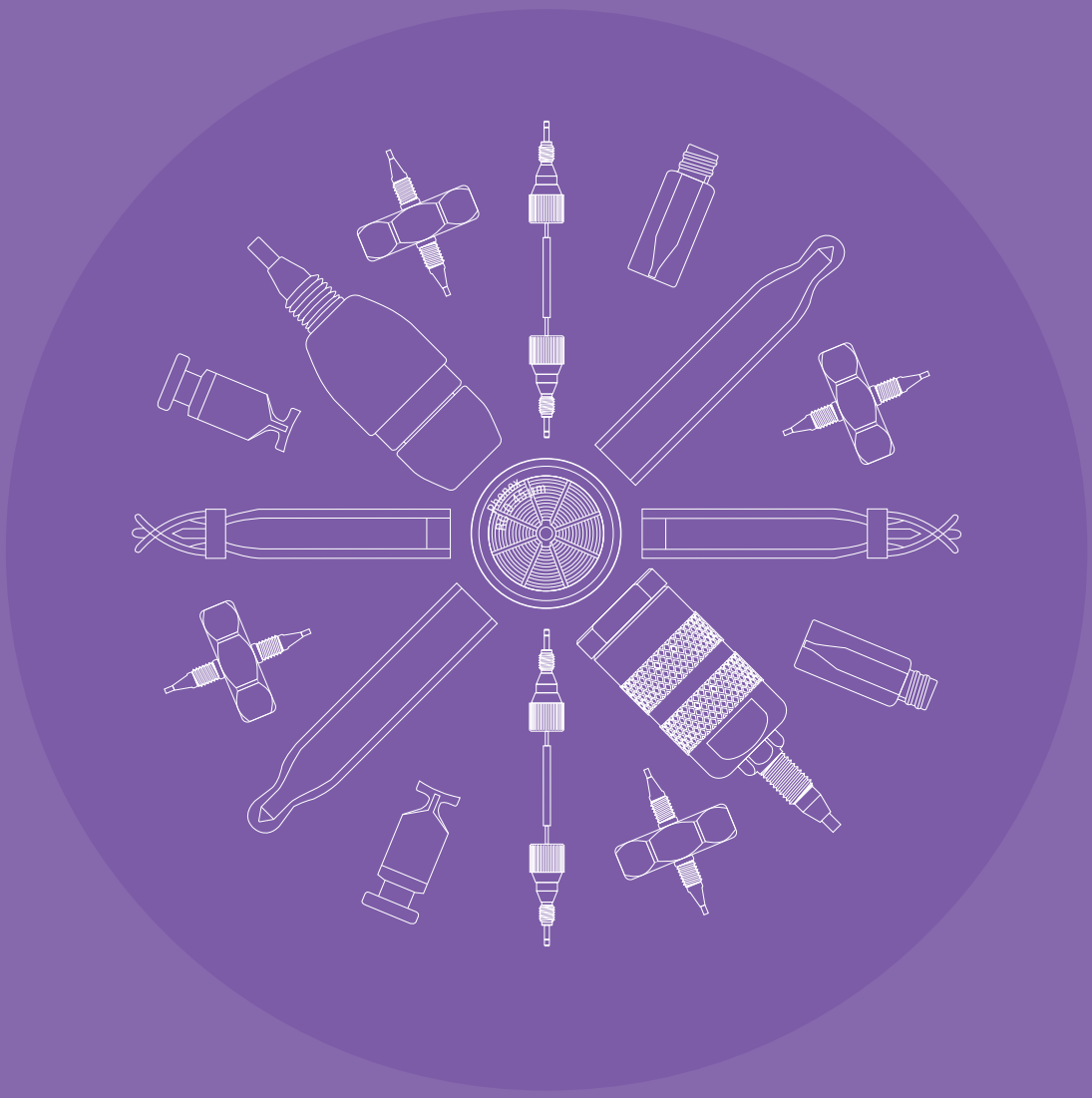
Accessories Contents



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HPLC Column Protection

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 150.

Analytical	SemiPrep
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.	 10 mm ID Guard Holder P/N AJ0-9281
SecurityGuard ULTRA  All core-shell and / or < 3 µm particle columns (< 20000 psi / 1378 bar) Holder P/N AJ0-9000 See page 155.	 Use with 9 to 16 mm ID Columns Cartridge size: 10 x 10 mm ID
SecurityGuard Standard  All non core-shell and / or ≥ 3 µm particle columns (5000 psi / 345 bar) Holder P/N KJ0-4282 See page 150.	

PREPARATIVE		
HPLC	**SFC**	
 21.2 mm ID **HPLC** Holder P/N AJ0-8223	 21.2 mm ID **SFC** Holder P/N AJ0-8617	 Use with 18 to 29 mm ID Columns Cartridge size: 15 x 21.2 mm ID
 30 mm ID **HPLC** Holder P/N AJ0-8277	 30 mm ID **SFC** Holder P/N AJ0-8618	 Use with 30 to 49 mm ID Columns Cartridge size: 15 x 30.0 mm ID

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)

SecurityCap™
LC Solvent Safety Products

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 (560 m^2/g) multi-compound adsorbent
- **Easy to Use**
  No more twisting tubes during bottle exchange

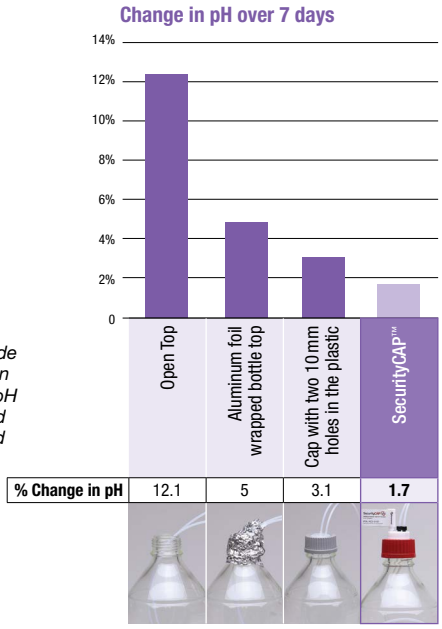
SecurityCAP solvent waste caps and exhaust filters ensure lab air quality. Feel confident that volatile vapors from solvent waste containers are being captured safely, beyond fume cupboards or hoods.

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!

Download complete technical note at:
www.phenomenex.com/SecurityCAP

A 1L solution of 4 mM ammonim 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.



Lab Safety *(cont'd)*

SecurityCap™
LC Solvent Safety Products

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.		**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, ¼ in.-28 Threads	ea
AC2-0961	6-month Capacity, ¼ in.-28 Threads	10/pk

SecurityCAP Waste Safety Filters		
Part No.	**Description**	**Unit**
AC1-0161	6-month Exhaust Filter for SecurityCAP, ¼ in.-28 Threads	ea
AC1-0361	6-month Exhaust Filter for SecurityCAP, ¼ 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

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 and Accessories

Ordering Information

SecurityCAP Fittings		
Part No.	**Description**	**Unit**
AC3-1101	for 1/16 in. or 2.0 mm OD Tubing, ¼ in.-28 Threads, blue	ea
AC3-1201	for 2.3-2.6 mm OD Tubing, ¼ in.-28 Threads, white	ea
AC3-2101	for ⅛ in. OD Tubing, ¼ in.-28 Threads, 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, 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 ¼ in. NPT-port (PTFE)	ea

SecurityCAP Sealing Plug		
Part No.	**Description**	**Unit**
AC3-2001	¼ in.-28 Threads, white	ea

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.

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, -NH_2, -Diol, -NO_2, alumina and PAC).

App ID 14744

Reversed Phase 1
(For C1, C18, CN and Phenyl)

Part No.: AL0-3034

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 Onyx C8, 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; Biozen Peptide PS-C18, XB-C18; Biozen Oligo)

Part No.: AL0-3045

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, and Clarity Oligo-RP
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.: AL0-7836

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)
(For Biozen WidePore C4; Biozen Intact XB-C8)

Part No.: AL0-8931

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, NH_2, NO_2, Diol, Alumina, PAC ,and Luna CN)

Part No.: AL0-3033

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; Biozen Glycan)

Part No.: AL0-8317

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.: AL0-7260

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

Flow rates and Injection volumes are for 250 x 4.6 mm size columns, unless otherwise noted.

App ID 14752

Aqueous SEC 1
(For BioSep-SEC-S)

Part No.: AL0-3042

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 % NaN_3 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.: 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

App ID 19807

Aqueous SEC 3
(For Biozen dSEC-2, Biozen SEC, and Yarra SEC columns)

Part No.: AL0-9253

Unit quantity: 2 mL Analyte
Contains: Bovine Thyroglobulin (2.5 mg/mL); BSA (2.5 mg/mL) Myoglobin (1 mg/mL) *(reconstitute 1 mL of 1X PBS Buffer)*
Diluent: 100 mM Sodium phosphate buffer, pH 6.8
Storage: Add 0.025 % NaN_3 to the solution and refrigerate

Test Conditions
Mobile Phase: 100 mM Phosphate buffer, pH 6.8, 0.05 % NaN_3
Flow Rate: 0.35 mL/min
Injection Volume: 1.4 µL
Detection: UV @ 280 nm
Storage Conditions: Refrigerate at 4 °C
Sample Components: 2. Bovine Serum Albumin (66.5 kDa) 4. Thyroglobulin (670 kDa) 6. Equine Myoglobin (17 kDa)

Note
1. After reconstituting the protein mix, filter solution with regenerated cellulose 0.2 µm syringe filter before use.

2. Flow rate and injection volume are recommended for use with 300 x 4.6 mm ID columns. Some adjustments may not exactly match your specific column, refer to the production test chromatograms received with your column for exact chromatographic profile.

Standards *(cont'd)*

HPLC Column Check Standards

App ID 14756

Chiral Test Mix 2
(Applicable to the following Chirex columns)

Part No.: AL0-3047

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.: AL0-3049

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 17476

Chiral Test Mix 5
(Applicable to the following Lux columns)

Part No.: AL0-8412

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)

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.: AL0-3035

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.: AL0-3036

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.: AL0-3037

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.: AL0-3038

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.: AL0-3039

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 H_2SO_4
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.: AL0-3040

Unit quantity: 2 mL
Contains: Uracil; Cytosine
Diluent: Water

Test Conditions
Mobile Phase: 0.15 M $(NH_4)_2HPO_4$, 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.: AL0-3041

Unit quantity: 2 mL
Contains: Uridine, UMP (refer to product insert for specific details)
Diluent: Water

Test Conditions
Mobile Phase: 0.15 M $(NH_4)_2HPO_4$, 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.

SecurityLINK UHPLC Fittings

SecurityLink™
UHPLC Connections in a Click

SecurityLINK
UHPLC Connections in a Click

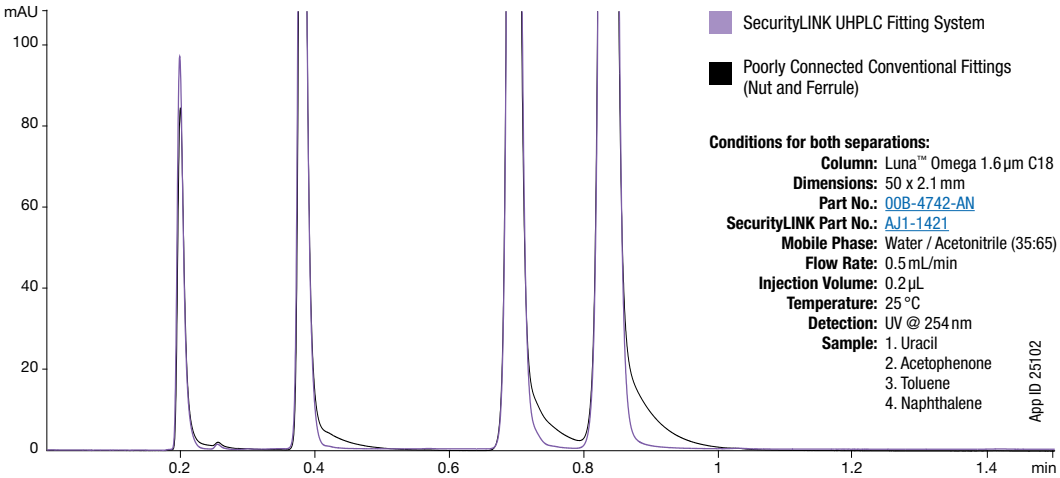
The SecurityLINK UHPLC fingertight fitting system simplifies your system and column connections and provides consistent performance with torque limiting technology that prevents column damaging overtightening.

SecurityLINK UHPLC Fittings

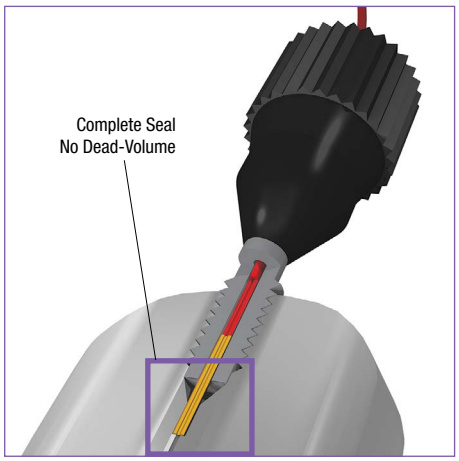
- **No tools required for quick and easy installation**
- **Fitting self-adjusts at column inlet to ensure zero dead-volume for better chromatographic results**
- **Torque limiting technology prevents system and column port damage**
- **UHPLC and HPLC compatibility: pressure rated to 19000 psi (1310 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.

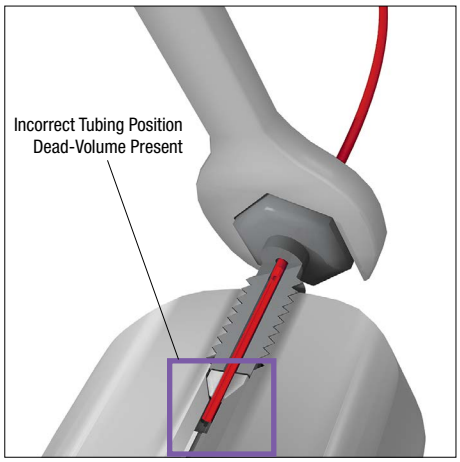


SecurityLINK UHPLC Fitting System



VS.

Poorly Connected Conventional Fittings (Nut and Ferrule)



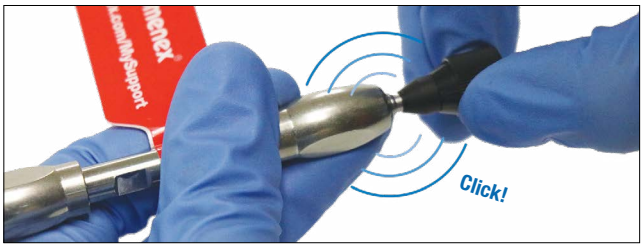
SecurityLINK UHPLC Fittings
(cont'd)

SecurityLink™
UHPLC Connections in a Click

Installation Instructions

1. Insert SecurityLINK UHPLC fitting into column port

2. Fingertighten until first "CLICK" feedback is received. Connection Complete!



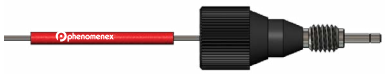
Ordering Information

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

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)
AJ1-2124	25	150
AJ1-2174	25	500
AJ1-2194	25	750
AJ1-21A4	25	1000
AJ1-21B1	25	1500
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.

The "CLICK" Feedback indicates the SecurityLINK Connection is Secure! This Prevents Overtightening & Saves Your Column.

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

Stainless Steel

Stainless Steel Double-Sided 10-32 Fittings for 1/16 in. Ports

Part No.	ID (µm)	Length (mm)
AJ1-14A1	100	1000
AJ1-1411	100	100
AJ1-1414*	100	100
AJ1-1421	100	150
AJ1-1441	100	250
AJ1-1461	100	350
AJ1-1471	100	500
AJ1-1481	100	600
AJ1-15A1	125	1000
AJ1-1521	125	150
AJ1-1541	125	250
AJ1-1561	125	350
AJ1-1571	125	500
AJ1-1581	125	600
AJ1-1611	254	100
AJ1-1621	254	150
AJ1-1641	254	250
AJ1-1661	254	350
AJ1-1671	254	500
AJ1-1681	254	600

*Single-Sided.

Phenomenex Column / Tubing ID Recommendation Chart

	Nano	Microbore		Analytical			Semi-Prep	
Column ID	0.05 - 0.1 mm (50 µm - 100 µm)	0.3 - 0.5 mm (300 µm - 500 µm)	1 mm	2.1 mm	3 mm	4.6 mm	7.8 mm	9.0 - 16.0 mm
Tubing ID	25 µm	50 µm	50 µm - 75 µm	100 µm	100 µm	100 µm	120 µm	254 µm

Fittings

¼ 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**
AQ0-3351	¼ 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**
AQ0-8507	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 50 mm 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.

AQ0-9222
Reducing Adapter for 50 mm ID Axia™ Preparative HPLC/SFC Hardware

AQ0-7555
Reducing Adapter for 50 mm ID Traditional (Non-Axia) HPLC/SFC Hardware

Ordering Information

Reducing Adapters		
Part No.	**Description**	**Unit**
Complete Assembly		
AQ0-9222	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
AQ0-7555	Reducing Adapter, 1/8 in. to 1/16 in. for 50 mm ID Traditional (Non-Axia) HPLC/SFC Hardware	2/pk
Replacement Parts		
AQ0-3018	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea

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**
AQ0-1674	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

Fittings *(cont'd)*

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 (AQ0-8506).

AQ0-8503
Pressure rated up to 12000 psi (827 bar)

AQ0-8504
shown with AQ0-8505
Pressure rated to 19000 psi (1310 bar)

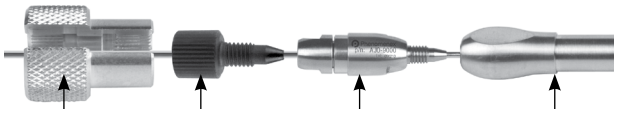
Ordering Information

Sure-Lok High Pressure PEEK Nuts		
Part No.	**Description**	**Unit**
AQ0-8502	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)	2/pk
AQ0-8503	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)**	10/pk
AQ0-8504	Sure-Lok High Pressure PEEK Nut, 10-32, for 1/16 in. Tubing, 19000 psi (1310 bar) *,**,†	10/pk
AQ0-8505	Sure-Lok PEEK Ferrule Assembly (2-pc), for High Pressure 2-Pc Nut (AQ0-8504)	10/pk

* Ferrule assembly (AQ0-8505) must be ordered separately.
** Sure-Lok fitting tightening tool is required for AQ0-8503 and AQ0-8504
† 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.



AQ0-8530
Sure-Lok Fitting Tightening Tool

AQ0-8502 or AQ0-8503
Sure-Lok HIGH Pressure PEEK 1-pc Fitting
(12000 psi/827 bar)

AJ0-9000
SecurityGuard™ ULTRA Holder with Guard Cartridge for UHPLC
(Cartridge sold separately)

HPLC/ UHPLC Column

Ordering Information

Sure-Lok Fitting Tightening Tool		
Part No.	**Description**	**Unit**
AQ0-8530	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**
AQ0-8521	Nut and Ferrule Set, SS, 10-32, for 1/16 in. Tubing, 28000 psi (1930 bar)	2/pk
AQ0-8506	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**

AQ0-7600
(2 x fittings, 6 x ferrules and 1 x wrench)

AQ0-7602
(2 x fittings, 6 x ferrules and 1 x tightening tool)

Ordering Information

PEEKLok Fittings		
Part No.	**Description**	**Unit**
AQ0-7600	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
AQ0-7601	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
AQ0-7602	PEEKLok fittings with 6-40 thread for 1/32 in. OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQ0-7603	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 pages 210-211.

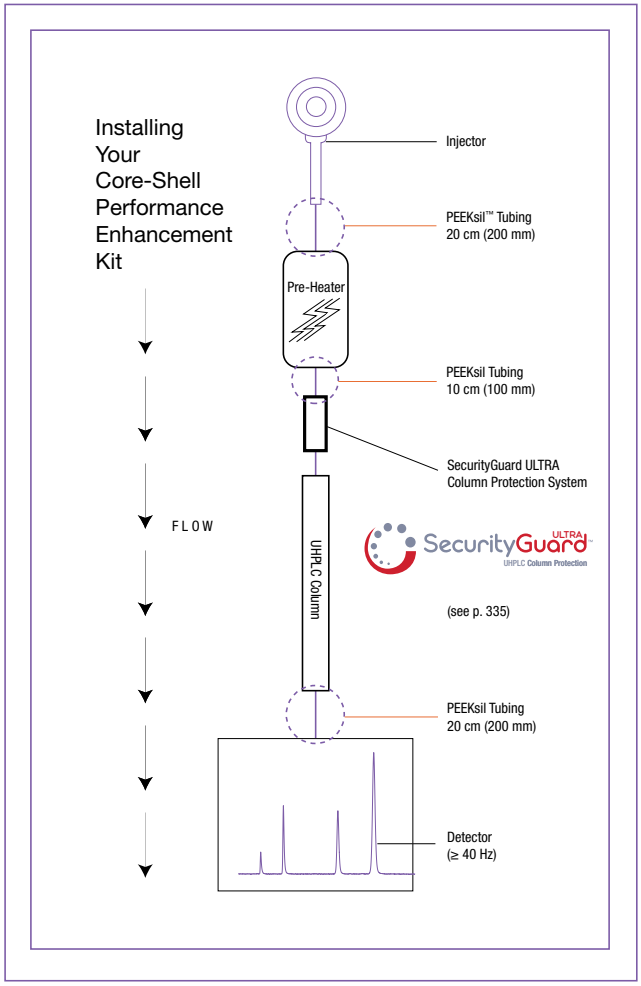
For more about SecurityGuard ULTRA Guard Cartridge System for UHPLC, see page 155.

Fittings *(cont'd)*

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**
AQ0-8892	Core-Shell Performance Enhancement Kit, Includes: PEEKsil™ Tubing, Fittings and Tool*	ea
***Kit AQ0-8892 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**
AT0-8896	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 20 cm L, Red	5/pk
AT0-8897	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 10 cm L, Red	5/pk
AQ0-8503	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing	10/pk
AQ0-8530	Sure-Lok Fitting Tightening Tool, Aluminum	ea

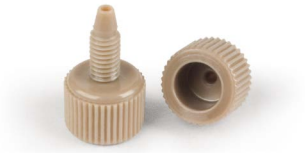
For more information on part nos. AT0-8896, AT0-8897, AQ0-8503, and AQ0-8530 see page 225.

For more information on SecurityGuard ULTRA Guard Cartridge System for UHPLC, see page 155.

Fittings *(cont'd)*

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**
AQ0-1388	PEEK Sure-Lok Fingertight Male Nut	ea
AQ0-1389	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**
AQ0-3018	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**
AQ0-0217	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**
AQ0-1392	PEEK Sure-Lok Coupler, 0.010 in. ID	ea
AQ0-1393	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**
AQ0-7654	Onyx Column Coupler, PEEK, 0.020 in. ID	ea

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

Fittings *(cont'd)*

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**
AQ0-2002	PEEK Tee, 0.020 in. thru-hole*	ea

*Fittings not included, use PEEK Sure-Lok fingertights part no. AQ0-1389, see p. 422

¼ 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**
AQ0-2949	Flangeless Nut and Ferrule for 1/16 in. tubing, ¼ in.-28 threads, red Delrin	10/pk
AQ0-2950	Flangeless Nut and Ferrule for 1/8 in. tubing, ¼ in.-28 threads, green Delrin	10/pk

Backpressure Regulators

- **Adjustable with preset pressure ratings**
- **Consistent backpressure at various flow rates**
- **Flow-through, low-volume design (146 mL)**

Ordering Information

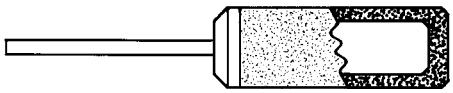
Backpressure Regulators		
Part No.	**Description**	**Unit**
AQ0-0222	40 psi Backpressure Regulator	ea
AQ0-0223	75 psi Backpressure Regulator	ea
AQ0-0224	100 psi Backpressure Regulator	ea

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.



Pump Inlet Filter

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

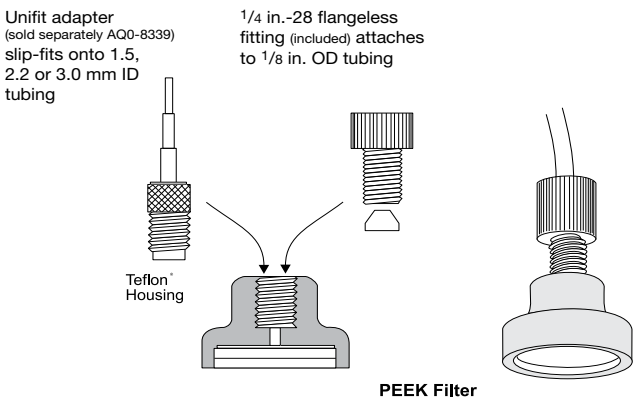
Important: Depending on the mobile phase, we recommend that you change your inlet filter every one to six months.

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.



PEEK Filter

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 1/16 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

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).

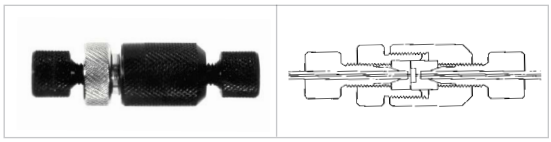
Ordering Information

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 Frit	ea

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pages 210-211.

For SecurityGuard™, the universal guard cartridge system, see pages 150-154.

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 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). The 2.0 µm filter has a PEEK filter body and the 0.5 µm has a stainless steel filter body.

Ordering Information

KrudKatcher Classic Disposable In-Line Filter (Analytical)		
Part No.	Description	Unit
AF0-5728	KrudKatcher Disposable Pre-Column Filter, 0.5 µm	10/pk
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 5/16 in. wrench. Wrench not provided. See p. 417

In-Line Filters

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 ⅞ 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. Finger-tight 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.

www.phenomenex.com/SFfinder

For SecurityGuard™, the universal guard cartridge system, see pages 150-154.

Solvent Reservoir and Reagent Bottles

- **Popular 1- and 2- liter sizes, equipped with a 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.

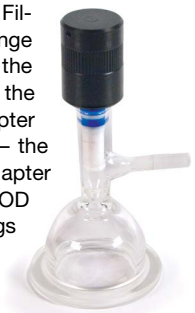
Ordering Information

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 page 210 AQ0-2950

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 ¼ in. OD outlet, PTFE 90° elbow with compression fittings for ¼ in. OD tubing, and 3 feet of ¼ in. OD PTFE tubing.



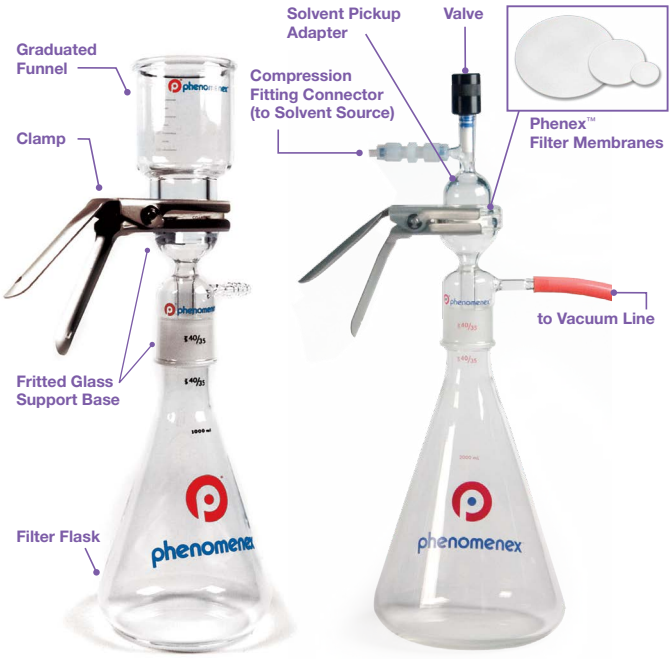
Ordering Information

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

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.

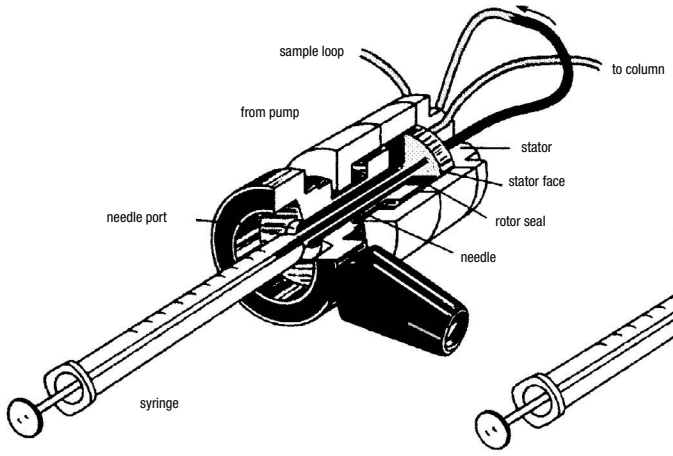
Ordering Information

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

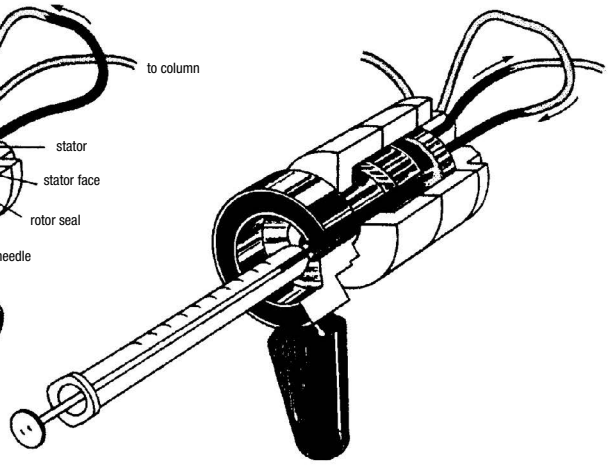
Sample Injector

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/cm^2)**
- **5 µL to 5 mL removable sample loops**



LEFT: In LOAD, mobile phase flows from the pump to the column via a rotor seal groove (not shown). Meanwhile sample is dispensed into the loop, displacing atmospheric-pressure mobile phase out a vent line (not shown).



RIGHT: In INJECT, sample is displaced from the loop to the column by mobile phase from the pump. The needle port is automatically isolated from pressure.

Ordering Information

Part No.	Mfr. No.	Description
7725 Sample Injectors		
AV0-2346	7725	Sample Injector[1]
AV0-2347	7725i	Sample Injector, with Position Sensing Switch[1]
Sample Loops for 7725 Valves Only		
AV0-2349	7755-020	5 µL Sample Loop
AV0-2350	7755-021	10 µL Sample Loop
AV0-2351	7755-022	20 µL Sample Loop
AV0-2352	7755-023	50 µL Sample Loop
AV0-2353	7755-024	100 µL Sample Loop
AV0-2354	7755-025	200 µL Sample Loop
AV0-2355	7755-026	500 µL Sample Loop
AV0-2356	7755-027	1 mL Sample Loop
AV0-2357	7755-028	2 mL Sample Loop
AV0-2358	7755-029	5 mL Sample Loop
Spare Replacement Parts for Model 7725 Injector		
AV0-3500	7725-999	Complete RheBuild® Kit for valves 7725, 7725i, 7726 (see p. 430 for description)
AV0-0169	7125-047	Vespel Rotor Seal
AV0-2416	7125-079	Tefzel Rotor Seal
AV0-2362	7725-026	Stator Face Assembly
AV0-0171	7125-054	Needle Port Cleaner
AV0-0180	7215	#22-Gauge Needle
AV0-2365	6000-263	Nut 10pk
AV0-2366	6000-264	Long Nut 10pk
AV0-2368	6000-110	Ferrule 5pk

[1]The 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.

Valves *(cont'd)*

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**
AV0-1074	9725	PEEK Sample Injector
AV0-4642	9725i	PEEK Sample Injector, with Position Sensing Switch
AV0-1086	9125-076	Suction Needle Adapter
AV0-3433	9725-999	Complete RheBuild® Kit for valves 9725, 9725i (see p. 430 for description)

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**
AV0-0181	8125	Low-Dispersion Sample Injector
AV0-3431	8125-999	Complete RheBuild® Kit for valve 8125 (see p. 430 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**
AV0-2054	3725i	PEEK Preparative Sample Injector, with Position Sensing Switch
AV0-2056	3725i-038	Stainless Steel Preparative Sample Injector, with Position Sensing Switch
AV0-3432	3725-999	Complete RheBuild® Kit for valves 3725, 2715i, 3725-038, 3725i-038 (see p. 430 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**
AV0-2376	7000	Switching Valve/Injector
AV0-2378	7010	Sample Injection Valve
AV0-3430	7010-999	Complete RheBuild® Kit for valves 7010, 7000 (see p. 430 for description)
AV0-1092	9010	PEEK Switching Valve/Injector
AV0-2381	9013	PEEK Needle Port

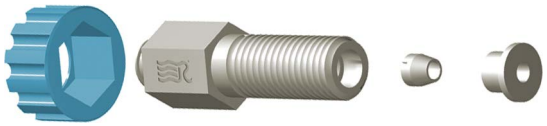
Sample Injector Loops and Fittings

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			
AV0-2390	7020	5 µL, 0.007 in. ID	ea
AV0-2391	7021	10 µL, 0.012 in. ID	ea
AV0-2392	7022	20 µL, 0.020 in. ID	ea
AV0-2393	7023	50 µL, 0.020 in. ID	ea
AV0-2394	7024	100 µL, 0.020 in. ID	ea
AV0-2396	7026	500 µL, 0.030 in. ID	ea
AV0-2397	7027	1 mL, 0.030 in. ID	ea
AV0-2398	7028	2 mL, 0.040 in. ID	ea
AV0-2399	7029	5 mL, 0.040 in. ID	ea
Loops for 8125 Low Dispersion Injector (Stainless Steel)			
AV0-2937	8020	5 µL, 0.008 in. ID	ea
AV0-2938	8021	10 µL, 0.008 in. ID	ea
AV0-2939	8022	20 µL, 0.010 in. ID	ea
PEEK (for all valves)			
AV0-1076	9055-020	5 µL, 0.007 in. ID	ea
AV0-1077	9055-021	10 µL, 0.010 in. ID	ea
AV0-1078	9055-022	20 µL, 0.010 in. ID	ea
AV0-1079	9055-023	50 µL, 0.020 in. ID	ea
AV0-1080	9055-024	100 µL, 0.020 in. ID	ea
AV0-1081	9055-025	200 µL, 0.020 in. ID	ea
AV0-1082	9055-026	500 µL, 0.030 in. ID	ea
AV0-1083	9055-027	1 mL, 0.030 in. ID	ea
AV0-1084	9055-028	2 mL, 0.030 in. ID	ea
AV0-1085	9055-029	5 mL, 0.030 in. ID	ea

1. Loops for the 7725 Valve are listed with the valve on p. 000. Note: Loops designed for 7125, 7010 and 8125 valves are not interchangable with the wide-ange ports of 7725 valves.
2. Loops not listed for other valves are available. Call your Phenomenex Technical Consultant.



Knob Nut Ferrule Assembly

Ordering Information

RheFlex Fittings			
Part No.	**Mfr. No.**	**Description**	**Unit**
AV0-2383	6000-054	RheFlex Std. Fitting Set (5 nuts and 5 ferrules)	ea
AV0-2384	6000-055	RheFlex Short Fitting Set (5 nuts and 5 ferrules)	ea
AV0-2386	6000-051	RheFlex Ferrules (5 ferrules)	ea

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.

Valves *(cont'd)*

Rheodyne® Fitting Wrench

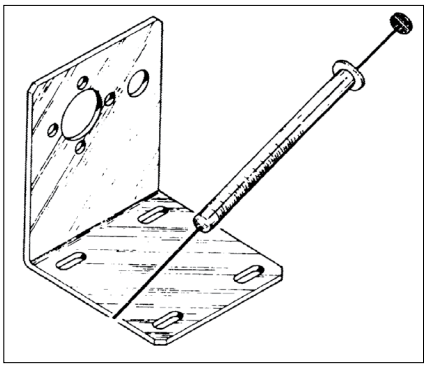
Slotted Wrench for Rheodyne Valves

- **Fits around tubing to tighten any ¼ 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
AV0-2426	7160	Mounting Panel	ea

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**
Vespel® (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

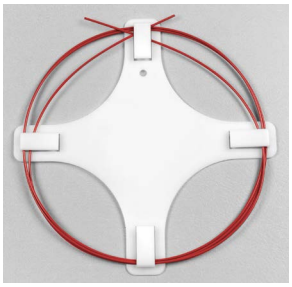
Additional Rheodyne valves and accessories not listed are available.

Capillary PEEK HPLC Tubing

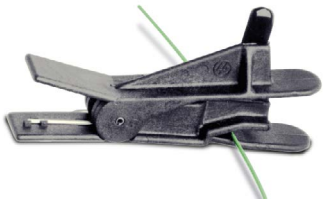
- **Chemically inert and biocompatible**
- **Pressure rated to 7000 psi (482 bar)**
- **Easily bendable and cuttable**

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. 213).

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
AT0-1107	5	1/16	0.010	blue	ea
AT0-1260	5	1/16	0.007	yellow	ea
AT0-1259	5	1/16	0.005	red	ea

Part No.	Description	Unit
PEEK Tubing Kit		
AT0-1964	PEEK Tubing Kit, includes one each of: AT0-1259 (5 ft. x 1/16 in. x 0.005 in.) AT0-1260 (5 ft. x 1/16 in. x 0.007 in.) AT0-1107 (5 ft. x 1/16 in. x 0.010 in.) AT0-1265 (5 ft. x 1/8 in. x 0.080 in.) AT0-1110 (Polymer Tubing Cutter)	ea
Polymer Tubing Cutter		
AT0-1110	Polymer Tubing Cutter	ea

PEEKsil is compatible with most organic solvents. Effective pH range from 0 to 10.

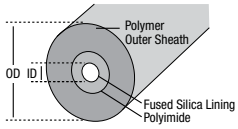
For more information on Part Nos. AQ0-8503 and AQ0-8530, see page 213.

See also our Core-Shell Performance Enhancement kit on page 214.

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.: AQ0-8892 is available (see p. 214).



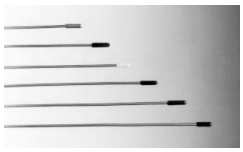
PEEKsil tubing showing the precision ground and square cut end enabling a zero dead volume connection.

Ordering Information

PEEKsil Tubing for UHPLC/HPLC		
Part No.	Description	Unit
AT0-8896	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 20 cm L, Red	5/pk
AT0-8897	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 10 cm L, Red	5/pk
Related Accessory Items		
AQ0-8503	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing	10/pk
AQ0-8530	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		
AT0-2996	5 cm	5/pk
AT0-2997	10 cm	5/pk
AT0-2998	20 cm	5/pk
0.010 in. ID x 0.062 in. (1/16 in.) OD		
AT0-0456	5 cm	5/pk
AT0-0457	10 cm	5/pk
AT0-0458	20 cm	5/pk
AT0-0460	50 cm	2/pk
AT0-0461	1 m	2/pk
0.020 in. ID x 0.062 in. (1/16 in.) OD		
AT0-0465	10 cm	5/pk
AT0-0466	20 cm	5/pk
AT0-0469	1 m	2/pk

Tubing *(cont'd)*

Teflon® (PTFE) Tubing

- **Resistant to virtually all corrosive chemicals and organic solvents**
- **Pressure rated to 500 psi (35 kg/cm²)**

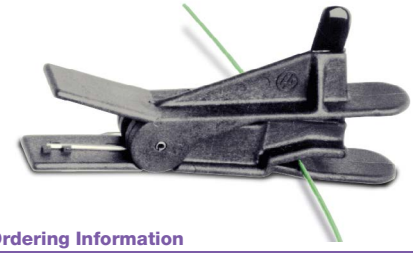
Ordering Information

Teflon Tubing				
Part No.	OD (inch)	ID (inch)	Wall Thickness (inch)	Length (feet)
AT0-8609	¼	⅛ (0.125)	0.060	5
AT0-8610	¼	⅛ (0.125)	0.060	10

Tubing Cutters

Terry Tools are compact tubing cutters for either 1/16 or ⅛ 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 ⅛ in. OD polymeric tubing, especially PEEK tubing

Ordering Information

Tubing Cutters		
Part No.	Description	Unit
AQ0-1305	1/16 in. Terry-Tool tubing cutter	ea
AQ0-1306	⅛ in. Terry-Tool tubing cutter	ea
AQ0-1307	Replacement cutting wheels for both AQ0-1305 and AQ0-1306	3/pk
AT0-1110	Polymer Tubing Cutter	ea

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	AS0-3353
10	N	22s	2 in./51 mm	3	701	80365	21250	ea	AS0-0022
25	N	22s	2 in./51 mm	3	702	80465	21251	ea	AS0-0023
50	N	22s	2 in./51 mm	3	705	80565	21252	ea	AS0-0024
100	N	22s	2 in./51 mm	3	710	80665	21253	ea	AS0-0025
250	N	22	2 in./51 mm	3	725	80765	21254	ea	AS0-0026
500	N	22	2 in./51 mm	3	750	80865		ea	AS0-0027

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	AS0-0028
25	RN	25s	1.97 in./50 mm	3	802	84816	21256	ea	AS0-0029
50	RN	25s	1.97 in./50 mm	3	805	84817	21257	ea	AS0-0030
100	RN	25s	1.97 in./50 mm	3	810	84818	21258	ea	AS0-0031

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	AS0-1906

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	AS0-1904
25-100	RN	26	2 in./51 mm	2	RN NDL	7758-02	24939	6/pk	AS0-4392
25-100	RN	22s	2 in./51 mm	2	RN NDL	7758-03	24940	6/pk	AS0-4393
0.250-10 mL	RN	22s	2 in./51 mm	2	RN NDL	7779-03	24944	6/pk	AS0-4398

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	AS0-4394
0.250-10 mL	RN	22	2 in./51 mm	3	RN NDL	7780-04	24945	6/pk	AS0-4397
0.250-10 mL	RN	22s	2 in./51 mm	3	RN NDL	7780-03		6/pk	AS0-4400

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.

Removable Needle (RN, R)

Cemented Needle (N, F)

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

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	AS0-0142
25	F	22	2 in./51 mm	LD	25F-LC	003300	24861	ea	AS0-0143
50	F	22	2 in./51 mm	LD	50F-LC	004300	24862	ea	AS0-0144
100	F	22	2 in./51 mm	LD	100F-LC	005300	24863	ea	AS0-0145
250	F	22	2 in./51 mm	LD	250F-LC	006300	24864	ea	AS0-0146
500	F	22	2 in./51 mm	LD	500F-LC	007300	24865	ea	AS0-0147

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	AS0-4370
25	R	22	2 in./51 mm	LD	25R-GT-LC-SS	003312	24867	ea	AS0-4371
100	R	22	2 in./51 mm	LD	100R-GT-LC-SS	005312	24869	ea	AS0-4373
500	R	22	2 in./51 mm	LD	500R-GT-LC-SS	007312	24871	ea	AS0-4375

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	AS0-7636

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	AS0-7638

Removable Needle (RN, R)

Cemented Needle (N, F)

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

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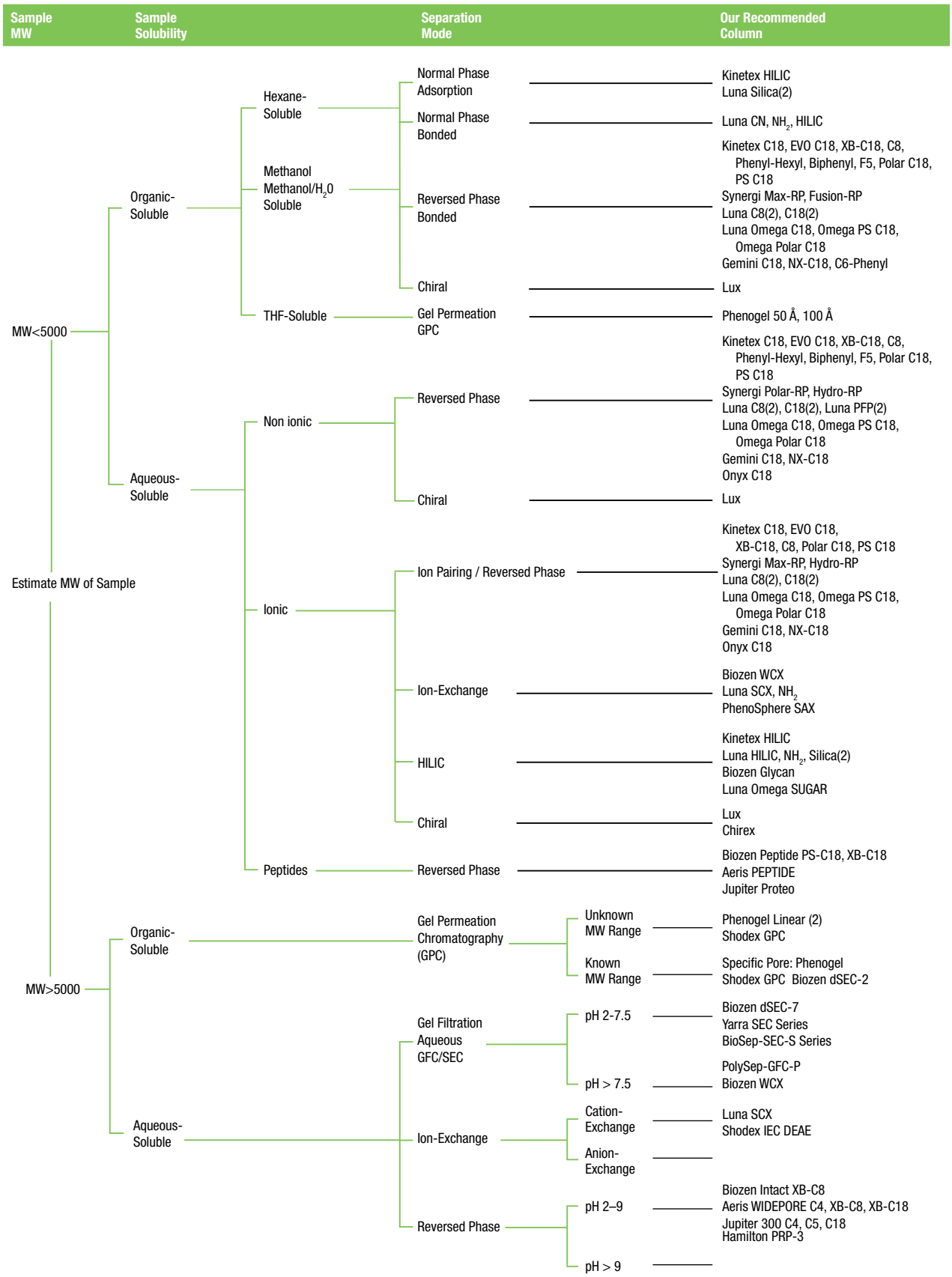
HPLC Column Selection Tree



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
- Phenomenex Chirex (chiral)
- Phenomenex Lux (chiral)
- Phenomenex Kinetex EVO C18 (FMOC or OPA derivatized)

Anions
- Phenomenex Luna NH_2
- Phenomenex Lux (chiral)
- Phenomenex PhenoSphere SAX
- Hamilton PRP
- Shodex IC
- Phenomenex Rezex ROA-Organic Acid

Antibiotics
- Phenomenex Kinetex
- Phenomenex Gemini / Gemini NX
- Phenomenex Luna
- Phenomenex Luna Omega
- Phenomenex Synergi

Biotechnology/Life Sciences
- Phenomenex Aeris WIDEPORE / PEPTIDE
- Phenomenex Biozen WidePore C4
- Phenomenex Biozen Intact XB-C8
- Phenomenex Clarity
- Phenomenex Jupiter 300/Jupiter Proteo
- Phenomenex Biozen dSEC-2
- Phenomenex Biozen dSEC-7
- Phenomenex BioSep-SEC-S
- Phenomenex Yarra SEC
- Phenomenex PolySep-GFC-P
- Phenomenex Luna SCX
- Phenomenex Biozen Peptide PS-C18 / XB-C18
- Phenomenex Luna NH_2
- Phenomenex Biozen Glycan
- Phenomenex Biozen WCX
- Shodex GFC, KW

Carbohydrates
- Phenomenex Rezex
- Phenomenex Luna Omega SUGAR
- Phenomenex Luna NH_2
- Shodex SUGAR

Cations
- Phenomenex Luna SCX
- Phenomenex Biozen WCX
- Hamilton PRP

Enantiomers (Chiral)
- Phenomenex Lux
- Phenomenex Chirex

Environmental (Carbamates, PAHs, Explosives)
- Phenomenex Zebron (GC)
- Phenomenex Kinetex
- Phenomenex Gemini / Gemini NX
- Phenomenex Luna
- Phenomenex Luna Omega
- Phenomenex Synergi

Foods, Flavors and Fragrances
- Phenomenex Rezex
- Phenomenex Kinetex
- Phenomenex Gemini / Gemini NX
- Phenomenex Luna
- Phenomenex Luna Omega SUGAR
- Phenomenex Lux (chiral)
- Phenomenex Synergi
- Phenomenex Zebron (GC)

Nucleosides and Nucleotides
- Phenomenex Kinetex EVO C18
- Phenomenex Luna NH_2, SCX
- Phenomenex Luna Omega Polar C18, Luna Omega PS C18
- Phenomenex Synergi Polar-RP
- Phenomenex PhenoSphere SAX

Oligonucleotides
- Phenomenex Biozen Oligo
- Phenomenex Clarity Oligo-XT
- Phenomenex Clarity Oligo-RP
- Phenomenex Clarity Oligo-MS
- Phenomenex Aeris WIDEPORE

Organic Acids
- Phenomenex Luna Omega PS C18
- Phenomenex Rezex
- Phenomenex Synergi Hydro-RP

Peptides/Proteins
- Phenomenex Aeris WIDEPORE / PEPTIDE
- Phenomenex Biozen Peptide PS-C18 / XB-C18
- Phenomenex Biozen WidePore C4
- Phenomenex Jupiter 300/Jupiter Proteo
- Phenomenex Biozen dSEC-2
- Phenomenex Biozen dSEC-7
- Phenomenex Biozen Glycan
- Phenomenex Biozen Intact
- Phenomenex Luna SCX, NH_2
- Phenomenex Yarra SEC
- Phenomenex BioSep-SEC-S
- Phenomenex Biozen WCX

Pesticides, Herbicides, and Dioxins
- Phenomenex Kinetex
- Phenomenex Gemini / Gemini NX
- Phenomenex Synergi
- Phenomenex Luna
- Phenomenex Luna Omega
- Phenomenex Zebron (GC)

Pharmaceuticals
- Phenomenex Kinetex
- Phenomenex Gemini / Gemini NX
- Phenomenex Synergi
- Phenomenex Luna
- Phenomenex Luna Omega
- Phenomenex Lux (chiral)
- Phenomenex Chirex (chiral)

Polymers, Plastics, Rubber
- Phenomenex Zebron (GC)
- Phenomenex Phenogel

Vitamins
- Phenomenex Kinetex
- Phenomenex Gemini / Gemini NX
- Phenomenex Synergi
- Phenomenex Luna
- Phenomenex Luna Omega

Taxanes
- Phenomenex Kinetex F5
- Phenomenex Luna PFP(2)

Textiles/Dyes
- Phenomenex Kinetex
- Phenomenex Gemini / Gemini NX
- Phenomenex Synergi
- Phenomenex Luna
- Phenomenex Luna Omega
- Phenomenex Phenogel GPC

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 dSEC-2
Advanced Bio PEPTIDE plus	Biozen Peptide XB-C18	Biozen Peptide PS-C18
Advanced Bio RP-Ab	Aeris WIDEPORE	Biozen WidePore C4
Advanced Bio Oligonucleotide	Clarity Oligo-XT	Biozen Oligo
Bio MAb (WCX)	Biozen WCX	—
Bio SEC	BioSep-SEC-S	Biozen dSEC-2
Chiradex	Shiseido Chiral CD-pH	—
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	Biozen WidePore C4
Poroshell 120	Kinetex	Kinetex
ProSEC 300S	Yarra	Biozen dSEC-2
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	Biozen dSEC-2
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 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	—
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 dSEC-2
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	—
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 XB-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 WidePore C4
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	—
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	Biozen WidePore C4

continued

HPLC Column Selection by Manufacturer *(cont'd)*

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		
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
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	Luna C18(2)	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	—
Supelcosil LC-SAX	PhenoSphere 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	—	—
Aquasil	Synergi Hydro-RP	—
BetaBasic	Luna	Kinetex
BioBasic SEC	Yarra	Biozen dSEC-2
BioBasic IEX	Shodex IEC	Biozen WCX
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	—
DNASwift	Clarity Oligo-RP	Biozen Oligo
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	—	Shodex IC series
IonPac CS series	Shodex IC series	Hamilton PRP-X200
IonPac ICE AS series	Rezex ROA	Rezex ROA
MAb Pac SEC-1	Biozen dSEC-2	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
Syncronis	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	Aeris PEPTIDE XB-C18
ACQUITY UPLC PEPTIDE CSH	Biozen Peptide PS-C18	Aeris PEPTIDE XB-C18
ACQUITY UPLC Oligonucleotide BEH C18	Clarity	Biozen Oligo
Atlantis	Synergi Fusion-RP	Synergi Hydro-RP
BioSuite IEX	Shodex IEC	—
BioSuite SEC	Yarra	Biozen dSEC-2
BioSuite RPC	—	Jupiter 300
Carbamate	—	Synergi Hydro-RP
Carbohydrate	Luna NH_2	Luna Omega SUGAR
CORTECS	Kinetex	Kinetex
Deltapak 100A	—	Luna
Deltapak 300A	Aeris	Biozen Intact
GST	—	Luna HILIC
IC-pak	Hamilton PRP-X100	—
µBondapak	Bondclone	Synergi Hydro-RP
µPorasil	Bondclone Silica	Luna Silica
µStyragel	Phenogel	Phenogel
Novapak 4 µm	—	Synergi Hydro-RP
OST	Clarity Oligo-XT	Biozen Oligo
PAH C18	Kinetex PAH	—
Protein-Pak IEC	Shodex IEC	—
Protein-Pak SW	Yarra	Biozen dSEC-2
PrST	Aeris WIDEPORE	Biozen WidePore C4
PST	Aeris PEPTIDE	Biozen Peptide
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	Biozen WidePore
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
Adsorption Chromatography
Phenomenex Kinetex HILIC
Phenomenex Luna Silica(2)
Chiral Chromatography
Phenomenex Lux
Phenomenex Chirex
Shinwa Ultron ES
Sumika Sumichiral OA
Gel Filtration Chromatography
Phenomenex Biozen dSEC-2
Phenomenex Yarra SEC (silica)
Phenomenex BioSep SEC/GFC (silica)
Phenomenex PolySep GFC-P (polymer)
Shodex GFC OHpak SB, Sugar KS, Protein KW
Gel Permeation Chromatography
Phenomenex Phenogel
Hydrophilic Interaction Chromatography (HILIC)
Phenomenex Biozen Glycan
Phenomenex Kinetex HILIC
Phenomenex Luna HILIC
Phenomenex Luna NH_2
Phenomenex Luna Silica(2)
Phenomenex Luna Omega SUGAR
Hydrophobic Interaction Chromatography (HIC)
Shodex HIC
Ion-Exclusion Chromatography
Phenomenex Rezex
Shodex RSpak, SUGAR
Ion-Exchange Chromatography
Phenomenex Biozen WCX
Phenomenex Luna SCX, Luna NH_2
Phenomenex PhenoSphere SAX
Phenomenex Rezex
Macherey-Nagel Nucleosil SAX, SB
Shodex IEC
Shodex RSpak KC-811

Separation Mode
Ion Chromatography
Hamilton PRP
Shodex IC
Ligand Exchange Chromatography
Phenomenex Rezex
Shodex SUGAR
Multi-Mode Chromatography
Phenomenex Luna SCX
Phenomenex Luna NH_2
Normal Phase Chromatography
Phenomenex Kinetex HILIC
Phenomenex Luna CN, NH_2, Silica(2)
Reversed Phase Chromatography
Phenomenex Kinetex
Phenomenex Luna Omega
Phenomenex Luna
Phenomenex Biozen
Phenomenex Gemini
Phenomenex Synergi
Phenomenex Aeris
Phenomenex Bondclone
Phenomenex Clarity
Phenomenex Gemini NX
Phenomenex HyperClone
Phenomenex Jupiter
Phenomenex Onyx
Phenomenex PolymerX
Phenomenex Prodigy
Phenomenex SphereClone
GL Sciences Inertsil
Hamilton PRP
Macherey-Nagel Nucleosil
Merck KGaA LiChrospher, Superspher

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
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 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18 Kinetex XB-C18 Luna™ C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini™ NX-C18 Gemini C18 Synergi™ Hydro-RP Synergi Fusion-RP Biozen™ Peptide PS-C18 Onyx™ C18 Jupiter™ C18 Clarity™ Oligo-RP Clarity Oligo-MS Clarity Oligo-XT Aeris™ WIDEPORE XB-C18 Biozen Peptide XB-C18	Core-Shell Core-Shell Core-Shell Core-Shell Core-Shell Spherical Spherical Spherical Spherical Spherical Spherical Spherical Spherical Spherical Monolith Spherical Spherical Core-Shell Core-Shell Core-Shell Core-Shell
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 Luna Silica(2)	Core-Shell Spherical
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 Luna C8(2) Biozen Intact XB-C8	Core-Shell Spherical Core-Shell
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 Luna Omega SUGAR	Spherical Spherical
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
L10	Nitrile groups chemically bonded to porous silica particles or superficially porous particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna CN	Spherical
L11	Phenyl groups chemically bonded to porous silica particles or superficially porous particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex Biphenyl Kinetex Phenyl-Hexyl Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy PH-3	Core-Shell Core-Shell Spherical Spherical Spherical Spherical
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
L14	Silica gel having a chemically bonded, strongly basic quaternary ammonium anion-exchange coating, 5 to 10 µm in diameter.	PhenoSphere™ SAX	Spherical
L15	Hexyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter.	PhenoSphere C6	Spherical
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 Rezex ROA-Organic Acid	Spherical Spherical
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 Rezex RCU-Sugar Alcohols	Spherical Spherical
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 BioSep™-SEC-S Biozen dSEC-2	Spherical Spherical Spherical
L21	A rigid, spherical styrene-divinylbenzene copolymer, 3 to 30 µm in diameter.	PolymerX™ RP-1 Phenogel™ 100 Å	Spherical Spherical
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
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
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 Shodex OHpak SB-802.5HQ	Spherical Spherical

HPLC Column Selection by USP Listing *(cont'd)*

USP Column Classification		Recommended Phenomenex Column	Particle Shape
L26	Butyl silane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter.	Jupiter 300 C4 Biozen WidePore C4	Spherical Core-Shell
L27	Porous silica particles, 30 to 50 µm in diameter.	Sepra Silica	Irregular
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 / SEC-3000 BioSep-SEC-S2000 / SEC-S3000	Spherical Spherical
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
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
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
L38	Methacrylate-based size-exclusion packing for water-soluble samples.	PolySep-GFC-P series Shodex OHpak SB-800HQ	Spherical Spherical
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
L40	Cellulose tris-3,5-dimethylphenylcarbamate coated porous silica particles, 3 µm to 20 µm in diameter.	Lux Cellulose-1	Spherical
L41	Immobilized α_1-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 or superficially porous particles, by a propyl spacer, 1.5 to 10 µm in diameter.	Kinetex F5 Luna PFP(2)	Core-Shell Spherical
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
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
L52	A strong cation-exchange resin made of porous silica with sulfopropyl or sulfoethyl 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
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
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 Biozen dSEC-2	Spherical Spherical Spherical Spherical Pore Controlled Technology
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%).		

HPLC Column Selection by USP Listing *(cont'd)*

USP Column Classification		Recommended Phenomenex Column	Particle Shape
L62	C30 silane bonded phase on a fully porous spherical silica or superficially porous particles, 3 to 15 µm in diameter.	FlexFire Fusion C30	Spherical
L63	Glycopeptide teicoplanin linked through multiple covalent bonds to a 100 Å spherical silica.		
L64	Strongly basic anion-exchange resin consisting of 8 % crosslinked styrene divinylibenzene copolymer with a quaternary ammonium group in the chloride form, 45 to 180 µm in diameter.		
L65	Strongly acidic cation-exchange resin consisting of 2 % sulfonated crosslinked styrene divinylbenzene copolymer with a sulfonic acid group in the hydrogen form, 63 to 250 µm in diameter.		
L66	A crown ether coated on a 5 µm particle size silica gel substrate. The active site is (S)-18-crown-6-ether.		
L67	Porous vinyl alcohol copolymer with a C18 alkyl group attached to the hydroxyl group of the polymer, 2 to 10 µm in diameter.	Asahipak ODP-50	Spherical
L68	Spherical, porous silica, 10 µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and not endcapped.		
L69	Ethylvinylbenzene/divinylbenzene substrate agglomerated with quaternary amine functionalized 130 nm latex beads, about 6.5 µm in diameter.		
L70	Cellulose tris (phenyl carbamate) coated on 5 µm silica.		
L71	A rigid, spherical polymethacrylate 4 to 6 µm in diameter.	Shodex RSpak DE-413 Shodex RSpak DE-613	Spherical Spherical
L72	(S)-phenylglycine and 3,5-dinitroaniline urea linkage covalently bonded to silica.		
L73	A rigid, spherical polydivinylbenzene particle 5 to 10 µm in diameter.		
L74	A strong anion-exchange resin consisting of a highly cross-linked core of 7 µm macroporous particles having a 100 Å average pore size and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene and an anion-exchange layer grafted to the surface, which is functionalized with alkyl quaternary ammonium ions.		
L75	A chiral-recognition protein, bovine serum albumin (BSA), chemically bonded to silica particles, about 7 µm in diameter, with a pore size of 300 Å.		
L76	Silica-based weak cation-exchange material, 5 µm in diameter. Substrate is surface polymerized polybutadiene-maleic acid to provide carboxylic acid functionalities. Capacity not less than 29 µEq/column.		
L77	Weak cation-exchange resin consisting of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 6 to 9 µm diameter. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 500 µEq/column (4 mm x 25 cm).		
L78	A silane ligand that consists of both reversed phase (an alkyl chain longer than C8) and anion-exchange (primary, secondary, tertiary, or quaternary amino groups) functional groups chemically bonded to porous or non-porous or ceramic micro-particles, 1.0 to 50 µm in diameter or a monolithic rod.		
L79	A chiral-recognition protein, human serum albumin (HSA), chemically bonded to silica particles, about 5 µm in diameter.		
L80	Cellulose tris(4-methylbenzoate)-coated, porous, spherical, silica particles, 5 to 20 µm in diameter.	Lux Cellulose-3	Spherical
L81	A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 9 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 70 nm diameter microbeads (6 % crosslinked) bonded with alkanol quaternary ammonium ions.		
L82	Polyamine chemically bonded to cross-linked polyvinyl alcohol polymer, 4 - 5 µm in diameter	Asahipak NH_2P-50	Spherical
L83	A hydroxide-selective, strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 10.5 µm microporous particles having a pore size of 10 Å and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene.		
L84	Weak cation-exchange resin consisting of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 5 µm diameter. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 8400 µEq column (5 mm x 25 cm).		
L85	A silane ligand that consists of both reversed phase (an alkyl chain longer than C8) and weak cation-exchange (carboxyl groups) functional groups chemically bonded to porous or non-porous particles, 1.0 to 50 µm in diameter.		
L86	Fused core particle with a highly polar ligand possessing multiple hydroxyl groups tethered to the silica gel outer layer.		
L87	Dodecyl silane chemically bonded to porous or superficially porous silica particles, 1.5 to 10 µm in diameter.	Synergi Max-RP	Spherical
L88	Glycopeptide vancomycin linked through multiple covalent bonds to 100 Å spherical silica.		
L89	Packing having the capacity to separate compounds with a molecular weight range from 100 - 3000 dalton (as determined by polyethylene oxide), applied to neutral and anionic water-soluble polymers. A polymethacrylate resin base, cross-linked with polyhydroxylate ether (surface contains some residual cationic functional groups).	Shodex OHpak SB-802.5 HQ	Spherical
L90	Amylose tris-[(S)-alpha-methylbenzylcarbamate] coated on porous, spherical silica particles, 3 to 10 µm in diameter.		
L91	Strong anion-exchange resin consisting of monodisperse porous polystyrene/divinylbenzene beads coupled with quaternary amine. Bead size is 3 to 10 µm.		
L92	A strong anion-exchange resin consisting of a highly cross-linked core of 5-9 µm macroporous particles having a 100 Å average pore size and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene and an anion-exchange layer grafted to the surface, which is functionalized with alkanol quaternary ammonium ions.		
L93	Cellulose tris (3,5-dimethylphenylcarbamate) reversed phase chiral stationary phase coated on 3 or 5 µm silica gel particles.	Lux Cellulose-1	Spherical
L94	A strong anion-exchange resin consisting of highly cross-linked 15 µm microporous particles functionalized with very low cross-linked latex (0.5 %) to provide alkanol quaternary ammonium ion-exchange sites.		
L95	Highly polar alkyl ligand comprising five hydroxyl groups that are chemically bonded to totally porous or superficially porous silica, or a monolithic silica rod.		
L96	Alkyl chain, reversed phase bonded to totally or superficially porous silica designed to retain hydrophilic and other polar compounds when using highly aqueous mobile phases, including 100 % aqueous, 1.5 µm to 10 µm in diameter.	Kinetex Polar C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP	Core-Shell Core-Shell Spherical Spherical
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).		

HPLC Column Selection by USP Listing *(cont'd)*

USP Column Classification		Recommended Phenomenex Column	Particle Shape
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
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
L108	A chiral-recognition protein, cellobiohydrolase (CBH), chemically bonded to silica particles, about 5 µm in diameter.		
L109	Spherical particles of porous graphitic carbon, 1.5 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 % divinyl-benzene 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 functional-ized 275 nm latex microbeads (6% cross-linked), about 8.5 µm in diameter.		
L116	Sulfonated ethylvinylbenzene/divinylbenzene substrate agglomerated with hydrophilic quaternary amine func-tionalized 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
L119	Cellulose tris-(3,5-dichlorophenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 µm in diameter.	Lux i-Cellulose-5	Spherical
L120	A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 µm micropo-rous particles having a pore size of less than 10 Å units 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).		
L121	A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 11 µm porous particles having a pore size of less than 10 Å units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene electrostatically bonded with hyperbranched alkanol quaternary ammonium ions.		
L122	Sulfobetaine graft-polymerized to totally or superficially porous hydrophilic polymer particles, 1.0 to 10 µm in diameter, or a monolithic rod. Packing having densely bonded zwitterionic groups with 1:1 charge balance.		
L123	Cellulose tris(3-chloro-4-methylphenylcarbamate) coated porous silica particles, 3 to 20 µm in diameter.	Lux Cellulose-2	Spherical
L124	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the silver form, average 9 µm in diameter.	Rezex RSO-Oligosaccharide	Spherical
L125	Polyvinyl alcohol polymer gel weak cation-exchange packing material, 5 µm porous particles. The surface is polymerized with polybutadiene-maleic acid to provide carboxylic acid functionalities. The Capacity is not less than 1 mEq/column.	Shodex IC YS-50	Spherical
L126	Amylose tris (3-chlorophenylcarbamate), immobilized on porous, spherical, silica particles, 1 µm to 20 µm in diameter.		
L127	A crown ether chemically bonded to a 5 µm particle size silica gel substrate. The active site is (S)- pseudo-18-crown-6-ether.	Sumichiral OA-8000	Spherical
L128	Porous particles of polystyrene divinyl benzene with linear molecular weight operating range from 200 to 2,000,000 g/mol (polystyrene equivalent), 5 µm in diameter.		
L130	Cellulose tris(3,5-dimethylphenylcarbamate) coated on 10 Âm silica gel particles.	Lux Cellulose-1	Spherical

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 Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column
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
Silica gel for chiral chromatography, urea type derivative: (R)-phenylglycin and 3, 5-dinitroaniline; 5 µm.	1181000	Chirex 3012
Silica gel for chiral separation, amylose derivative of substituted amylose coated on very finely divided silica gel.	1171700	Lux Amylose-1
Silica gel for chiral separation, cellulose derivative of substituted cellulose coated on very finely divided silica gel.	1110300	Lux Cellulose-1, -2, -3 and -4
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
Silica gel for chiral separation, L-Penicillamine coated silica gel.	1200050	Sumichiral OA-5000L
Silica gel for chromatography.	1076900	Kinetex HILIC Luna Silica(2)
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
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
Silica gel for chromatography, alkysilyl, solid core, endcapped. Spherical silica particles containing a non-porous solid silica core surrounded by a thinner outer porous silica coating with alkysilyl 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
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)
Silica gel for chromatography, aminopropylsilyl.	1077000	SphereClone NH_2 (Amino) PhenoSphere NH_2 (Amino)
Silica gel for chromatography, aminopropylsilyl R1 particle size of ~55 µm.	1077001	Strata NH_2
Silica gel for chromatography, amylose derivative of chemically modified at the surface by the bonding of an amylose derivative	1109800	Lux i-Amylose-1 Lux i-Amylose-3
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
Silica gel for chromatography, butylsilyl, endcapped.	1170500	Biozen WidePore C4 Aeris WIDEPORE C4 Jupiter 300 C4
Silica gel for chromatography, carbamoylsilyl. Chemically modified at the surface by the bonding of carbamoylsilyl groups.	1210400	

HPLC Column Selection by Ph. Eur. Listing
(cont'd)

Description According Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column
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
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
Silica gel for chromatography compatible with highly aqueous mobile phase, octadecylsilyl diol, endcapped.	1207500	
Silica gel for chromatography, crown-ether.	1178000	Sumichiral OA-8000
Silica gel for chromatography, cyanopropylsilyl, endcapped, base-deactivated pre-treated by various techniques before the bonding of cyanopropyl-silyl groups. To minimize any interaction with basic compounds, it's carefully endcapped to cover most of the remaining silanol groups.	1194200	Luna CN (Cyano)
Silica gel for chromatography, cyanosilyl.	1109900	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)
Silica gel for chromatography, cyanopropylsilyl, endcapped.	1195000	Luna CN (Cyano)
Silica gel for chromatography, cyanolsilyl, endcapped, base-deactivated.	1211200	Luna CN (Cyano)
Silica gel for chromatography, di-isobutyloctadecylsilyl.	1140000	Kinetex XB-C18
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
Silica gel for chromatography, diol dihydroxypropyl, 100 Å; 10 µm.	1110000	Spherex OH (Diol)
Silica gel for chromatography, dodecylsilyl, endcapped.	1179700	Synergi Max-RP
Silica gel for chromatography, hexadecylamidylsilyl with hexadecylcarboxamidopropyldimethylsilyl groups; 5 µm.	1162500	
Silica gel for chromatography, hexadecylamidylsilyl, endcapped with hexadecylcarboxamidopropyldimethylsilyl groups; 5 µm.	1172400	
Silica gel for chromatography, hexylsilyl.	1077100	SphereClone C6 PhenoSphere C6
Silica gel for chromatography, octylsilyl R1 Bonding of octylsilyl and methyl groups (double bonded phase)	1077101	Luna C8(2) Prodigy C8 Hyperclone C8 (MOS) Sphereclone C8 Kinetex C8
Silica gel for chromatography, octylsilyl R2 ultrapure silica gel, chemically modified at the surface by the bonding of octylsilyl groups	1077102	Luna C8(2) Prodigy C8 Hyperclone C8 (MOS) Sphereclone C8 Kinetex C8
Silica gel for chromatography, hexylsilyl, endcapped.	1174400	SphereClone C6 PhenoSphere C6
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
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
Silica gel for chromatography, octylsilyl (hybrid material), ethylene-bridged (hybrid material) 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 octadecyl-silyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1208800	
Silica gel for chromatography, (hybrid material) octylsilyl, ethylen-bridged, 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 octadecyl-silyl 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
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
Silica gel for chromatography, hydroxypropylsilyl chemically modified at the surface by bonding of hydroxypropylsilyl groups.	1210500	
Silica gel for chromatography, nitrile cyanopropylsilyl.	1077300	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)

HPLC Column Selection by Ph. Eur. Listing
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Description According Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column
Silica gel for chromatography, nitrile R1 chemically bonded nitrile groups.	1077400	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)
Silica gel for chromatography, nitrile R2 ultrapure silica (<20 ppm metal) with cyanopropylsilyl groups.	1119500	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)
Silica gel for chromatography, nitrile, endcapped with cyanopropylsilyl groups.	1174500	Luna CN (Cyano)
Silica gel for chromatography, 4-nitrophenylcarbamidesilyl. A very finely divided silica gel, chemically modified at the surface by bonding with 4-nitrophenylcarbamide groups.	1185200	
Silica gel for chromatography, octadecanoylaminopropylsilyl 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)
Silica gel for chromatography, octadecylsilyl R1. A very finely divided ultrapure silica gel, chemically modified at the surface by the bonding of octadecylsilyl groups.	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
Silica gel for chromatography, octadecylsilyl R2 ultrapure silica; 150 Å pore size; 20 % C-load; optimized for the analysis of PAHs.	1115300	EnviroSep-PP
Silica gel for chromatography, octadecylsilyl, base-deactivated pretreated by various techniques before the bonding of octadecylsilyl groups to minimize the interaction with basic components.	1077600	Luna C18(2) Luna Omega C18 Luna Omega Polar C18 Luna Omega PS C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18
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
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
Silica gel for chromatography, octadecylsilyl, endcapped R1 ultrapure silica, chemically modified by the bonding of octadecylsilyl groups. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1115401	Luna C18(2) Gemini C18 Gemini NX C18 Kinetex C18 Kinetex XB C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18 Luna Omega C18 Luna Omega Polar C18 Luna Omega PS C18

HPLC Column Selection by Ph. Eur. Listing
(cont'd)

Description According Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column
Silica gel for chromatography, octadecylsilyl, endcapped, base-deactivated; pretreated by various techniques before the bonding of octadecylsilyl groups. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1108600	Luna C18(2) Gemini C18 Gemini NX C18 Kinetex C18 Kinetex XB C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18 Luna Omega C18 Luna Omega Polar C18 Luna Omega PS C18
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
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
Silica gel for chromatography, octadecylsilyl, monolithic.	1154500	Onyx C18
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
Silica gel for chromatography, octadecylsilyl, polar embeded, encapsulated silica gel chemically modified at the surface by the bonding of polar embedded octadecylsilyl groups.To minimise any interaction with basic compounds it's carefully encapsulated to cover most of the remaining silanol groups.	1206600	
Silica gel for chromatography, octadecylsilyl, polar endcapped.	1205500	Synergi Hydro RP Luna Omega Polar C18
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
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
Silica gel for chromatography, octadecylsilyl, with polar embedded groups, endcapped; a very finely divided silica gel, 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.	1177900	Synergi Fusion-RP
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
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
Silica gel for chromatography, octylsilyl.	1077700	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (MOS) SphereClone C8
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
Silica gel for chromatography, octylsilyl R2 ultrapure silica (<20 ppm metal); pore size 100 Å; C-load: 19 %.	1077702	
Silica gel for chromatography, octylsilyl R3 ultrapure silica, bonding of octasilyl groups and sterically protected with branched hydrocarbons at the silanes.	1155200	Biozen Intact XB-C8
Silica gel for chromatography, octylsilyl, base-deactivated pretreated by various techniques before the bonding of octylsily groups to minimize the interaction with basic components.	1131600	Luna C8(2) Prodigy C8 HyperClone C8 (BDS) Kinetex C8

HPLC Column Selection by Ph. Eur. Listing

(cont'd)

Description According Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column
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)
Silica gel for chromatography, octylsilyl, endcapped, base-deactivated pretreated by various techniques before the bonding with octylsilyl groups. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1148800	Luna C8(2) Prodigy C8 Kinetex C8 HyperClone C8 (BDS)
Silica gel for chromatography, octylsilyl, with embedded polar groups, endcapped; a very finely divided silica gel, chemically modified at the surface by the bonding of polar-embedded octylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1152600	
Silica gel for chromatography, octylsilyl, extra-dense bonded, endcapped.	1200900	Luna C8(2) Kinetex C8
Silica gel for chromatography, octylsilyl, solid core, endcapped. Silica gel with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octyl-silyl groups. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1208600	Biozen Intact XB-C8 Kinetex C8 Aeris WIDEPORE XB-C8
Silica gel for chromatography, octylsilyl, solid core. Silica gel with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octylsilyl groups.	1209900	Biozen Intact XB-C8 Kinetex C8 Aeris WIDEPORE XB-C8
Silica gel for chromatography, oxypropionitrilsilyl	1184700	
Silica gel for chromatography, palmitamidopropylsilyl, endcapped bonding with palmitamidopropyl groups and endcapped with acetamidopropyl groups.	1161900	
Silica gel for chromatography, pentafluorophenylpropylsilyl, solid core, endcapped.	1207600	Kinetex F5 Kinetex PFP
Silica gel for chromatography, phenylhexylsilyl.	1153900	Kinetex Phenyl-Hexyl Luna Phenyl-Hexyl Gemini C6-Phenyl
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
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
Silica gel for chromatography, phenylsilyl.	1110200	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl
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
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
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
Silica gel for chromatography, propoxybenzene, endcapped.	1174600	Synergi Polar-RP
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
Silica gel for chromatography, strong cation-exchange bonding of sulfonic acid groups.	1161400	Luna SCX
Silica gel for chromatography, trimethylsilyl.	1115500	Capcell Pak
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 10^5; 10 µm.	1077900	BioSep-SEC-S3000 Yarra SEC-3000
Silica gel OC for chiral separations. Coated with cellulose tris (phenylcarbamate); 5 µm.	1146800	
Silica gel OD for chiral separations.	1110300	Lux Cellulose-1
Silica gel OJ for chiral separations. Coated with cellulose tris (4-methylbenzoate).	1179800	Lux Cellulose-3
Encapsulated octadecylsilyl silica gel for chromatography. Silica gel that is encapsulated to cover most of the silanol groups, then chemically modified at the surface by the bonding of octadecylsilyl groups	1218100	Capcell Pak (all C18)
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

HPLC Column Selection by Ph. Eur. Listing

(cont'd)

Description According Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column
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
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
Organosilica polymer compatible with 100 % aqueous mobile phases, octadecylsilyl, solid core, endcapped.	1201700	Kinetex EVO C18
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
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
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
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
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
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
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
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 propylensulfonic 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
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
Cation-exchange resin, weak. Weak cation-exchange resin in pronated form with carboxylate functional groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1203200	Biozen WCX
Anion-exchange resin. Resin in chlorinated form containing quaternary ammonium groups [$CH_2N+(CH_3)3$] 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 [$CH_2N+(CH_3)3$] 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	

HPLC Calculations

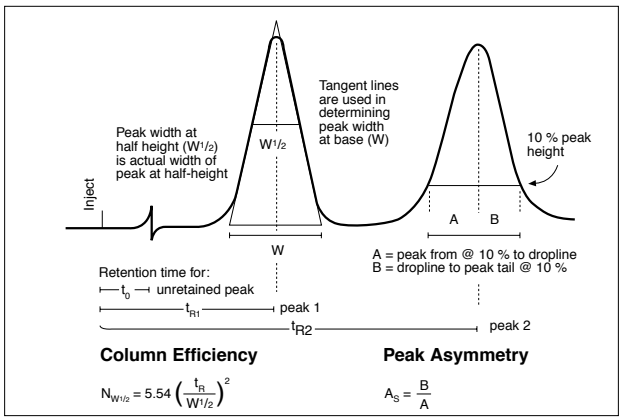
Column Efficiency

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 t_0 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:

$$a = k_2/k_1$$

Resolution

R_s, defined as the amount of separation between two adjacent peaks, is given by:

$$R_s = \frac{\sqrt{N}}{4}\left(\frac{a-1}{a}\right)\left(\frac{k}{k+1}\right)$$

where **k** is the average value for the two peaks.

Technical information found in this Appendices can also be viewed on our website. Please visit **www.phenomenex.com**

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:

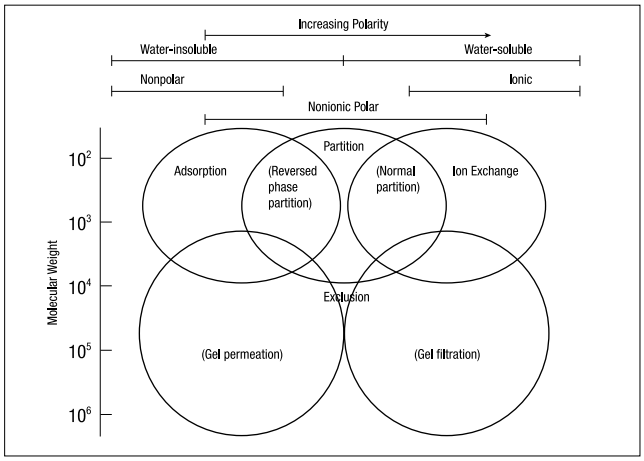
$$F2 = F1 \times (L2/L1) \times (r2/r1)^2$$

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 et al.**	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	—	$\alpha = \frac{k_2}{k_1} = \frac{t'_{R2}}{t'_{R1}}$	$r_{ji} = \frac{t'_{Rj}}{t'_i}$	$r = \frac{t''_S}{t'_S}$
Resolution	—	$R_s = 2\left(\frac{t'_{R2} - t'_{R1}}{w_2 + w_1}\right)$	$R_{ji} = 2\left(\frac{t_{Rj} - t_{R1}}{y_{tj} + y_{ti}}\right)$	$R_s = 2\left(\frac{t''_{m+s} - t'_{m+s}}{w''_b + w'_b}\right)$
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}	$u = \frac{L}{t_0}$	$\overline{u} = \frac{L}{t_m}$	$\overline{u} = \frac{L}{t_m}$

*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

The following numbers are recommendations and the maximum loading for methods should be found experimentally or using our calculator.

www.phenomenex.com/tools/lc-transfer

Column Type	ID (mm)	Approx. Dead Volume (mL)*	Typical Flow Rate (mL)	Typical and (Max.) Injection Masses (mg)	Typical and (Max.) Injection Volumes (µL)**
Nano	.075		Ask for specifications		
Capillary	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:

Column Dead Volume (mL) = Vo = 0.487 x d^2 x L

Where: L = column length (cm); 15 cm (150 mm) used for calculation.
d = column ID (cm, not mm)

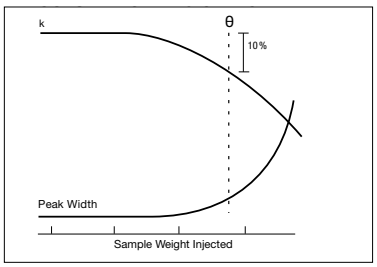
**The maximum allowable Sample Injection Volume (Vi) can be estimated as follows:

$$\textbf{Maximum Injection Volume} = Vi = \frac{Vr}{2\sqrt{N}}$$

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.

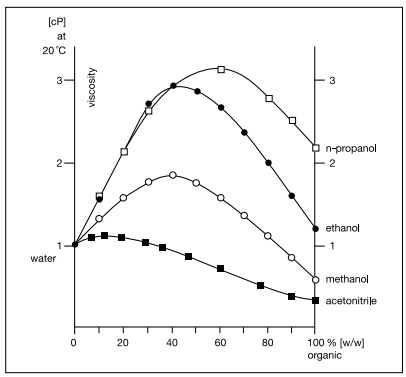


Probes for Column Characterization

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

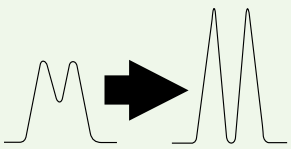
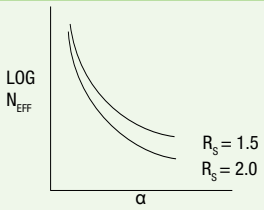
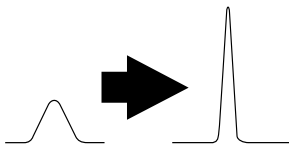
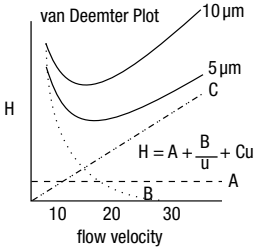
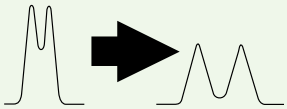
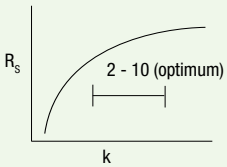


Reversed Phase Method Development

Factors Controlling Resolution

The equation below shows how resolution is affected by the controllable factors: Selectivity, Efficiency and Retention:

$$R_s = \frac{\sqrt{N}}{4}\left(\frac{a-1}{a}\right)\left(\frac{k}{k+1}\right)$$

Goal	Factor	Control
	**Selectivity Factor** **$\alpha = k_2 / k_1$** 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. ***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.	
	**Efficiency Factor** **$N = -8 \ln(f) (t_r / w_f)^2$** 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. ***Improve efficiency (N)*** by increasing column length, decreasing particle size of column packing, or decreasing flow rate. Minimize extra-column dead volume.	
	**Retention Factor** **$k = (t_r - t_0) / t_0$** 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. ***Improve k*** by changing the eluent strength.	

Where: k = Retention factor = $(t_r - t_o) / t_o$ (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_o = 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

Technical information found in this Appendices can also be viewed on our website. Please visit
www.phenomenex.com

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. 438 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. 424-425 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. 442)
- 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 8,700 psi (600 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

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 % NaN_3 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 ⅕ - ½ 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, NH_2)
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.
Note: IPA can be used in place of THF at a lower flow rate.

BONDED NORMAL PHASE COLUMNS (CN, NH_2, 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.
For Biosep/Yarra column: Reverse flush is acceptable. For Biozen dSEC-2/dSEC-7 column: Do not reverse flush!

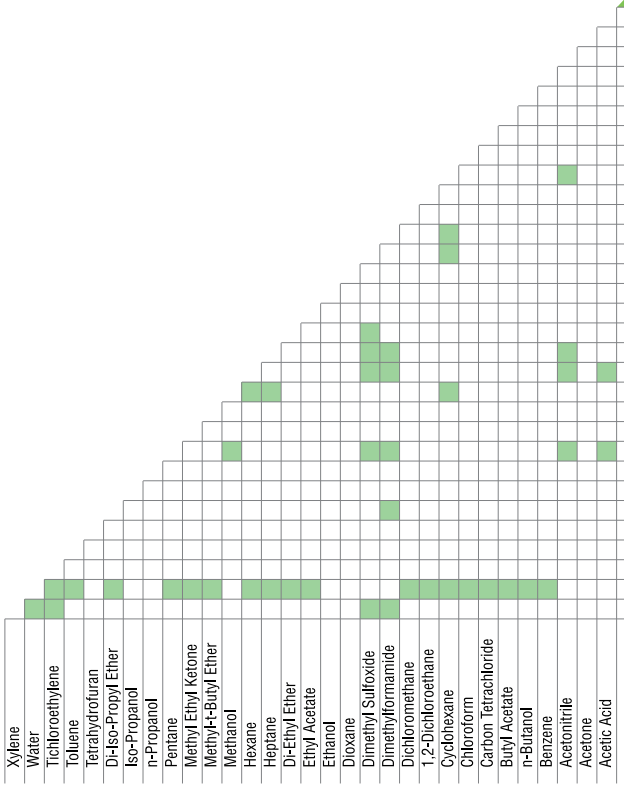
ION-EXCHANGE COLUMNS (SAX, SCX, NH_2, WAX, WCX)
Rinse with 10 column volumes each of:
500 mM Phosphate Buffer pH 7
10 % Acetic Acid (Aq)
5 column volumes of Water
10 column volumes of Phosphate Buffer pH 7
5 column volumes of Water
10 column volumes of Methanol
10 column volumes of Water
For protein 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

Miscible

Immiscible means that in some proportions two phases will be produced

Synonym Table
[1] Ethylene Chloride
[2] Methylene Chloride
[3] Methyl Sulfoxide
[4] tert-Butyl Methyl Ether
[5] 2-Butanone
[6] 2-Propanol

Solvent Polarity Chart

Relative Polarity	Compound Formula	Group	Representative Solvent Compounds
Nonpolar	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

Increasing Polarity

Technical information found in this Appendices can also be viewed on our website. Please visit www.phenomenex.com

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	200	—	25	—	—	Yes	1.5-9	L1
Aeris WIDEPORE XB-C8	Core-Shell 3.6	200	—	25	—	—	Yes	1.5-9	L7
Aeris WIDEPORE C4	Core-Shell 3.6	200	—	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	—	—	1.5-8.5Δ	L1
Biozen Peptide XB-C18	Core-Shell 1.7, 2.6	100	—	200	10	—	—	1.5-9‡	L1
Biozen WidePore C4	Core-Shell 2.6	400	—	25	<1	—	—	1.5-9‡	L26
Biozen Intact XB-C8	Core-Shell 3.6	200	—	20	—	—	—	1.5-9‡	L7
Biozen Oligo	Core-Shell 1.7, 2.6	100	—	200	11†	—	—	1-12	—
Biozen WCX	Non-Porous 6	—	—	—	—	—	—	2-12	—
Bondclone Silica	Irreg. 10	148	1.1	300	0	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-MS	Core-Shell 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. 3, 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	1.5-8.5Δ	L1
Kinetex PS C18	Core-Shell 2.6	100	—	200	9†	—	Yes	1.5-8.5Δ	L1
Kinetex XB-C18	Core-Shell 1.7, 2.6, 3.5, 5	100	—	200	10†	—	Yes	1.5-8.5Δ	L1
Kinetex C8	Core-Shell 1.7, 2.6, 5	100	—	200	8†	—	Yes	1.5-8.5Δ	L7
Kinetex Biphenyl	Core-Shell 1.7, 2.6, 5	100	—	200	11†	—	Yes	1.5-8.5Δ	L11
Kinetex Phenyl-Hexyl	Core-Shell 1.7, 2.6, 5	100	—	200	11†	—	Yes	1.5-8.5Δ	L11
Kinetex F5	Core-Shell 1.7, 2.6, 5	100	—	200	9†	—	Yes	1.5-8.5Δ	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	9†	—	Yes	1.5-8.5Δ	L1
Kinetex PAH	Core-Shell 3.5	100	—	200	12†	—	Yes	1.5-8.5Δ	L118
Luna PFP(2)	Spher. 3, 5	100	1.0	400	11.5	2.20	Yes	1.5-8.0	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, Binding Capacity: 0.15 meq/g	—	No	2.0-7.0	L9
Luna Omega C18	Spher. 1.6, 3,5	100	—	260	11	2.5	Yes	1.5-8.5Δ	L1
Luna Omega PS C18	Spher. 1.6, 3,5	100	—	260	9	—	Yes	1.5-8.5Δ	L1
Luna Omega Polar C18	Spher. 1.6, 3,5	100	—	260	9	—	Yes	1.5-8.5Δ	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

† 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 *(cont'd)*

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 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
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,

where $N(\mu mol/m^2) = \frac{10^6 P_c}{1200 n_c - P_c(M-1)} \bullet \frac{1}{S}$

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 m^2/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 50Å	Spher. 5, 10	50	3×10^3
Phenogel 100Å	Spher. 5, 10	100	6×10^3
Phenogel 500Å	Spher. 5, 10	500	1.5×10^4
Phenogel 10^3Å	Spher. 5, 10	10^3	5.5×10^4
Phenogel 10^4Å	Spher. 5, 10	10^4	5×10^5
Phenogel 10^5Å	Spher. 5, 10	10^5	1×10^6
Phenogel 10^6Å	Spher. 5, 10	10^6	1×10^7
Phenogel Linear	Spher. 5, 10	Mixed	1×10^7

Aqueous SEC/GFC Materials

Packing Material	Particle Shape/Size (µm)	Pore Size** (Å)	Exclusion Limit***
Biozen dSEC-2	Spher. 1.8, 3	200	Proprietary
Biozen SEC-2	Spher. 1.8	150	4.5×10^5
Biozen SEC-3	Spher. 1.8	300	7×10^5
Yarra SEC-2000	Spher. 3, 5	145	3×10^5
Yarra SEC-3000	Spher. 3, 5	290	7×10^5
Yarra SEC-4000	Spher. 3, 5	500	1×10^6
BioSep-SEC-S 2000	Spher. 5	145	3×10^5
BioSep-SEC-S 3000	Spher. 5	290	7×10^5
BioSep-SEC-S 4000	Spher. 5	500	1.5×10^6
PolySep-GFC-P 1000	Spher.	N/A	2×10^3 (PEG)
PolySep-GFC-P 2000	Spher.	N/A	9×10^3 (PEG)
PolySep-GFC-P 3000	Spher.	N/A	50×10^3 (PEG)
PolySep-GFC-P 4000	Spher.	N/A	20×10^4 (PEG)
PolySep-GFC-P 5000	Spher.	N/A	20×10^5 (PEG)
PolySep-GFC-P 6000	Spher.	N/A	10×10^6 (PEG)
PolySep-GFC-P Linear	Spher.	N/A	10×10^7 (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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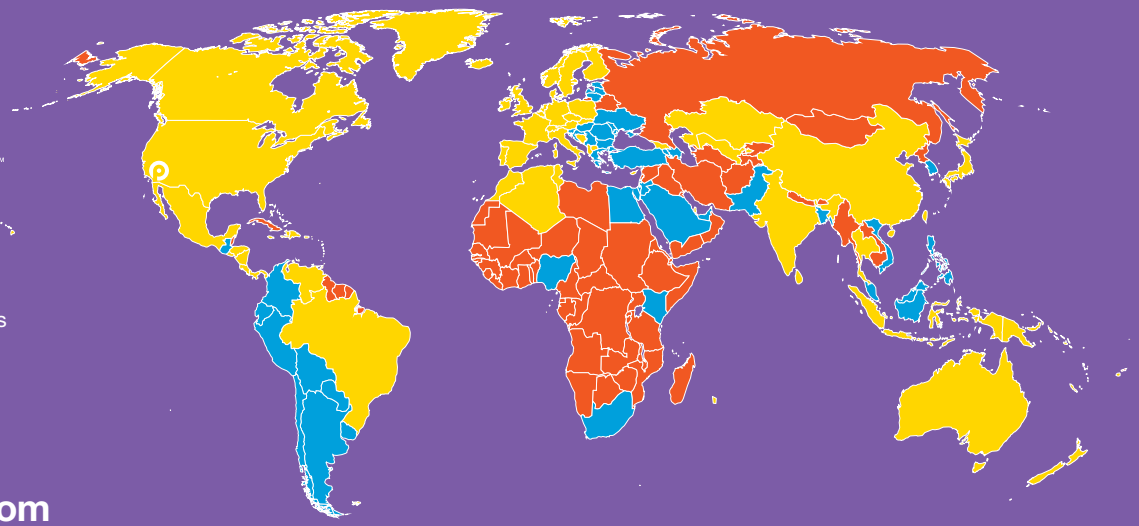

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