Chromatography Bulk Media and PREP

Great Performance On Every SCALE

phenomenex®

. . . breaking with tradition℠

www.phenomenex.com/Bulk

Increase Yield, Purity, and Media/Column Lifetime

We have redefined the standard for industrial process media and control all areas of media production.

We Specialize in Media with:

- High surface area for increased loadability
- Wide range of media for superior selectivities
- Superior mechanical strength for long column lifetimes
- Enhanced chemical stability for added versatility

We GUARANTEE Media with:

- Controlled pore size diameter and volume
- Narrow particle size distribution
- Reproducible bonding
- Exacting scalability
- Optimized packing density
- Metal-free silica

Phenomenex's quality management system is ISO 9001:2015 certified. This certification validates that all our processes are fully established, functional, and meet international regulatory standards.

Picture Courtesy of NovaSep®

Wide Range of Unique Selectivities

The separation characteristics of each Phenomenex media offer unique selectivity for each type of application and significant production gains for maximum loadability and process economy.

Achieve identical performance from analytical development to large process scale. Our media is available in a wide range of particle sizes and designed for the exacting standards of process, pilot, and commercial scale-up.

Bulk Media

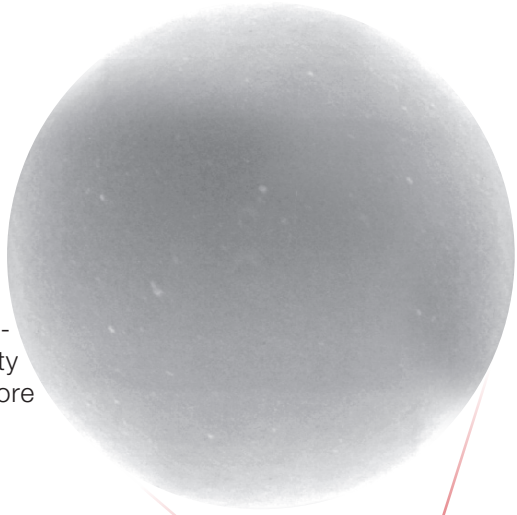
		Small Molecules	Peptides	Proteins	Chiral Molecules	Oligonucleotides	Capture and Concentrate	Information
explore LUNA®	Proven Performance	●	●			●		4-11
Gemini® pH Flexible LC	High pH Process Separations	●	●	●		●		12-16
Jupiter® Protein and Peptide LC	Increased Loadability for Biomolecule Separations		●	●				17-19
LUX® Chiral LC Columns	Polysaccharide Supports with Excellent Enantioselectivity				●			20-21
Sepra™	Premium Low/ Medium Pressure Purifications						●	29

Increased Performance with high surface area

The advanced silica technology behind Luna media yields a particle that is extremely uniform in its sphericity, surface smoothness, and overall physical properties.

Luna(3) Media Provides:

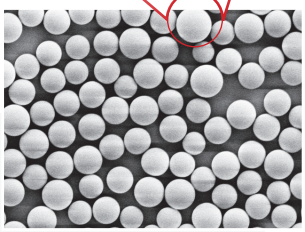
- **High-surface area**
  for increased loading
- **Silica smoothness**
  for stable packed beds
- **Optimum particle and pore size distribution**
  provide outstanding performance
- **Optimized pore volume**
  offers increased surface area
- **Fine tuned bonding density**
  for excellent reproducibility



We carefully control pore size and volume by porosimetry for maximum column performance and loading capacity. Consistent quality is ensured by tightly controlled pore size distribution and total pore volume.

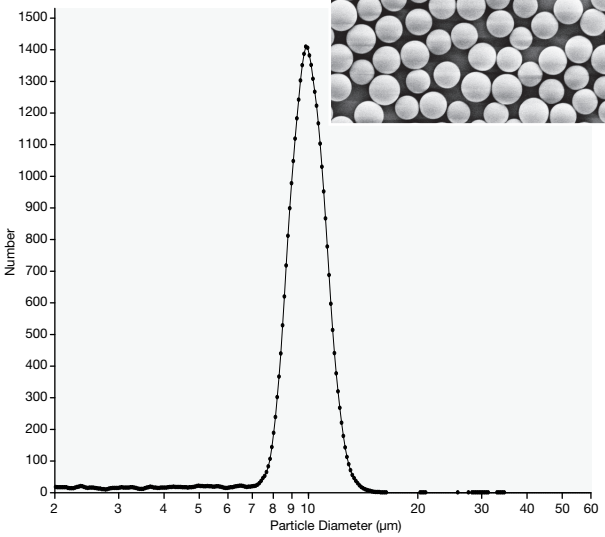
Lower Backpressure with narrower particle size distribution

One of the distinguishing characteristics of the new Luna(3) sorbent is the unusually narrow particle size distribution compared to other purification media.



Luna(3) Media Provides:

- **Increased column efficiency**
  with more uniform particles
- **Increased performance**
  with more uniform packed media beds
- **Lower backpressure**
  with improved fluid dynamics



The size of the particles influences critical column characteristics and is a valuable indicator of quality and performance. The size and shape of media particles influence packed column bed uniformity and flow rates. Uniform and more spherical particles like Luna(3) will typically pack more easily than particles that vary in size and produce packed beds with improved flow characteristics.

Luna C18(3), C8(3) and Silica(3)

Excellent Preparative Media

In addition, Phenomenex's quality management system is ISO 9001:2015 certified. This certification validates that all our processes are fully established, functional, and meet international standards for predictable performance.

Optimized loading parameters include:

- High-surface area for increased loading
- Silica smoothness for stable packed beds
- Optimum particle and pore size/distribution provide outstanding performance
- High pore volume offers increased surface area
- Fine tuned bonding density for excellent reproducibility

Product Characteristics

Particle Size:	10 µm	
Surface Area:	400 m^2/g	
Pore Volume:	1 mL/g	
Pore Size:	100 Å	
Particle Size Distribution:	$dp_{90}/dp_{10} \leq 1.6$	
Chemical Purity:	Total Metal Content ≤ 20 ppm	
Coverage:	C8(3) 13 % C, 4 µmol/m^2	
	C18(3) 17 % C, 3 µmol/m^2	
Packing Density:	**Silica(3)**	0.47 g/mL
	C8(3)	0.58 g/mL
	C18(3)	0.60 g/mL
Chemical Stability:	**Silica(3)**	2.0-7.5
	C8(3)	1.5-10*
	C18(3)	1.5-10*

Mechanical Stability: Allows repeated packing up to 140 Bar (2000 psi effective piston pressure)

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

> "The bulk media products and product support services provided by Phenomenex are of consistently high quality. We use Phenomenex media in the cGMP manufacture of complex peptides for our customers."
>
> **Almac**
> **United Kingdom**

Key: ● Best Suited ◐ Very Good

	Applications			Type of Compounds				Loading
	Insulin	Peptides	Small Molecules	Acids	Polar	Hydro-phobic	Bases	Available Surface Area
Packing Material								
Luna C18(3)	●	●	●	◐		●	◐	●
Luna C8(3)	●	●	●	◐		●	◐	●
Luna Silica(3)			●	◐	◐		◐	●

● Best Suited ◐ Very Good

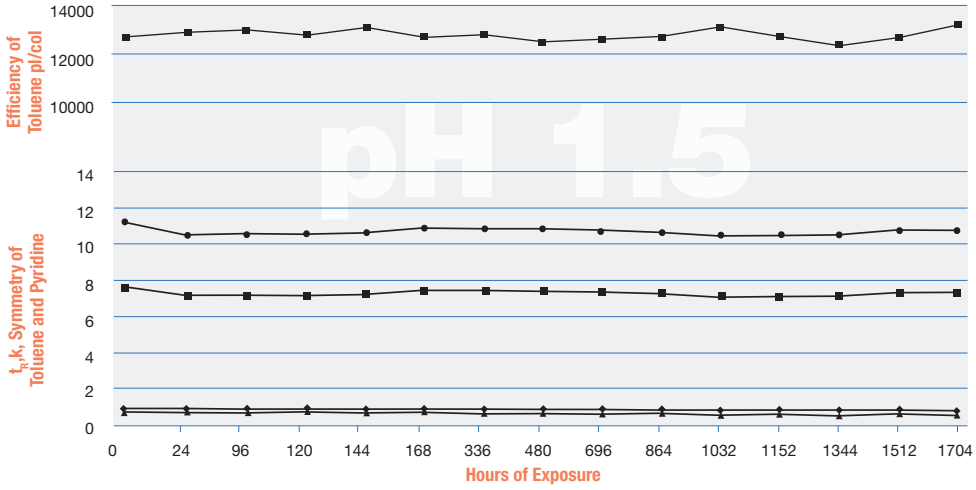
Added **Versatility** With **Excellent** Chemical Stability

explore LUNA®

Luna C18(3) media features an extended pH range of stability of 1.5 to 10.0* due to our proprietary bonding technology resulting in a high ligand surface density. The advantages of using chemically stable silica-based materials are the following:

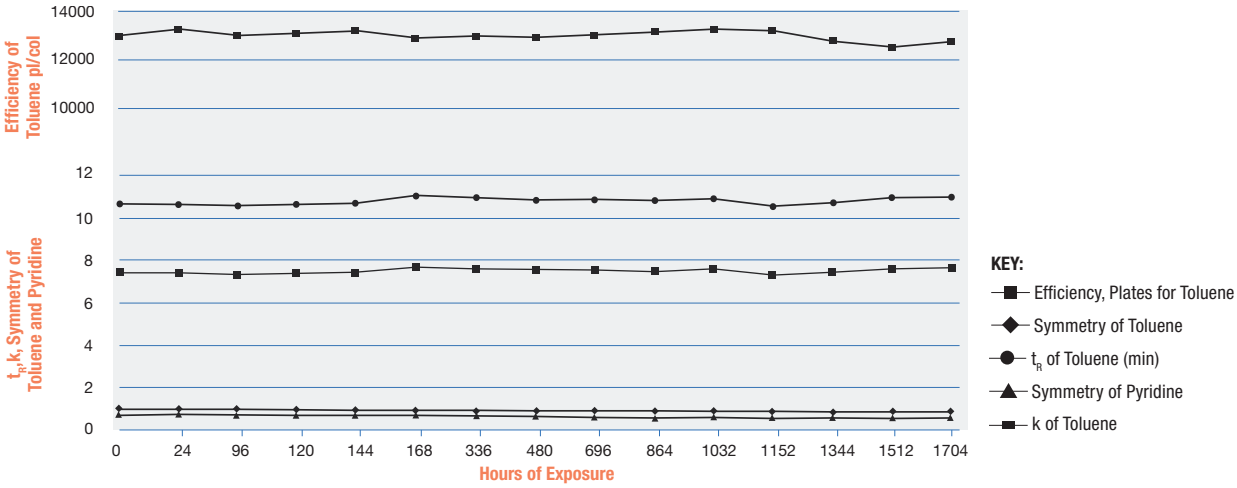
- Loading under various pH conditions
- Optimization of sample solubility
- Wide range of mobile phase (buffer) options
- Optimal column regeneration
- Longer lifetime for better total economy

High Chemical Stability at pH 1.5 over 1000 hours



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

High Chemical Stability at pH 10 over 1000 hours



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.

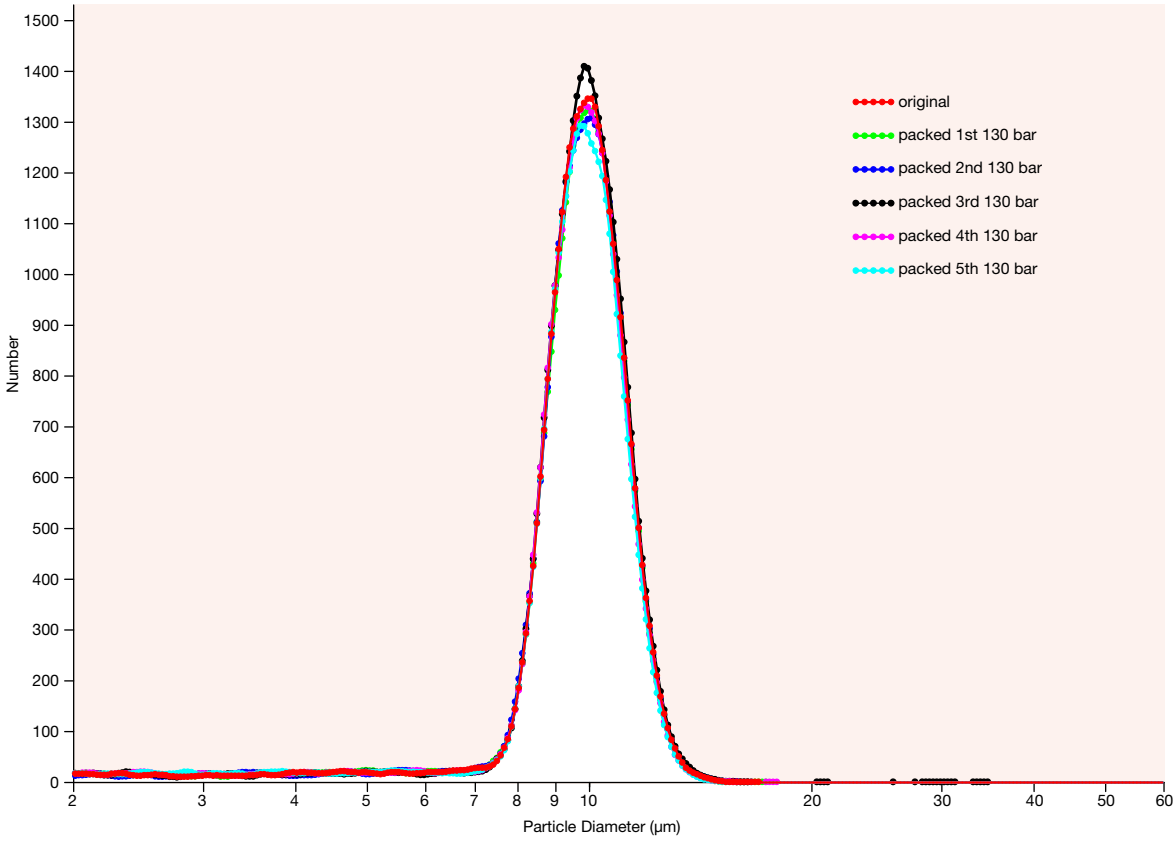
*pH range under isocratic conditions. pH range is 1.5-9.0 under gradient conditions.

Long Column **Lifetime** With **Superior** Mechanical Strength

The mechanical stability of Luna HPLC media is crucial for successful large-scale purifications using dynamic axial compression (DAC) equipment. Luna media provides superior mechanical stability which allows its reuse for repeated packing and ensures extended lifetime in DAC HPLC systems.

Mechanically weak particles will break during column packing and generate fragments (fines) that will clog frits and create abnormally high backpressures. To verify the structural integrity of the Luna C18(3) sorbent, it was repeatedly packed at 130 bars in a 5 cm ID DAC system. There were no significant amounts of fines detected after each packing operation demonstrating excellent mechanical stability under repeated DAC packing for improved economy. In large DAC systems (>5 cm) the pressure available to be applied to the silica is generally 70 bars or less allowing extended media lifetimes. (For additional information, request the recommended Luna(3) packing recipe and handling instructions).

Mechanical Stability Demonstrated by Repeated Packing

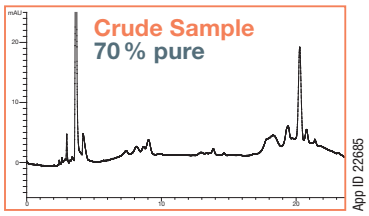


Overlay of particle size distributions of Luna C18(3) repeatedly packed at 130 bars in a 5 cm ID DAC system.

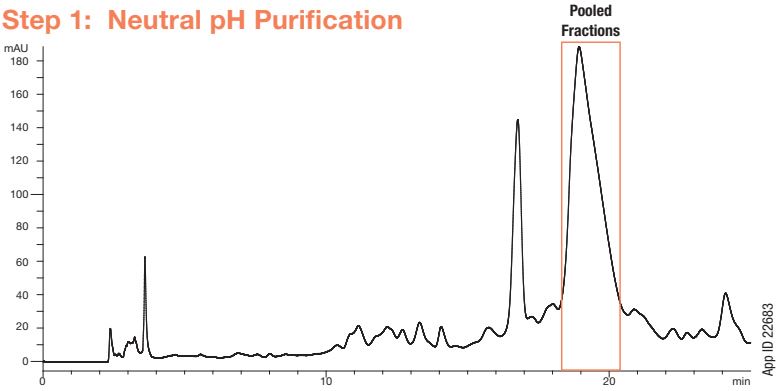
Synthetic Peptide Multi-Step Purifications Bivalirudin

explore LUNA®

Bivalirudin 2-Step Purification on a Single Stationary Phase



Step 1: Neutral pH Purification



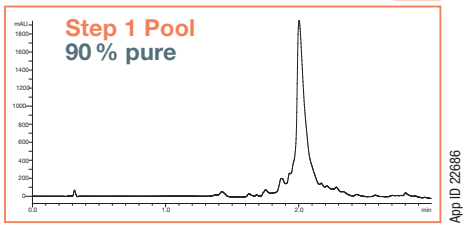
Step 1 Conditions

Column: Luna® 10 µm-*PREP* C18(3)
Dimensions: 250 x 4.6 mm
Part No.: 00G-4616-E0
Mobile Phase: A: 20 mM Potassium phosphate pH 7.0
B: Acetonitrile

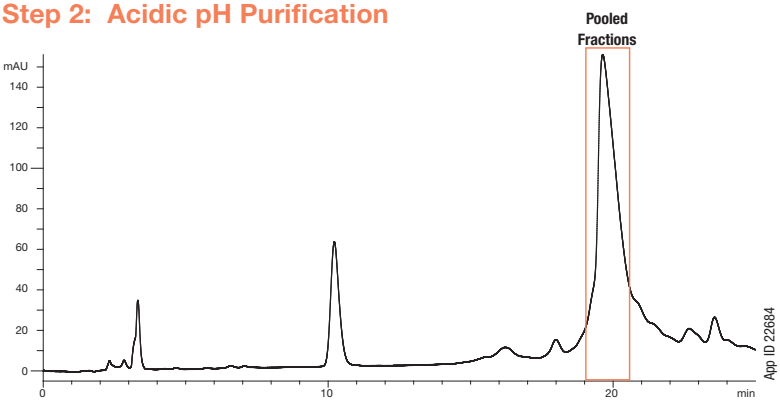
Gradient:

Time (min)	% B
0	10
2.5	10
22.5	20
30	20

Flow Rate: 1.0 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: Bivalirudin Initial Material



Step 2: Acidic pH Purification



Step 2 Conditions
Conditions same as Step 1, except as noted:

Mobile Phase: A: 0.1 % TFA in Water
B: Acetonitrile

Gradient:

Time (min)	% B
0	10
5	10
20	20
25	20

Sample: Bivalirudin Step 1 Product

Analytical QC Conditions

Column: Kinetex® 2.6 µm XB-C18 (App ID: 22685)
Dimensions: 50 x 4.6 mm
Part No.: 00B-4496-E0
Mobile Phase: A: 0.1 % TFA in Water
B: Acetonitrile

Gradient:

Time (min)	% B
0	10
2.75	10
22.5	20
25	20

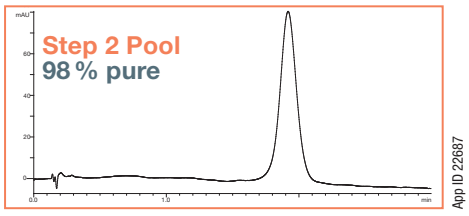
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: Bivalirudin

App ID: 22686 and 22687 Conditions same as above, except as noted:

Gradient:

Time (min)	% B
0	10
0.25	10
1	30
1.75	30
2	40

Flow Rate: 2.0 mL/min



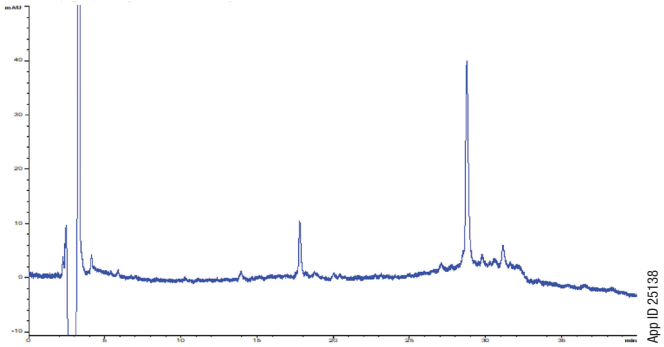
TIP

For more detailed information on the purification of Bivalirudin, view complete Tech Note at: www.Phenomenex.com/tn1177

Synthetic Peptide Multi-Step Purifications Liraglutide

Liraglutide 2-Step Purification on Luna C8(3)

Crude Liraglutide Sample

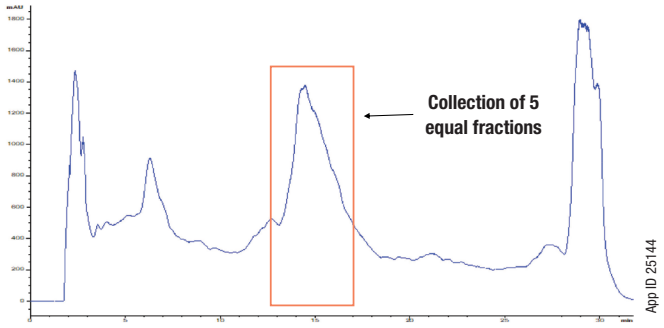


Column: Luna® 5 µm C18(2)
Dimension: 250 x 4.6 mm
Part No.: 00G-4252-E0
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Acetonitrile

Gradient:	Time (min)	% B
	0	30
	30	60
	40	80

Flow Rate: 1 mL/min
Injection Volume: 30 µL
Temperature: 40 °C
Detection: UV @ 220 nm

Step 1: 0.5% Loading

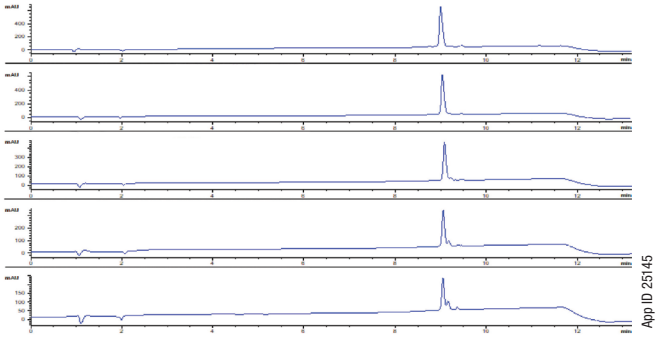


Step 1 Conditions
Column: Luna 10 µm-*PREP* C8(3)
Dimension: 250 x 4.6 mm
Part No.: 00G-4623-E0
Mobile Phase: A: 10 mM Ammonium bicarbonate in Water (pH 6.9) + 10 % Ethanol
B: 90 % Acetonitrile + 10 % Ethanol

Gradient:	Time (min)	% B
	0	33
	25	43
	26	67

Flow Rate: 1.5 mL/min
Load: 0.3 mg of crude
Temperature: 30 °C
Detection: UV @ 220 nm

Collected Fractions 1-5

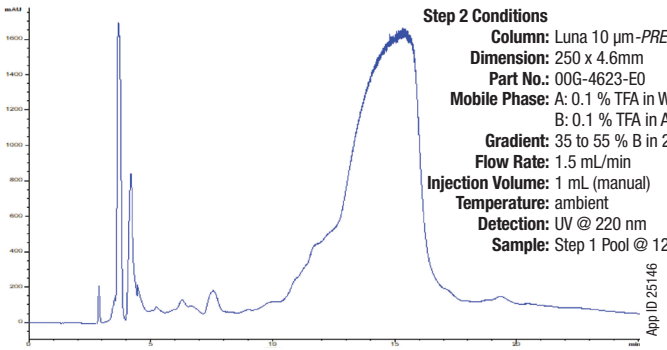


Faction	1	2	3	4	5
% Purity	94.7	95.9	91.6	81.3	74.5
% Yield	28	25	18	12	7

Analytical Conditions
Column: Kinetex® 5 µm Biphenyl
Dimension: 150 x 4.6mm
Part No.: 00F-4627-E0
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Methanol
Gradient: 50 to 60 % B in 5 min
Flow Rate: 1 mL/min
Temperature: ambient
Detection: UV @ 254 nm

Polishing Step

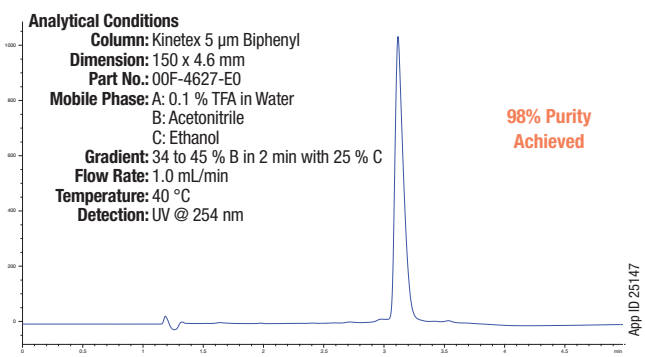
Step 2:



Step 2 Conditions
Column: Luna 10 µm-*PREP* C8(3)
Dimension: 250 x 4.6mm
Part No.: 00G-4623-E0
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Acetonitrile
Gradient: 35 to 55 % B in 20 min
Flow Rate: 1.5 mL/min
Injection Volume: 1 mL (manual)
Temperature: ambient
Detection: UV @ 220 nm
Sample: Step 1 Pool @ 12 mg/mL

Analytical Conditions
Column: Kinetex 5 µm Biphenyl
Dimension: 150 x 4.6 mm
Part No.: 00F-4627-E0
Mobile Phase: A: 0.1 % TFA in Water
B: Acetonitrile
C: Ethanol
Gradient: 34 to 45 % B in 2 min with 25 % C
Flow Rate: 1.0 mL/min
Temperature: 40 °C
Detection: UV @ 254 nm

98% Purity Achieved



Luna 10 µm-*PREP* Polar-RP

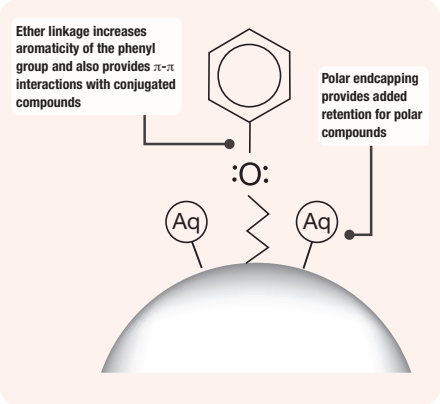
High Performance Media for

Process Scale Chromatography

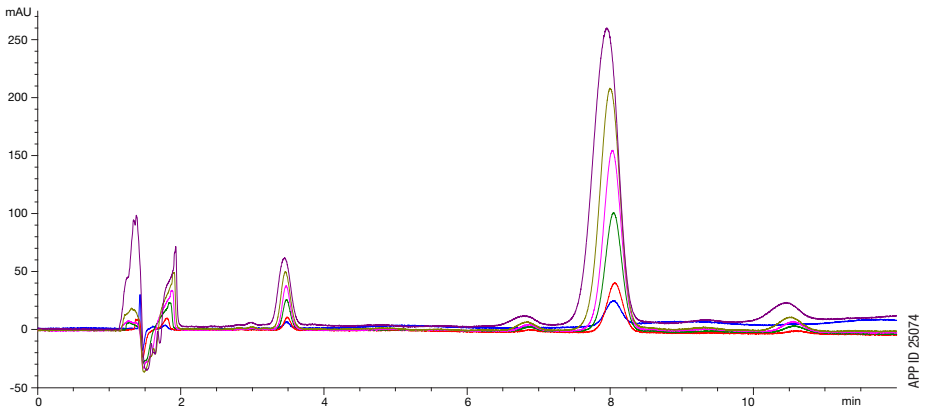
This ether linked phenyl phase is polar endcapped and offers high cation retention capabilities to improve retention for ionized bases.

The slightest variations in compound polarity and aromaticity are exploited to achieve optimal separation between polar and/or aromatic compound.

- Good separation of polar compounds, small molecules and peptides
- Alternative selectivity to Luna C18(3)
- 100% aqueous and SFC compatible
- Excellent loading with Luna (3) high surface area 400 m^2/g



Misoprostol on Luna 10 µm-*PREP* Polar-RP

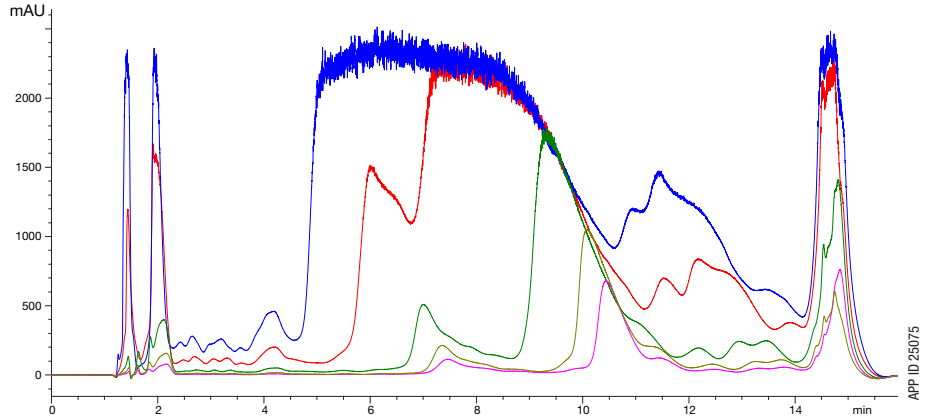


Column: Luna 10 µm-*PREP* Polar-RP
Dimensions: 250 x 4.6 mm
Part No.: 00G-4757-E0
Mobile Phase: A: 0.1% TFA in Water
B: Acetonitrile

Gradient:	Time (min)	% B
	0	24
	12	30
	13	50
	13.5	24

Flow Rate: 2 mL/min
Temperature: 25 °C
Detection: UV @ 220 nm
Sample: Crude Misoprostol at various loading

Bivalirudin on Luna 10 µm-*PREP* Polar-RP



Column: Luna 10 µm-*PREP* Polar-RP
Dimension: 250 x 4.6 mm
Part No.: 00G-4757-E0
Mobile Phase: A: 0.1% TFA in Water
B: Acetonitrile

Gradient:	Time (min)	% B
	0	23
	12	30
	13	50
	13.5	23

Flow Rate: 2 mL/min
Temperature: 25 °C
Detection: UV @ 210 nm
Sample: Crude Bivalirudin at various loading

Luna 10 µm-*PREP* Polar-RP

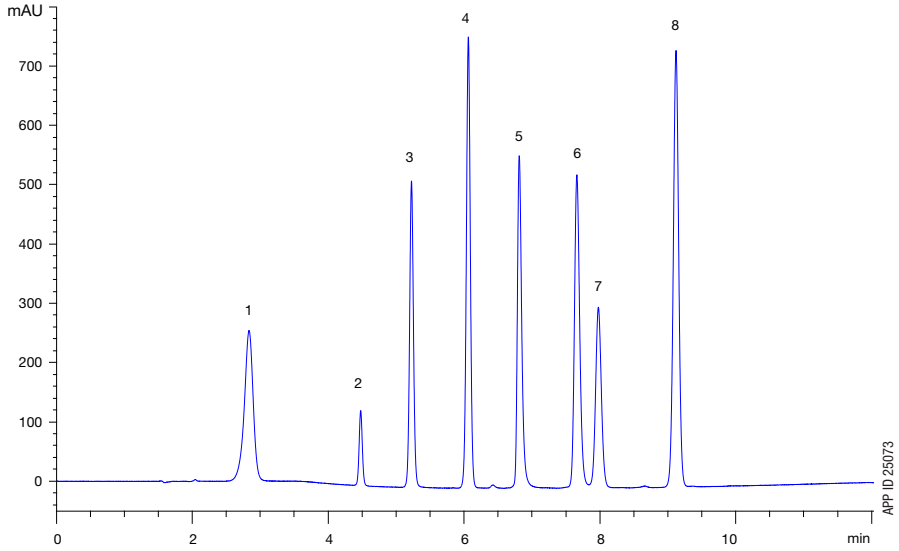
Alternative Selectivity for Purification of

Pharmaceutical Compounds

Luna Polar-RP vs C18

- Better peak shape for early eluting compound #1 due to more retention than on non-polar end-capped C18
- Less retentive than C18 for late eluting compounds 5-8
- Selectivity change for compounds 6 and 7

Pharmaceutical Compound Mix on Luna 10 µm-*PREP* Polar-RP

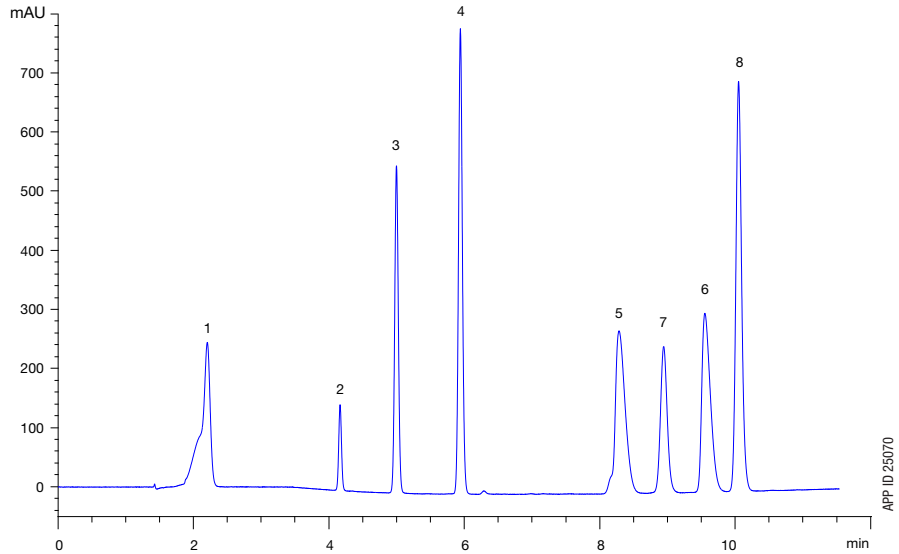


Column: Luna 10 µm-*PREP* Polar-RP
Dimensions: 250 x 4.6 mm
Part No.: 00G-4757-E0
Mobile Phase: A: 0.1% Acetic Acid in Water
B: Acetonitrile

Gradient: Time (min)	% B
0	10
1	10
5	65
10	100
13	10
15	10

Flow Rate: 2 mL/min
Temperature: 25 °C
Detection: UV @ 254 nm
Sample: Proprietary pharmaceutical compound mix

Pharmaceutical Compound Mix on Luna 10 µm-*PREP* C18(3)



Column: Luna 10 µm-*PREP* C18(3)
Dimensions: 250 x 4.6 mm
Part No.: 00G-4616-E0
Mobile Phase: A: 0.1% Acetic Acid in Water
B: Acetonitrile

Gradient: Time (min)	% B
0	10
1	10
5	65
10	100
13	10
15	10

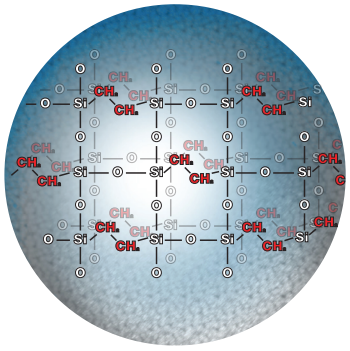
Flow Rate: 2 mL/min
Temperature: 25 °C
Detection: UV @ 210 nm
Sample: Proprietary pharmaceutical compound mix

Gemini C8(3) Optimized Purification Media for Human Insulin and its Analogues

Gemini pH Flexible LC

Designed Mechanically Strong and Robust to Withstand Caustic Washes for Aggregation Removal

Gemini C8(3) is a third generation innovative LC material that utilizes a patented organo-silica grafting process to evenly incorporate stabilizing ethylene cross-linking onto the particle surface. This promotes resistance to high pH particle dissolution while not affecting the mechanical strength and high particle efficiencies provided by the internal base silica.

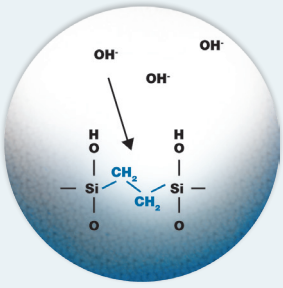


- Superior pH stability
- Better reproducibility
- Increased robustness/performance
- High surface area

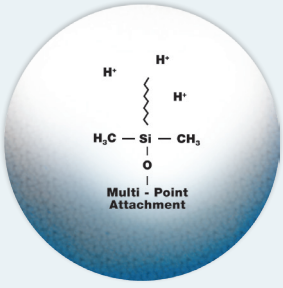
Excellent pH Robustness

Gemini C8(3)

Ethylene Cross-Linking
Resists High pH Attack



Multi-Point Ligand
Attachment Resists Low
pH Ligand Cleavage

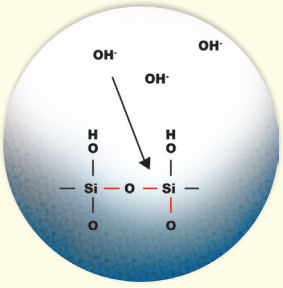


VS.

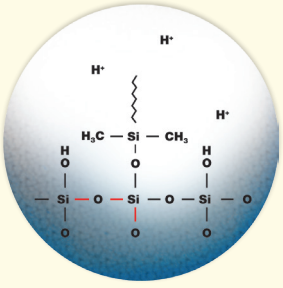
Poor pH Robustness

Standard Silica

Silica Dissolution
at High pH



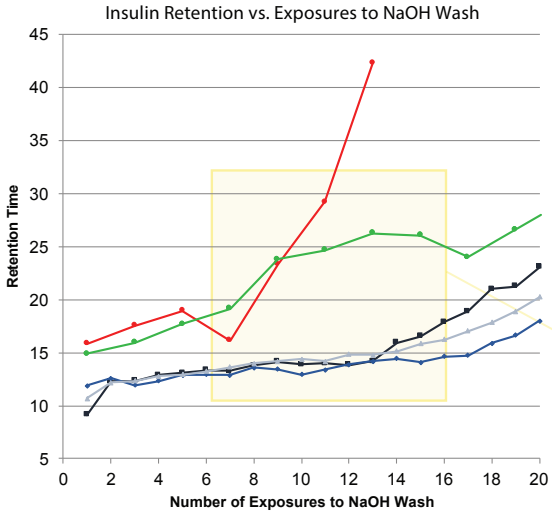
Ligand Cleavage
at Low pH



The Material **Developed** for Insulin Purification with **High pH** Caustic Wash

Gemini® pH Flexible LC

Many products can separate human insulin and its degradant, while few can withstand high pH caustic washes for aggregate removal. Now, there is a clear media choice. Gemini C8(3) provides the needed separation, the needed low/high pH robustness, and the overall consistency in terms of efficiency and retention cycle to cycle. You don't have to choose between consistent performance or robustness; Gemini C8(3) was developed to give you the best of both worlds.

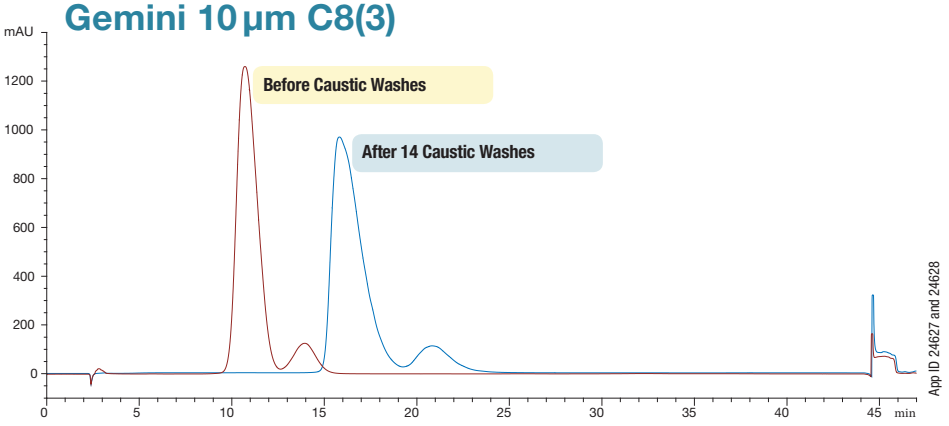


Running conditions are part of a confidential customer protocol. See page 14 for caustic wash conditions.

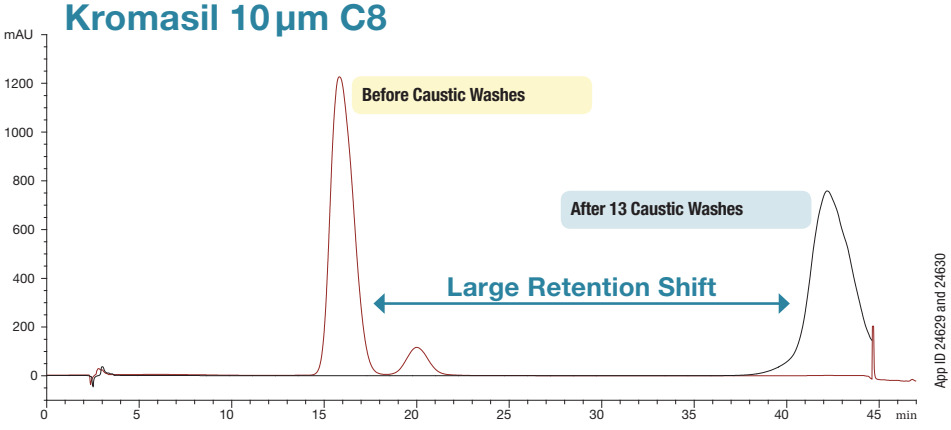
Improved robustness of Gemini C8(3) allows for greater material lifetime!

Insulin Retention Comparison

Gemini 10 µm C8(3)



Kromasil 10 µm C8



Comparative separations may not be representative of all applications.

Designed to **Withstand** Caustic Washes, Manufactured for **Purification** of Human Insulin

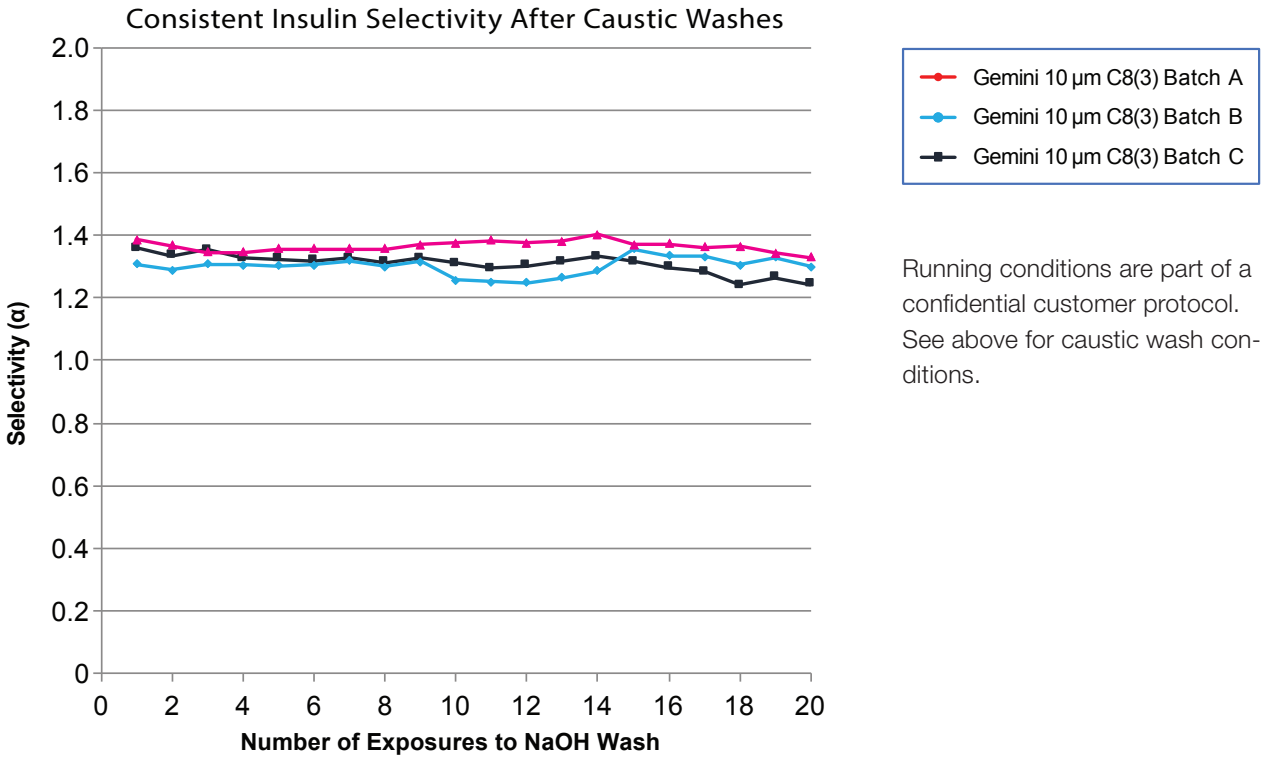
Gemini® pH Flexible LC

Typically, insulin purification methodologies include vital steps for column efficiency testing, equilibration, sample loading, and caustic washes. In particular, the high pH caustic washes are very important for the removal of aggregate build up, however these wash steps typically diminish column lifetime quite substantially. With the improved chemical robustness and performance of Gemini C8(3) customers can now switch their focus to higher yields and purities and minimize operational down-time due to less frequent need to replace contaminated media.

Step	Description	Conditions
1	**Column Efficiency**	55:45 0.02 M Acetic acid/1-propanol (standard test – not specific to Insulin)
2	**Pre-Insulin Flush**	Confidential customer protocol
3	**Insulin - Gradient**	Confidential customer protocol
4	**Caustic Wash**	50:50 1N NaOH/1-propanol (3.5 CV), then 55:45 0.02 M Acetic acid/1-propanol (12 CV)
5	**Column Efficiency**	55:45 0.02 M Acetic acid/1-propanol (standard test – not specific to Insulin)
6	**Caustic Wash**	50:50 1N NaOH/1-propanol (3.5 CV), then 55:45 0.02 M Acetic acid/1-propanol (12 CV)

QC Tested for Consistent Insulin and Impurity Selectivity

In conjunction with a media designed specifically for insulin purification, the Quality team at Phenomenex strives to ensure high reproducibility of Gemini 10 µm C8(3) through numerous quality control steps throughout the manufacturing process, including a fit for purpose human insulin QC test. This elevated level of focus on quality ultimately results in a model product for large scale insulin purification.



Running conditions are part of a confidential customer protocol. See above for caustic wash conditions.

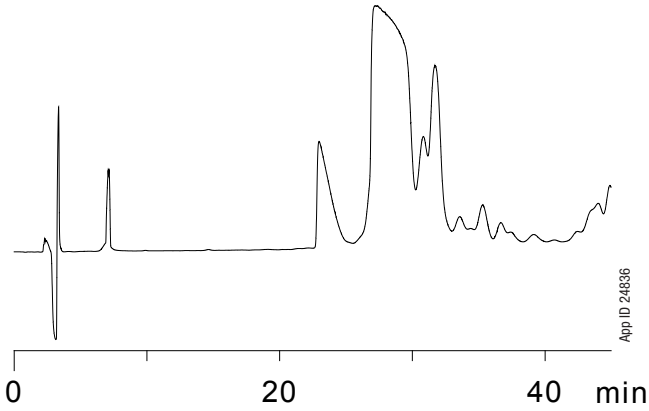
Comparative separations may not be representative of all applications.

Process Scale Purification of Insulin Analog Glargine

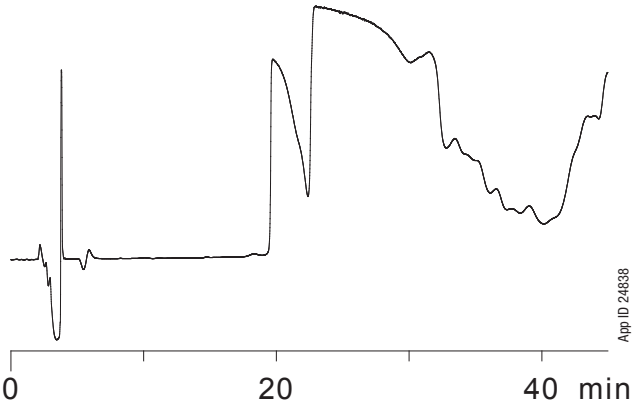
Gemini® pH Flexible LC

Chromatographic media is often a significant portion of the cost for large scale peptide purification. The cost is not solely due to the media, but also the time spent regenerating the column back to initial conditions. Therefore, it is often more cost and time effective to use a durable silica media like Gemini 10 µm C8(3) that can be used under caustic conditions.

Gemini 10 µm C8(3)
40 min. Run, 10 mg Load



Gemini 10 µm C8(3)
40 min. Run, 25 mg Load



Conditions same for both columns, except as noted:

Column: Gemini 10 µm C8(3)
Dimensions: 250 x 4.6 mm
Part No.: 00G-4763-E0
Mobile Phase: A: 20 mM Ammonium acetate, 200 mM Ammonium chloride, 10 % Acetonitrile, pH 4
B: 20 mM Ammonium acetate, 50 % Acetonitrile, pH 4

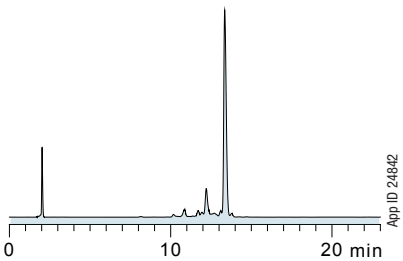
Gradient:

Time (min)	% B
0	65
40	50
45	50

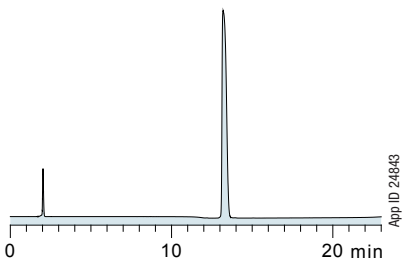
Flow Rate: 1.2 mL/min
Injection Volume: 200 µL (10 mg)
500 µL (25 mg)
Temperature: 35 °C
Detection: UV @ 214 nm (ambient)

Collected Fractions from Gemini C8(3)

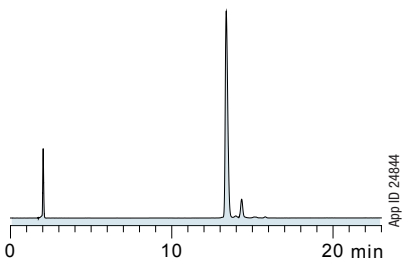
Early Fraction



Middle Fraction



Late Fraction



Column used to assay fractions:

Column: Kinetex® 5 µm C18
Dimensions: 250 x 4.6 mm
Part No.: 00G-4601-E0
Mobile Phase: A: 58 mM Sodium phosphate, 417 mM Sodium chloride, 25 % Acetonitrile, pH 2.5
B: 125 mM Sodium phosphate, 893 mM Sodium chloride, 65 % Acetonitrile, pH 2.5

Gradient:

Time (min)	% B
0	4
20	17
30	37

Flow Rate: 1.2 mL/min
Injection Volume: 5 µL
Temperature: 35 °C
Detection: UV @ 214 nm (ambient)

Gemini 10 µm C8(3)*

Pool	% purity	% yield
1	98.24	92.8
2	98.91	84.3
3	99.44	71.9
4	99.71	61.5

*** Table note:**
% yield is the peak area in the pool divided by the total peak area available.
It is not pool divided by crude.

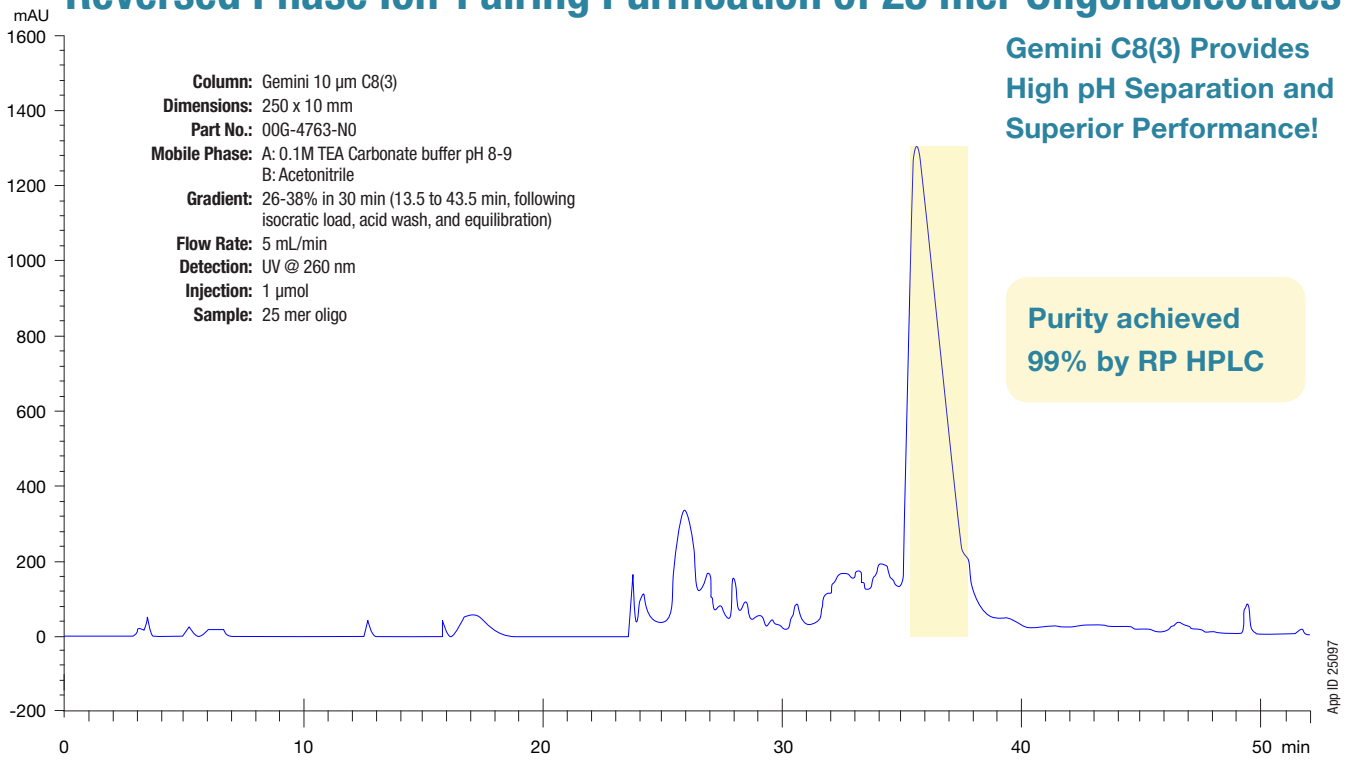
Gemini C8(3)

Reversed Phase Purification for

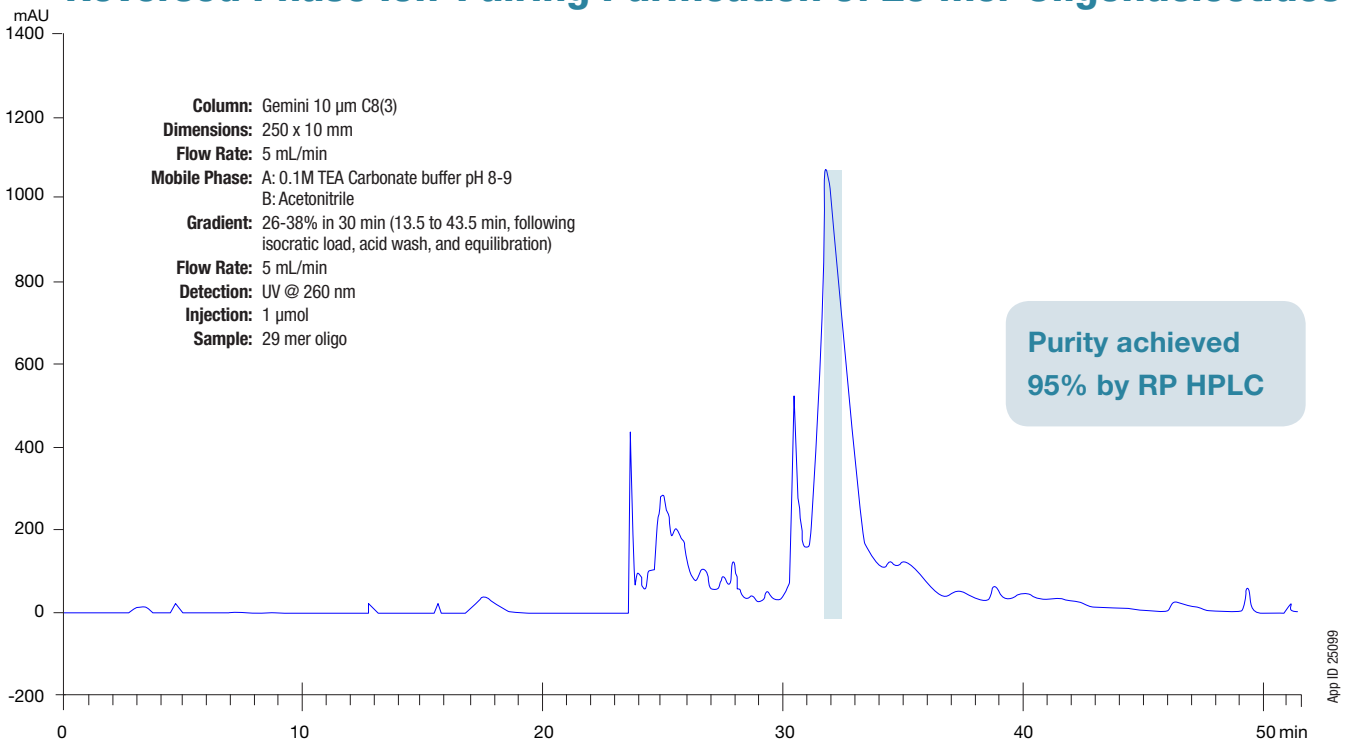
Synthetic Oligonucleotides

Gemini pH Flexible LC

Reversed Phase Ion-Pairing Purification of 25 mer Oligonucleotides



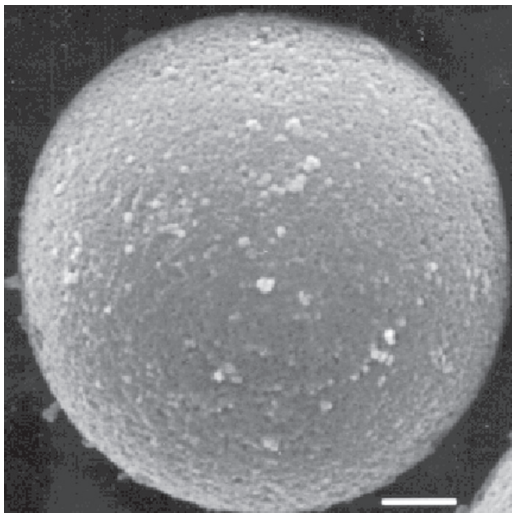
Reversed Phase Ion-Pairing Purification of 29 mer Oligonucleotides

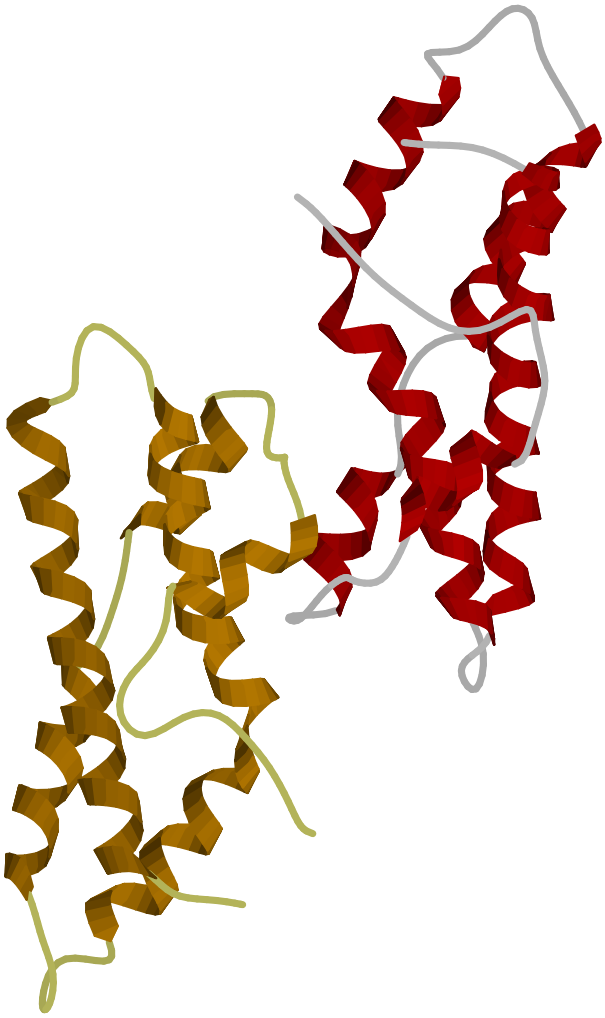


Increased Loadability for Biomolecule Separations

Jupiter 300 features ultra-pure metal-free silica with 300 Å pores, making it suitable for purifying target proteins and large peptide therapeutics. Its dense, bonded phase coverage decreases non-specific interactions, leading to easier quantitation and improved resolution and separation of complex mixtures. This produces higher yields, fewer purification runs, and better overall economy.

- High mechanical-strength silica for better packing and longer lifetime
- Large loading capacity for higher sample recovery
- 1.5 to 10 pH stability for easy column cleaning and regeneration
- Low particle densities, requiring less material to pack columns





Easy Scale-Up for Exacting Performance

Jupiter uses identical bonding and base silica technology in both analytical and preparative materials. 5 µm and 15 µm Jupiter 300 Å media easily scales up with minimal changes to the separation.

All Jupiter particle sizes offer:

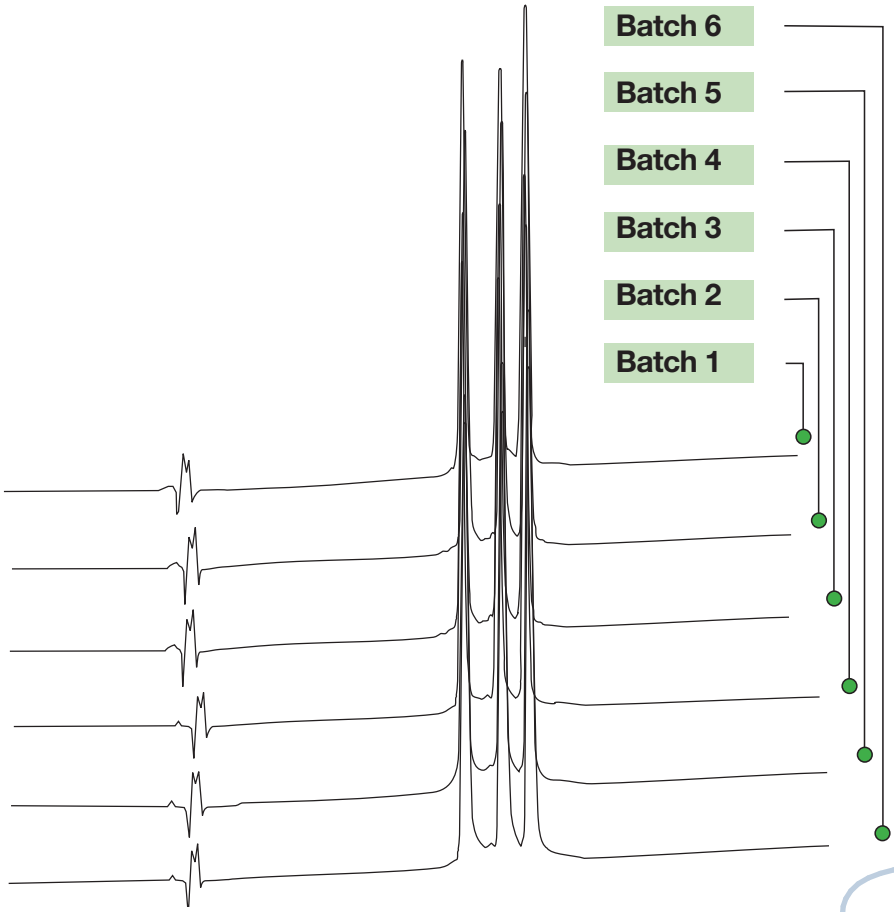
- Resistance to silica shearing and fine formation at high packing pressures and flow rates
- Easy material cleaning and regeneration

Engineered for Reproducibility and Quality

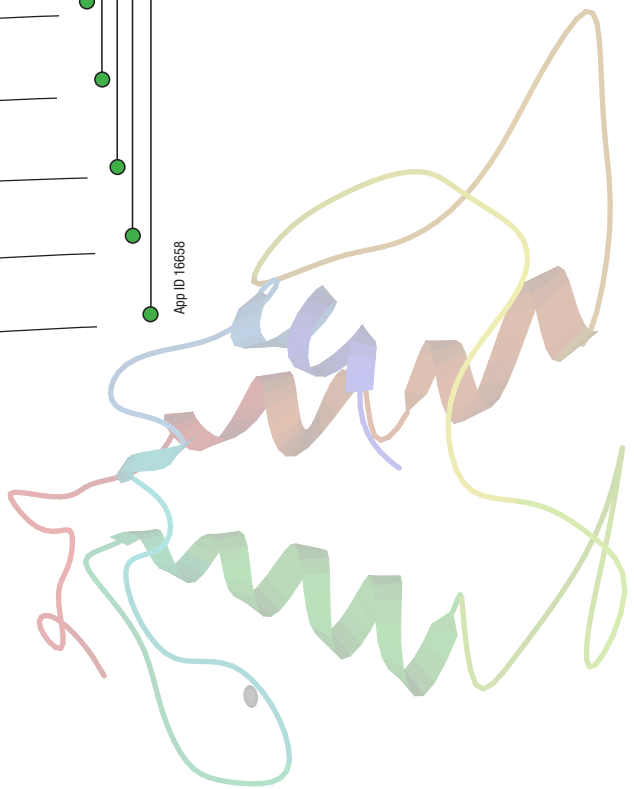
Jupiter silica particle consistency, size, and smoothness is tightly controlled for quality and reproducibility.

- Over 25 individual quality control tests performed on every batch of Jupiter material
- Every aspect of media reproducibility is specified, tested, and reported in a Materials Validation Document (MVD)
- pH 1.5-10 stability gives robust, method development opportunities for increased yield

Batch-to-Batch Reproducibility of Jupiter 300 Å 5 µm C18



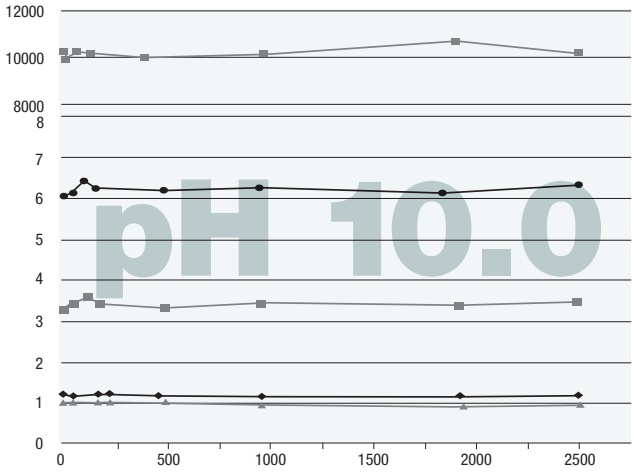
Column: Jupiter 5 µm C18 300 Å
Dimensions: 250 x 4.6 mm
Part No.: 00G-4053-E0
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Acetonitrile
Gradient: A/B (75:25) to A/B (45:55) in 15 min
Flow Rate: 1.0 mL/min
Detection: UV @ 220 nm
Sample: 1. Yeast Cytochrome *c*
2. Equine Cytochrome *c*
3. Bovine Cytochrome *c*



Extended Chemical Stability
from pH 1.5 - 10

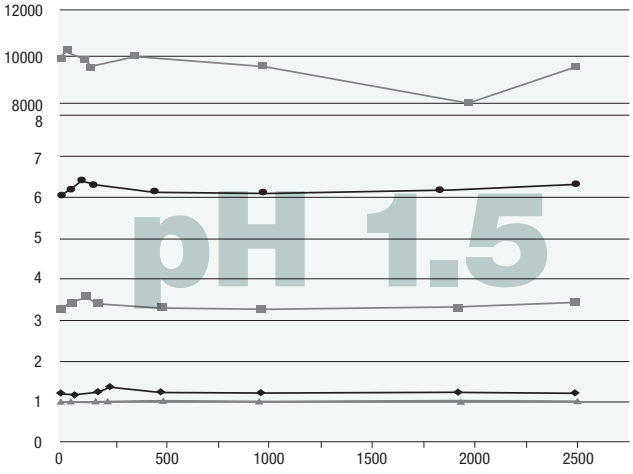
Jupiter 300 has been tested and is stable from pH 1.5 to 10 for over 2,500 hours. Jupiter offers increased column lifetime at extreme pH levels and method development opportunities for increased yield.

Stability of Jupiter 300 C18 at pH 1.5 and 10



Hours of Exposure

Test Conditions: Column flushed in 20 mM Na_2HPO_4 (pH 10.0) in Water/Acetonitrile (50:50)



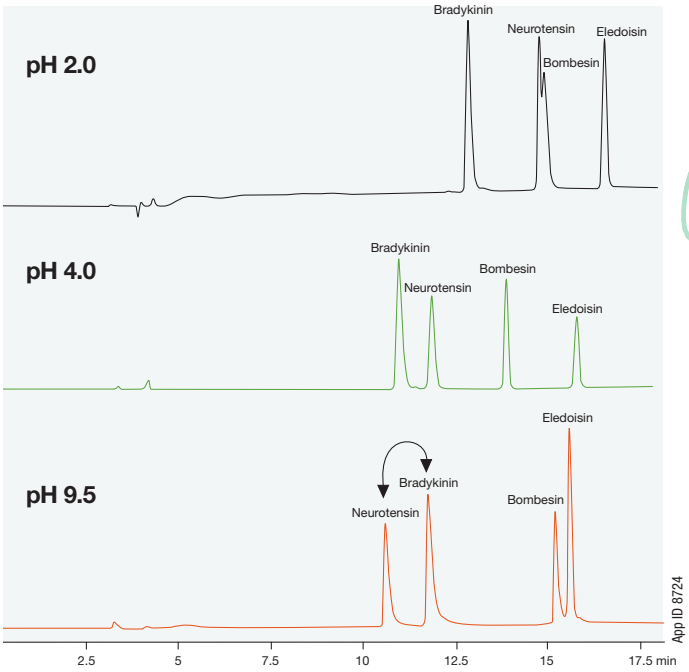
Hours of Exposure

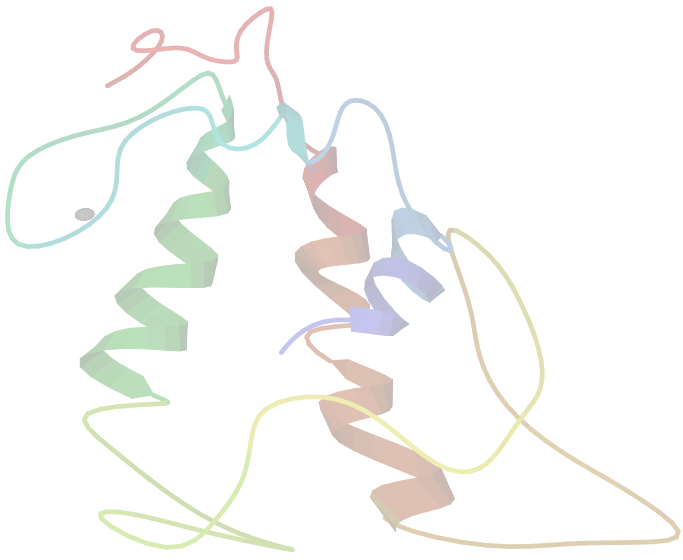
Test Conditions: Column flushed in 0.1 % TFA (pH 1.5) in Water/Acetonitrile (50:50)

KEY:

- ◆ Efficiency, Plates for Toluene
- ▲ t_R of Toluene (min)
- ◆ k of Toluene
- ■ Asymmetry of Toluene
- ● Asymmetry of of Pyridine

Utilize pH for Method Development of Protein Separations





Complete Chiral Solutions

Achieving optimal chiral separation is easier than ever with eight unique bulk Lux polysaccharide stationary phases to screen. Choose a phase, then transfer the method to process, pilot, and commercial scale.

Lux chiral columns and bulk media simplify the separation process:

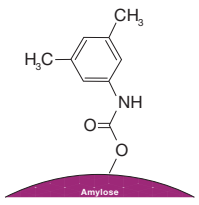
- Unique and traditional phases that increase the success rate of the chiral screen
- Consistent particle size distribution so performance is maintained
- Mechanically strong media for increased stability
- Available in multiple particle sizes for direct scale up (bulk media for process scale purifications; 3 µm, 5 µm, and 10 µm packed columns for screening and small scale purifications)

Resolve Your Enantiomers with Unique Phases

The Lux family of bulk cellulose chiral selectors provides a variety of complementary selectivities.

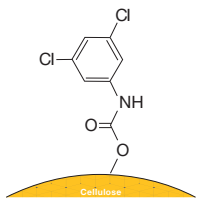
Screen for the most effective chiral separation under the following conditions:

- Reversed Phase
- Polar Organic
- Normal Phase
- Supercritical Fluid Chromatography (SFC)



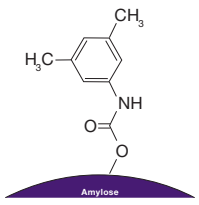
Lux i-Amylose-1

Amylose tris
(3,5-dimethylphenylcarbamate)



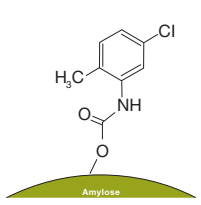
Lux i-Cellulose-5

Cellulose tris
(3,5-dichlorophenylcarbamate)



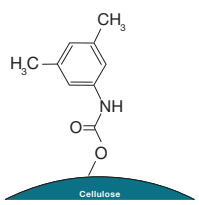
Lux Amylose-1

Amylose tris
(3,5-dimethylphenylcarbamate)



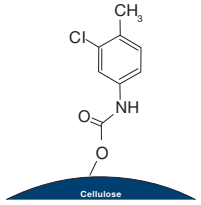
Lux Amylose-2

Amylose tris
(5-chloro-2-methylphenylcarbamate)



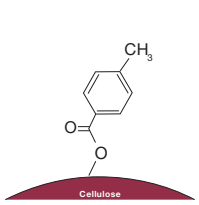
Lux Cellulose-1

Cellulose tris
(3,5-dimethylphenylcarbamate)



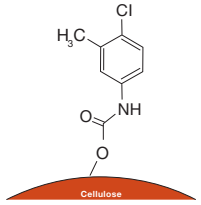
Lux Cellulose-2

Cellulose tris
(3-chloro-4-methylphenylcarbamate)



Lux Cellulose-3

Cellulose tris
(4-methylbenzoate)



Lux Cellulose-4

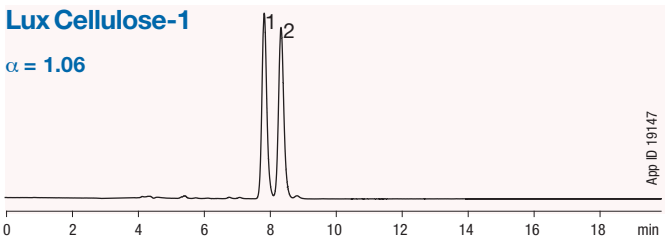
Cellulose tris
(4-chloro-3-methylphenylcarbamate)

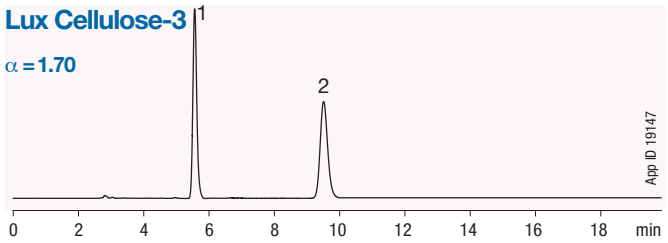
Versatile Polysaccharide

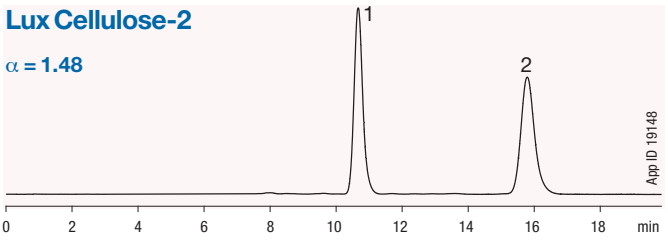
Chiral Phases for **HPLC, SMB** and **SFC**

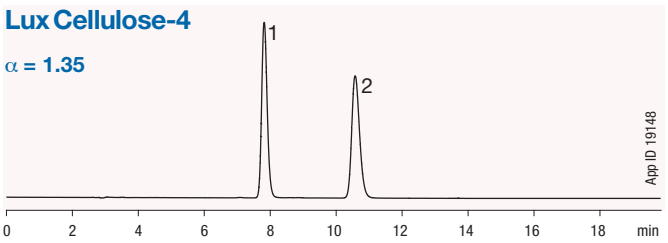
Utilizing differences in selectivity can help develop methods more efficiently by offering broad and contrasting chiral recognition abilities. Lux chiral selectors provide an opportunity for increased yield.

Etozolin



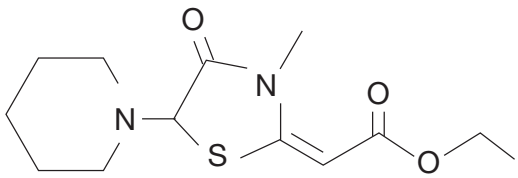






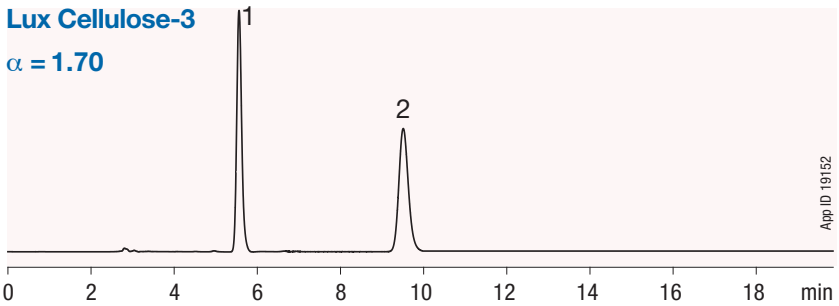
Conditions for all columns:

Dimensions: 250 x 4.6 mm
Mobile Phase: Acetonitrile / 0.1 % Diethylamine in 20 mM NH_4HCO_3 (60:40)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient



Optimal Resolution

Based on a four phase screen under Reversed Phase conditions, the optimal chiral stationary phase for resolving Etozolin is Lux Cellulose-3.



Comparative separations may not be representative of all applications.

Axia Technology VS Traditional Prep Column Packing

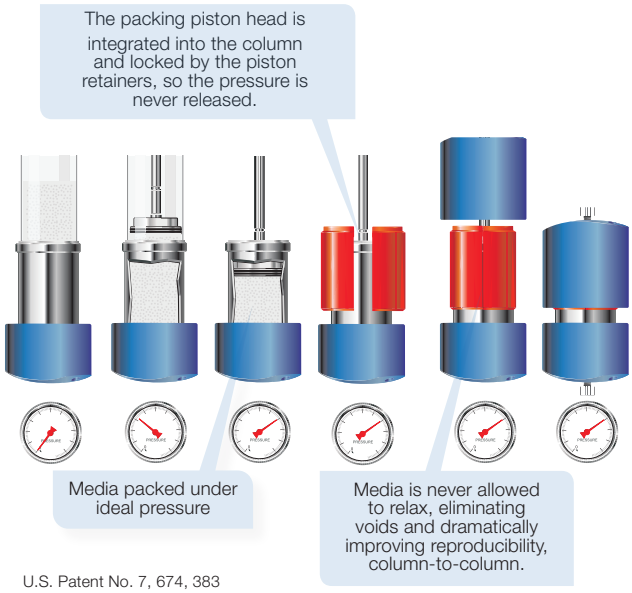
Axia Packing Technology

Axia packed preparative columns involve a single axial compression step unlike conventional packed preparative columns. The ideal column bed density is custom calculated and automated for each specific media and column size. Computer control of the entire process ensures both proper bed density and column uniformity every time.

During the Axia packing process, the packing piston is locked in place, eliminating any decompression and then recompression of the media sorbent, thus maintaining media and column bed integrity. This solves common lifetime and performance problems associated with conventional packing processes for preparative columns.

Axia Packing Process Involves:

Compression → Final Column



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

Traditional Slurry Packing

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

Several potential problems with this packing method are:

- Variability in column performance due to increased number of manual operations required for assembly
- Potential silica media damage during recompression
- Level of process control is based on traditional slurry packing technology

Conventional Packing Process Involves:

Compression → Decompression → Recompression → Final Column

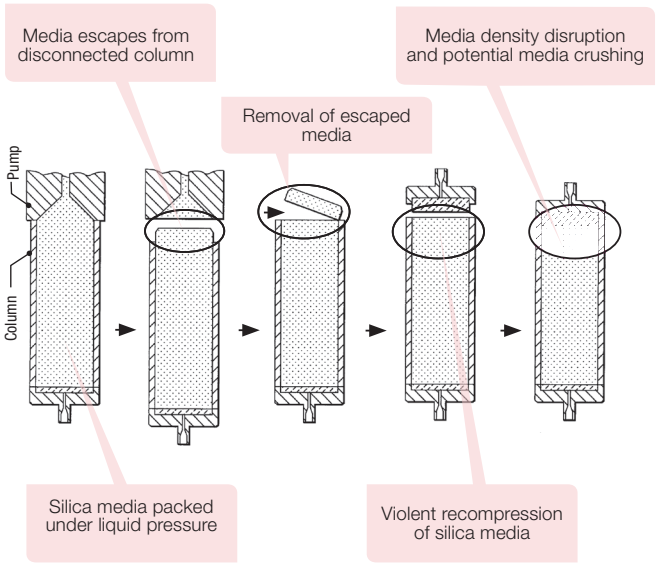


Diagram from Waters Corporation U.S. Patent No. 7,399,410

Comparative separations may not be representative of all applications.

Axia Technology Outperforms Traditional Packing Processes!

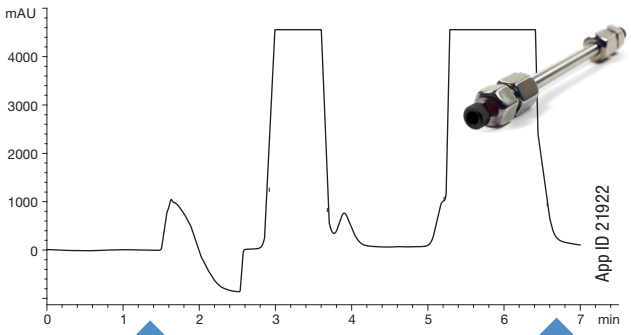
Because of the constant pressure placed on the integrated packing piston, Axia packed columns possess the dynamic capability of maintaining a consistent, homogeneous media bed. This results in superior column performance no matter which media selectivity you choose.

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 I.D. columns. One column was packed using Axia technology and the other prep column was packed using the traditional slurry packing process.

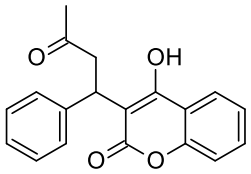
The Axia packing technology had a substantial increase in column efficiency resulting in increased resolution over traditionally packed preparative columns. With increased resolution you are able to increase your sample load enabling you to purify more target compound(s) per purification run. This equates to better throughput and economics.

Warfarin Chiral Purification in Normal Phase Mode

Analytical

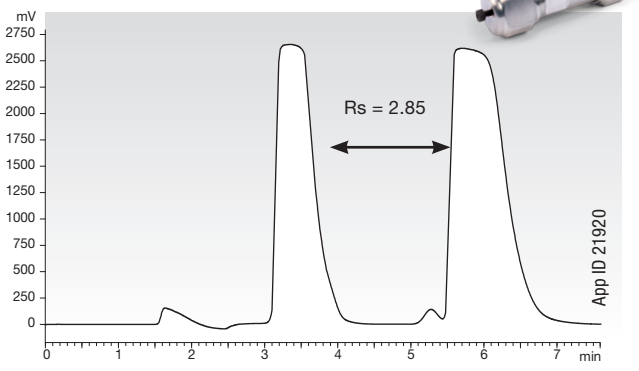


Column: Lux 5 µm Cellulose-1
Dimensions: 150 x 4.6 mm
Mobile Phase: Hexane/Ethanol (75:25)
Flow Rate: 1 mL/ min
Temperature: Ambient
Inj. Volume: 100 µL



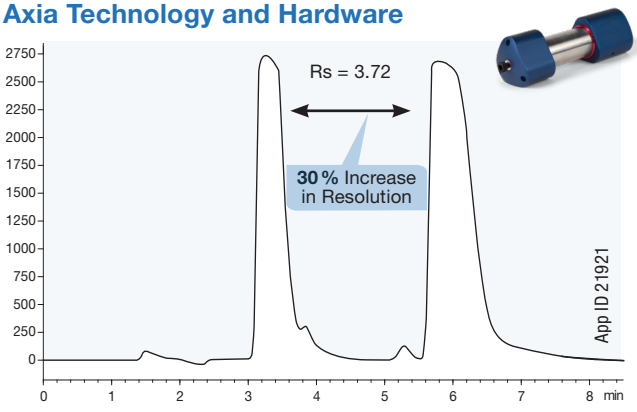
Warfarin

Standard Packing and Hardware



Conditions for both PREP columns:
Media: Lux 5 µm Cellulose-1
Dimensions: 150 x 21.2 mm
Mobile Phase: Hexane / Ethanol (75:25)

Axia Technology and Hardware



Flow Rate: 20 mL/ min
Temperature: Ambient
Inj. Volume: 2 mL

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

42 % Increase in Efficiency

TIP

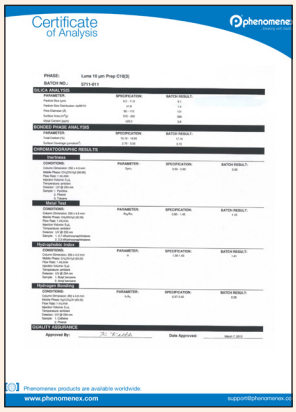
For more detailed information on this warfarin application, view application at:
www.phenomenex.com/tn9002

Comparative separations may not be representative of all applications.

Quality and Customer Support

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

Product Quality


Certificate of Analysis

ISO 9001


DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

This is to certify that the management system of

Phenomenex
411 Madrid Avenue, Torrance, CA, 90501, USA

has been found to conform to the Quality Management System standard:
ISO 9001:2015

This certificate is valid for the following scope:
The Design, Manufacture and Sales of Consumables for Separation Science.

BSE/TSE Certificate


4 February 2013

Luna® C18(3) BSE/TSE Disclaimer

The raw materials, manufacturing/production, assembly, and quality control of Luna® C18(3) media, to the best of our knowledge, are completely free of TSE/BSE and are not derived from animals.

Scott Krepich
Technical Manager

Delivery

Phenomenex Bulk Media is delivered in polyethylene bottles or in polyethylene bags packed in drums.

> "We have been very satisfied with the bulk media performance and the support we have received from Phenomenex. We trust Phenomenex as one of our key suppliers for GMP purification media."
>
> **Bachem Inc., USA**

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

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.

TIP

Phenomenex Provides Customer Support for Drug Master File DMF

Helpful Preparative Information

How to Scale-Up Flow Rate & Sample Load

Adjusting a method to accommodate a change in load and scale, requires changing multiple method parameters including flow rate and column ID. With good resolution, greater loading is possible with Phenomenex high surface area medias.

Column Diameter	4.6 mm	21.2 mm	30 mm	50 mm
250 mm Column Length	2.5 to 25 mg	50 to 500 mg	100 to 1000 mg	300 to 3000 mg
Flow Rate (typical to high)(mL/min)	**1 mL/min**	**20 mL/min**	**40 mL/min**	**120 mL/min**

Calculating Your Scaling Factor:

Scaling a separation to meet preparative demands requires the re-dimensioning for chromatographic parameters such as: Flow Rate, Column ID, Sample Load.

When only the column ID is changing: **SF = (d2 / d1)^2**

Where:
SF = Scaling Factor
d1 = diameter of starting column
d2 = diameter you are scaling to

When both ID & length are changing: **SF = (d2 / d1)^2 * (L2 / L1)**

Where:
SF = Scaling Factor
L1 = length of starting column
L2 = length you are scaling to

Sources of Column Failure:

The major cause of preparative column failure is void formation due to:

Operational use: excessively high flow rates; high viscosity samples

Packing Process: media density too low or non-uniform; media compresses, shifts or channels

Column ID	Flow Rate	Gram of Packing Material	Avg. Sample Load
10 mm	8 mL/min	12 g	120 mg
21.2 mm	25 mL/min	60 g	600 mg
30 mm	45 mL/min	120 g	1.2 mg
50 mm	100 mL/min	350 g	3.5 mg

Average sample load is approximately 1% of total packing sorbent. Overall, this is an average and is sample dependent.

Sample load (mg/column) depends on the degree of separation (alpha value); on the low end of separation (low alpha; poor separation) multiply packing weight by 0.1mg analyte/g sorbent (note: alpha value <1.3). On the higher end of separation (high alpha; great separation) multiply packing weight by 5mg analyte/g sorbent (note: alpha value >1.3)

Preparative Volumes and Loading:

Since Luna® , and Gemini® are very low density or "light" medias, and have a very high surface area, they will allow a higher load at the same material weight as other, more dense medias, or conversely, the same loadability at a lower material weight.

Column Dimension 250 x …	50	80	100	110	150	200	300	450	600	800	1000
Column Volume (L)	0.49	1.26	1.96	2.37	4.42	7.85	17.66	39.74	70.65	125.6	196.25
Typical Flow Rate (L/min)	0.12	0.3	0.47	0.57	1.06	1.89	4.25	9.57	17.01	30.25	47.26
Media Amount (kg)	0.29	0.47	1.18	1.43	2.65	4.17	10.6	23.86	42.41	75.4	117.81
Loading 0.1 %	0.00029	0.00047	0.00118	0.00143	0.00265	0.00471	0.0106	0.02386	0.04241	0.0754	0.11781
Loading 1 %	0.0029	0.0047	0.0118	0.0143	0.0265	0.0471	0.106	0.2386	0.4241	0.754	1.1781

Helpful Chromatography Equations

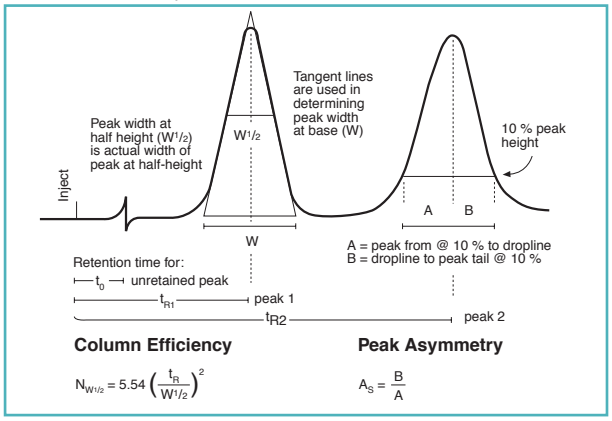
Column Efficiency

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:

$$\alpha = k_2/k_1$$

Resolution

R_s, defined as the amount of separation between two adjacent peaks, is given by:

$$R_s = \frac{\sqrt{N}}{4}\left(\frac{\alpha-1}{\alpha}\right)\left(\frac{k}{k+1}\right)$$

where **k** is the average value for the two peaks.

Technical information found here can also be viewed on our website. Please visit
www.phenomenex.com/chromtips.

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:

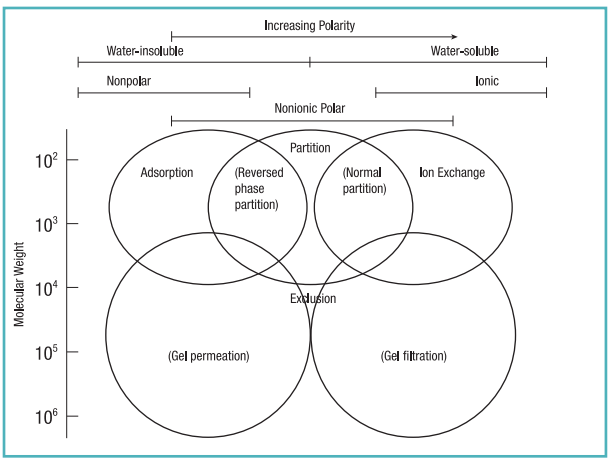
$$F2 = F1 \times (L2/L1) \times (r2/r1)^2$$

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_t	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}	$u = \frac{L}{t_o}$	$\overline{u} = \frac{L}{t_m}$	$\overline{u} = \frac{L}{t_m}$

*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

Column Type	ID (mm)	Approx. Dead Volume (mL)*	Typical Flow Rate (mL)	Typical and (Max.) Injection Masses (mg)	Typical and (Max.) Injection Volumes (µL)**
Capillary (Fused Silica)	0.32	0.0075	0.001 - 0.02	0.001 (0.01)	1 (10)
Microbore	1.0	0.07	0.02 - 0.1	0.01 (0.1)	5 (25)
Analytical	4.6	1.5	0.5 - 2.0	0.1 (2.5)	10 (200)
Semi-Prep	10.0	7.3	5.0 - 20	1.0 (25)	50 (1000)
Preparative	20.0	29.2	10 - 200	5.0 (500)	200 (5000)

*The column Dead Volume (Vo) may be estimated from:

Column Dead Volume (mL) = $Vo = 0.487 \times d^2 \times L$

Where: L = column length (cm); 15 cm (150 mm) used for calculation.
d = column ID (cm, not mm)

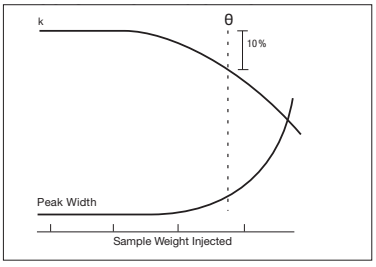
**The maximum allowable Sample Injection Volume (Vi) can be estimated as follows:

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.

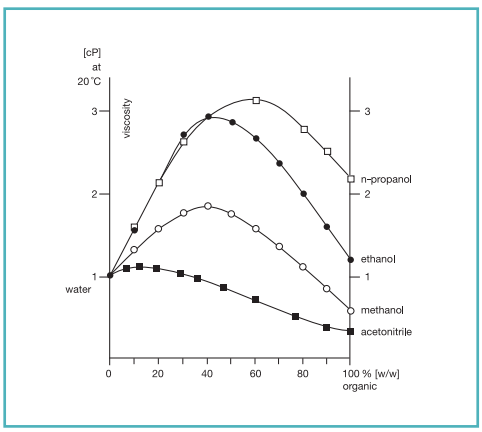


Probes for Column Characterization

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



Bulk Media Guide

Phenomenex media offers identical performance from analytical to large process scale, and is available in a wide range of particle sizes, all supported in over 100 countries.

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
	Jupiter® 300 C18	300	170	1.5 – 10	10 µm (bulk), 15 µm (bulk)	0.44	Hydrophilic Proteins, Oligonucleotides (>30 mer)
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 – 12	10 µm (bulk)	0.6	Small molecule, Peptides, Proteins, and Oligonucleotides ,insulin, and insulin analogues
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	400	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
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
Chiral Media							
cellulose tris(3,5-dimethylphenyl carbamate)	Lux® Cellulose-1	1000	—	2 – 9	10, 20 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(3-chloro-4-methyl phenylcarbamate)	Lux Cellulose-2	1000	—	2 – 9	10, 20 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(4-methylbenzoate)	Lux Cellulose-3	1000	—	2 – 9	10, 20 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(4-chloro-3-methyl phenylcarbamate)	Lux Cellulose-4	1000	—	2 – 9	10, 20 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
Amylose 3,5-dimethylphenylcarbamate	Lux Amylose-1	1000	—	2 – 9	10, 20 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds

Sepra Ordering Information

Sepra™

	Phase (Particle size, Pore size)	Phase Description	MW Range	Common Applications	100 g	1 kg	10 kg
Polymer Sepra-ZT Small Pore Polymer Resin	Sepra ZT (30 µm, 85 Å)	Pyrrolidone modified styrenedivinylbenzene polymer	≤ 10 kDa	Reversed phase, hydrophobic, polar or aromatic, small molecule selectivity from aqueous samples in pH 1-14 including peptides and small proteins	04G-4426	04K-4426	Inquire
	Sepra ZT-SCX (30 µm, 85 Å)	Sulfonic acid modified styrenedivinylbenzene polymer	≤ 10 kDa	Strong ion-exchange of cationic or aromatic, small molecule selectivity from aqueous samples in pH 1-14 including peptides and small proteins	04G-4466	04K-4466	Inquire
	Sepra ZT-WCX (30 µm, 85 Å)	Carboxylic acid modified styrenedivinylbenzene polymer	≤ 10 kDa	Weak ion-exchange of cationic or aromatic, small - large molecule selectivity from aqueous samples in pH 1-14 including peptides and small – large proteins	04G-4478	04K-4478	Inquire
	Sepra ZT-SAX (30 µm, 85 Å)	Quaternary amine modified styrenedivinylbenzene polymer	≤ 10 kDa	Strong ion-exchange of anionic or aromatic, small molecule selectivity from aqueous samples in pH 1-14 including peptides and small proteins	04G-4485	Inquire	Inquire
	Sepra ZT-WAX (30 µm, 85 Å)	Primary, secondary amine modified styrenedivinylbenzene polymer	≤ 10 kDa	Weak ion-exchange of anionic or aromatic, small molecule selectivity from aqueous samples in pH 1-14 including peptides and small proteins	04G-4463	Inquire	Inquire
Polymer Sepra-ZTL Large Pore Polymer Resin	Sepra ZTL (115 µm, 330 Å)	Large particle, large pore pyrrolidone modified styrenedivinylbenzene polymer	≤ 75 kDa	Reversed phase, hydrophobic, polar or aromatic, small - large molecule selectivity from aqueous samples in pH 1-14 including peptides and small – large proteins	04G-4470	Inquire	Inquire
	Sepra ZTL-SCX (115 µm, 330 Å)	Large particle, large pore sulfonic acid modified styrenedivinylbenzene polymer	≤ 75 kDa	Strong ion-exchange of cationic or aromatic, small - large molecule selectivity from aqueous samples in pH 1-14 including peptides and small - large proteins	04G-4467	04K-4467	Inquire
	Sepra ZTL-WCX (115 µm, 330 Å)	Large particle, large pore carboxylic acid modified styrenedivinylbenzene polymer	≤ 75 kDa	Weak ion-exchange of cationic or aromatic, small - large molecule selectivity from aqueous samples in pH 1-14 including peptides and small – large proteins	Inquire	Inquire	Inquire
	Sepra ZTL-SAX (115 µm, 330 Å)	Large particle, large pore quaternary amine modified styrenedivinylbenzene polymer	≤ 75 kDa	Strong ion-exchange of anionic or aromatic, small - large molecule selectivity from aqueous samples in pH 1-14 including peptides and small – large proteins	Inquire	Inquire	Inquire
	Sepra ZTL-WAX (115 µm, 330 Å)	Large particle, large pore primary, secondary amine modified styrenedivinylbenzene polymer	≤ 75 kDa	Weak ion-exchange of anionic or aromatic, small - large molecule selectivity from aqueous samples in pH 1-14 including peptides and small – large proteins	04G-4494	Inquire	Inquire
Silica Sepra 100 % Silica Resin	Sepra C18-E (50 µm, 65 Å)	Endcapped silica-based C18	≤10 kDa	Reversed phase, hydrophobic, small molecule selectivity from aqueous samples	04G-4348	04K-4348	04M-4348
	Sepra C18-T (50 µm, 135 Å)	Wide pore endcapped silica-based C18	≤ 45 kDa	Reversed phase, hydrophobic, small-medium molecule selectivity from aqueous samples, including peptides and small proteins	04G-4405	04K-4405	04M-4405
	Sepra C8 (50 µm, 65 Å)	Endcapped silica-based C8	≤ 10 kDa	Reversed phase, hydrophobic, small molecule selectivity from aqueous samples	04G-4406	04K-4406	Inquire
	Sepra Phenyl (50 µm, 65 Å)	Endcapped silica-based phenyl	≤ 10 kDa	Reversed phase, hydrophobic and aromatic, small molecule selectivity from aqueous samples	04G-4407	04K-4407	Inquire
	Sepra CN (50 µm, 65 Å)	Unendcapped silica-based cyano	≤ 10 kDa	Reversed or normal phase, pi electron/ aromatic, small molecule selectivity from aqueous or organic samples	04G-4409	Inquire	Inquire
	Sepra NH_2 (50 µm, 65 Å)	Unendcapped silica-based primary amine	≤ 10 kDa	Reversed or normal phase, anion or polar, small molecule selectivity from aqueous or organic samples	04G-4408	04K-4408	Inquire
	Sepra Florisil® (170 µm, 80 Å)	Magnesium silicate Pesticide Residue Grade Florisil	≤ 10 kDa	Normal phase, polar, small molecule selectivity from organic samples	04G-4411	04K-4411	Inquire
	Sepra SCX (50 µm, 65 Å)	Silica-based sulfonic acid	≤ 10 kDa	Strong ion-exchange of cationic small molecules from aqueous or organic samples including peptides and small proteins	04G-4413	04K-4413	Inquire
	Sepra SAX (50 µm, 65 Å)	Silica-based quaternary amine	≤ 10 kDa	Strong ion-exchange of anionic small molecules from aqueous or organic samples	04G-4414	04K-4414	Inquire
	Sepra WCX (55 µm, 70 Å)	Silica-based carboxylic acid	≤ 10 kDa	Weak ion-exchange of cationic small molecules from aqueous or organic samples including peptides and small proteins	04G-S027	04K-S027	Inquire
	Sepra Silica (50 µm, 65 Å)	Unendcapped silica	≤ 10 kDa	Normal phase, polar, small molecule selectivity from organic samples	04G-4410	04K-4410	Inquire
	Sepra EPH (200 µm, 70 Å)	Large particle, specialty normal phase silica	≤ 10 kDa	Specialty resin for extractable petroleum hydrocarbon analysis	04G-4508	Inquire	Inquire
Sepra SDB-L (95 µm, 255 Å)		Styrenedivinylbenzene polymer	≤ 75 kDa	Reversed phase, hydrophobic or aromatic, small – large molecule selectivity from aqueous samples in pH 1-14 including peptides and small - large proteins	04G-4412	04K-4412	Inquire

Scout Columns Ordering Information

Scout Columns

Achiral 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

Chiral Columns

Ordering Information

Lux® (1000 Å)		
Phases	**250 x 4.6 mm**	**250 x 10 mm**
10 µm		
Cellulose-1	00G-4501-E0	00G-4501-N0
Cellulose-2	00G-4502-E0	00G-4502-N0
Cellulose-3	00G-4624-E0	—
Cellulose-4	00G-4625-E0	—
20 µm		
Cellulose-1	00G-4473-E0	00G-4473-N0
Cellulose-2	00G-4464-E0	00G-4464-N0
Cellulose-3	00G-4504-E0	00G-4504-N0
Cellulose-4	00G-4503-E0	00G-4503-N0

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

Phenomenex Bulk/PREP Team is Here to Help!

Chat with technical experts about any questions —nearly 24/7!

www.phenomenex.com/chat

Bulk Ordering Information

Bulk HPLC Media

Achiral 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

Chiral Media

Ordering Information

Lux® (1000 Å)

Phases	10 g	100 g	1 kg
10 µm			
Cellulose-1	04D-4501	04G-4501	04K-4501
Cellulose-2	04D-4502	04G-4502	04K-4502
Cellulose-3	04D-4624	04G-4624	04K-4624
Cellulose-4	04D-4625	04G-4625	04K-4625

Please inquire for 10 µm Lux Amylose-1 media.

> "We are using chromatography media from Phenomenex for GPL/GMP purposes, therefore we audited Phenomenex USA as a manufacturer. From the beginning, we were impressed with Phenomenex and the attitude of their employees. Phenomenex is a unique company in many aspects. Their degree of dedication to customer service, to the organization of the QMS system and last but not least the positive atmosphere in the company is impressive. The outcome of the audit was to our fullest"satisfaction"
>
> **Major Generic Pharma Company, Europe**

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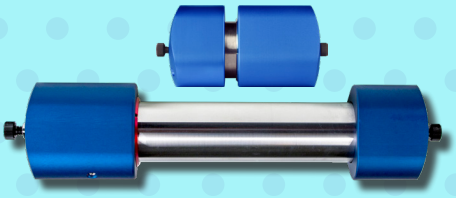

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