Phenogel™
Organic GPC/SEC

Enhanced Resolution for

POLYMER ANALYSIS

- Remarkable Reproducibility
- Exceptional Efficiency
- Long Lifetimes
- Economically Priced

phenomenex®
. . . breaking with tradition℠

www.phenomenex.com/Phenogel

Phenogel™ Non-Aqueous GPC/SEC Columns

Phenomenex Phenogel

5 µm, 300 x 7.8 mm

Guaranteed Economical Alternative

Agilent® PLgel™

5 µm, 300 x 7.5 mm

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-200 Series GPC KF-800 Series GPC KD-800 Series
Tosoh Bioscience®	TSKgel® Hxl TSKgel Hhr
Waters®	Styragel® Ultrastyragel™ HSPgel™

© 2020 Phenomenex, Inc. All rights reserved.

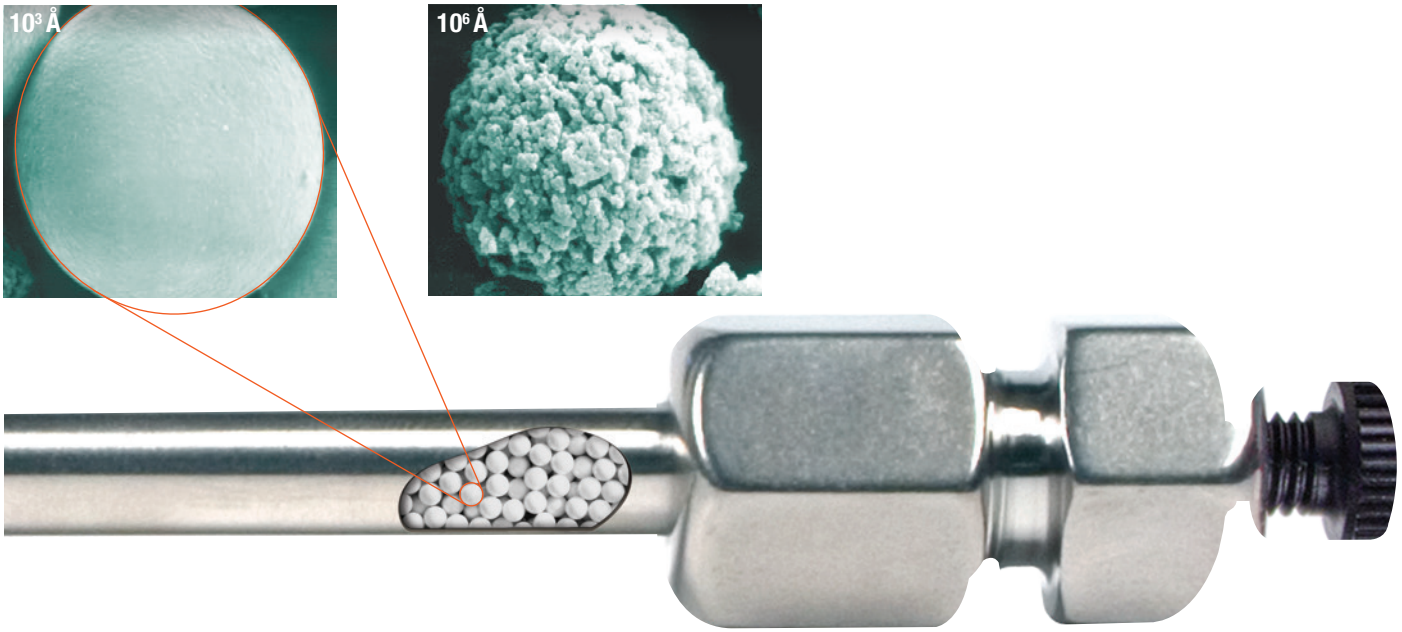
Phenogel™ Non-Aqueous GPC/SEC Columns

- 5 and 10 µm particle sizes
- Narrow bore (4.6 mm ID) solvent-saver columns available
- Highly cross-linked for mechanical and chemical stability
- Temperature stable to 140 °C

Phenogel packing materials are made from styrene-divinylbenzene by emulsion polymerization under conditions to optimize pore size, total pore volume, particle size, and degree of cross-linking. The results yield Gel Permeation Chromatography (GPC) materials that provide very high resolution, rugged durability, and wide solvent compatibility.

Phenogel is available in seven different pore sizes ranging from 50 Å to 10^6 Å, and a unique Linear(2) configuration. Pore size distribution and pore volume are closely controlled parameters in the manufacturing process; attention to these details accounts for the high resolution and tight linear calibration curves associated with Phenogel, as well as the excellent column-to-column reproducibility.

SEM Photos of Phenogel Polymer Beads



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)

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

Solvent and Temperature Compatibility

- Phenogel™ columns are packed in tetrahydrofuran (THF)
- Columns can also be shipped in solvents such as DMF and chloroform to help minimize equilibration time

Although styrene-divinylbenzene materials are exceptionally inert, interaction between the column packing and sample materials (especially very polar solutes) occasionally occurs and the mobile phase must be modified to eliminate this effect. Phenogel columns can tolerate up to 0.1 % low MW amines, 0.5 % glacial acetic acid, or up to 1 % water in the mobile phase as modifiers.

Phenogel columns are temperature stable to 140 °C which is important for applications involving solutes with limited solubility at ambient temperatures, or where solubility considerations demand the use of viscous solvents such as DMF or DMSO. At higher temperatures, eluent viscosity is decreased and mass transfer is enhanced, with the effect of increasing sample resolution. This temperature stability is particularly useful when analyzing polymers such as polyethylene and polypropylene which require higher temperatures.

Solvent Selection Table

Recommended GPC Solvent	Sample	Suggested Temp.
THF	Polystyrenes Polybutadienes Epoxy Resins Phenolic Resins Polymethyl Methacrylates Polyethylene Glycol	Ambient — — Ambient — —
HFIP**	Polyamides (Nylon) PET/PETP (polyethyleneterephthalate)	30 °C —
Dichloromethane	Naphthalene Diethylhexyl Phthalate	— Ambient
Toluene	Polyisobutylene Polyisoprene Silicone Oils	Ambient — —
DMF	Polyethylene Oxide Polyvinylpyrrolidone (PVP) Cellulose Acetate Hydroxyethylcellulose (HEC) Chlorinated Rubber	50 °C 40 °C — — —

**HFIP (hexafluoroisopropanol) allows polymers such as polyamides and PET that are analyzed at a temperature of 135 °C and higher to be analyzed at temperatures below 100 °C. The narrow particle distribution of Phenogel columns eliminates the problem of overlapping peaks and band broadening that is typically associated with using this solvent with traditional GPC columns.

Solvent Compatibility Table

Mobile Phase Solvent	Phenogel Pore Size: 50 Å	100 Å	500 Å	10^3 Å	10^4 Å	10^5 Å	10^6 Å	Linear & Mixed	Suggested Operating Temp.
Acetone	Y	Y	Y	Y	Y	Y	Y	Y	
Benzene	Y	Y	Y	Y	Y	Y	Y	Y	
Carbon Tetrachloride	Y	Y	Y	Y	Y	Y	Y	Y	
Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	
30 % HFIP/Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	
Diethyl Ether	Y	Y	Y	Y	Y	Y	Y	Y	
Dimethylacetamide (DMAC)	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Dimethylformamide (DMF)	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Dioxane	Y	Y	Y	Y	Y	Y	Y	Y	
DMSO	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Ethyl Acetate	Y	Y	Y	Y	Y	Y	Y	Y	
Hexafluoroisopropanol (HFIP)	Y	Y	Y	Y	Y	Y	Y	Y	
Hexane	Y	Y	Y	Y	Y	Y	Y	Y	
M-Cresol	Y*	Y	Y	Y	Y	Y	Y	Y	100 °C
Methyl Ethyl Ketone	Y	Y	Y	Y	Y	Y	Y	Y	
Methylene Chloride	Y	Y	Y	Y	Y	Y	Y	Y	
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), see diagram below right. 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.

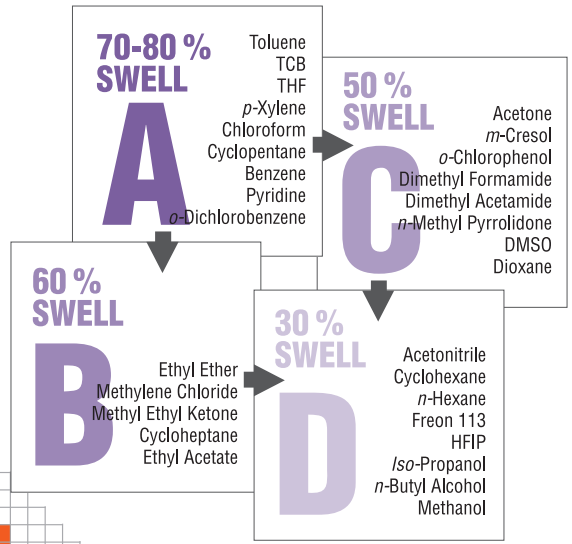
Column life can be maximized by dedicating certain columns to certain solvents. This will also minimize solvent switches. If care is not taken, a void may occur.

- 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 below before proceeding with ANY solvent switch
- Compare the swell characteristics of solvent 1 (old solvent) to solvent 2 (new solvent) and follow the guidelines below

☐ If solvent 1 and solvent 2 belong to the same swell category (see table below right), check the solvent miscibility and proceed with the switch

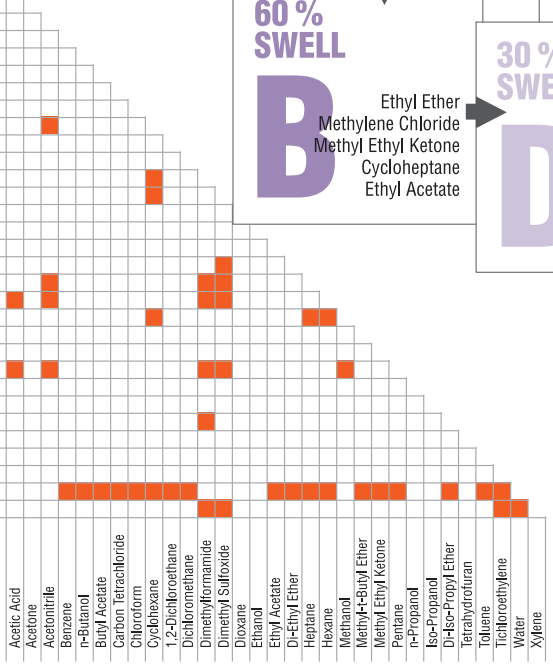
☐ If solvent 1 and solvent 2 belong to successive swell categories as indicated by the arrows in the table below right, check the miscibility and proceed with the switch

☐ 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 below



Solvent Miscibility Table

Solvent	Polarity Index	Refractive Index @ 20 °C	UV (nm) Cutoff @ 1 AU	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
Tichloroethylene	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

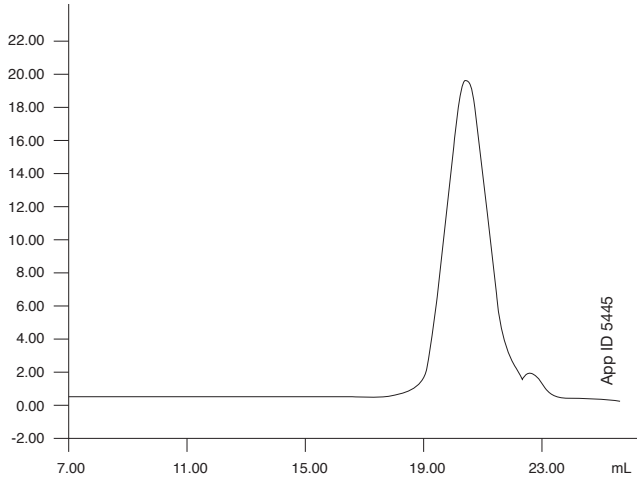
Applications on Phenogel™ Linear Non-Aqueous GPC/SEC Columns

Linear Columns

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

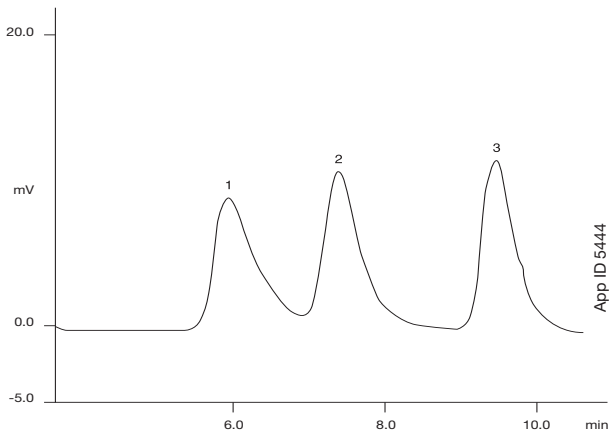
Nylon 6 in HFIP

Column: Phenogel 10 µm Linear(2) x 2
Dimensions: 300 x 7.8 mm
Part No.: 00H-3260-K0
Mobile Phase: HFIP (0.01 M NATFAT)
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.025 % w/v
Temperature: 30 °C
Sample: 14,500 MW



Mixed Polystyrene Standard on Linear(2) Column

Column: Phenogel 5 µm Linear(2)
Dimensions: 300 x 7.8 mm
Part No.: 00H-3259-K0
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Detection: RI
Injection Volume: 50 µL
Temperature: 35 °C
Sample: Polystyrene standards injected
1. 2,860,000 MW
2. 277,000 MW
3. 9,350 MW



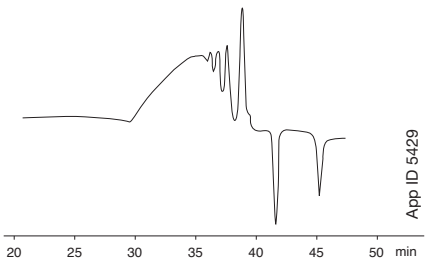
Applications on Phenogel™ Fixed Pore Non-Aqueous GPC/SEC Columns

50 Å - 10^6 Å Fixed Pore Columns

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

Phenolic Resins

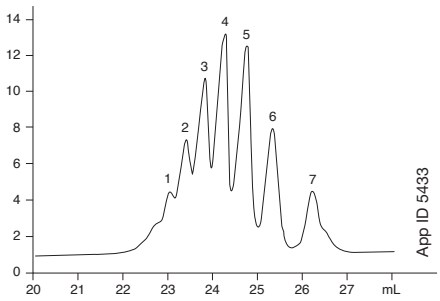
Column: Phenogel 5 µm 500 Å x 2, 10^3 Å, 10^4 Å
Dimensions: 300 x 7.8 mm
Part No.: 00H-0443-K0 (500 Å)
00H-0444-K0 (10^3 Å)
00H-0445-K0 (10^4 Å)
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: RI
Injection Volume: 5 µL
Temperature: 25 °C
Sample: Phenolic Aldehyde Resin, MW 500 to 470 K



Polyethylene Glycol 330

Column: Phenogel 5 µm 50 Å, 100 Å, 500 Å
Dimensions: 300 x 7.8 mm
Part No.: 00H-0441-K0 (50 Å)
00H-0442-K0 (100 Å)
00H-0443-K0 (500 Å)
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.25 % w/v
Temperature: Ambient
Sample:

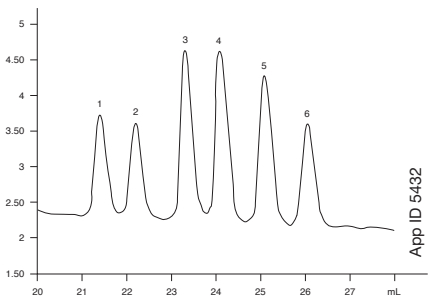
1. dp7	546 MW	5. dp3	194 MW
2. dp6	458 MW	6. dp2	106 MW
3. dp5	370 MW	7. dp1	62 MW
4. dp4	282 MW		



Closely Related Hydrocarbons

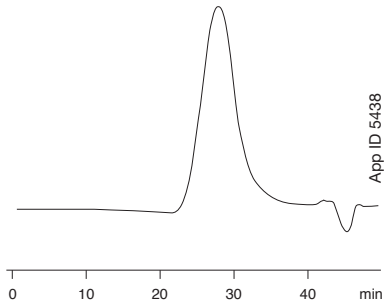
Column: Phenogel 5 µm 50 Å, 100 Å, 500 Å
Dimensions: 300 x 7.8 mm
Part No.: 00H-0441-K0 (50 Å)
00H-0442-K0 (100 Å)
00H-0443-K0 (500 Å)
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.25 % w/v
Temperature: Ambient
Sample:

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



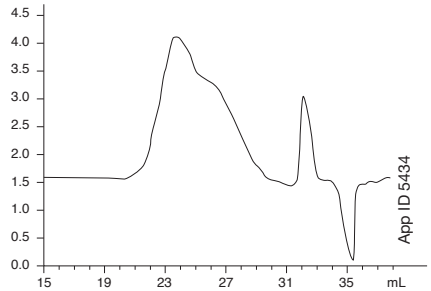
Polyvinyl Butyral

Column: Phenogel 5 µm 500 Å, 10^3 Å, 10^4 Å, 10^5 Å
Dimensions: 300 x 7.8 mm
Part No.: 00H-0443-K0 (500 Å)
00H-0444-K0 (10^3 Å)
00H-0445-K0 (10^4 Å)
00H-0446-K0 (10^5 Å)
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.25 % w/v
Temperature: 25 °C
Sample: 300,000 MW



Polyethylene Oxide (PEO)

Column: Phenogel 10 µm 10^3 Å, 10^4 Å, 10^5 Å
Dimensions: 300 x 7.8 mm
Part No.: 00H-0444-K0 (10^3 Å)
00H-0445-K0 (10^4 Å)
00H-0446-K0 (10^5 Å)
Mobile Phase: DMF (0.1M 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

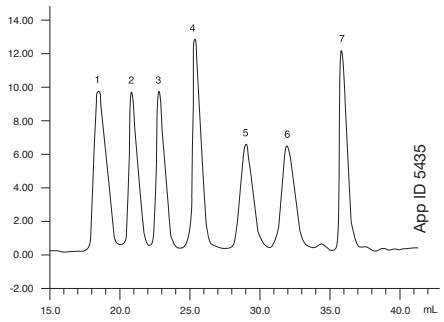


Applications on Phenogel™ Fixed Pore Non-Aqueous GPC/SEC Columns

50 Å - 10^6 Å Fixed Pore Columns *(cont'd)*

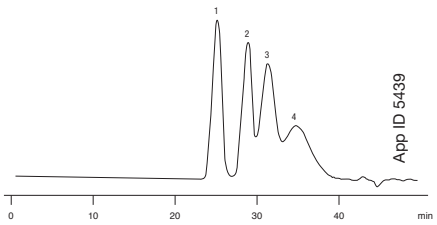
Polystyrenes (Wide MW Range)

Column: Phenogel 10 µm 10^5 Å, 10^4 Å, 10^3 Å
Dimensions: 300 x 7.8 mm
Part No.: 00H-0446-K0 (10^5 Å)
00H-0445-K0 (10^4 Å)
00H-0444-K0 (10^3 Å)
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.25 % w/v
Temperature: Ambient
Sample: 1. 1,560,000 MW 5. 6,100 MW
2. 260,000 MW 6. 854 MW
3. 94,000 MW 7. 146 MW
4. 30,000 MW



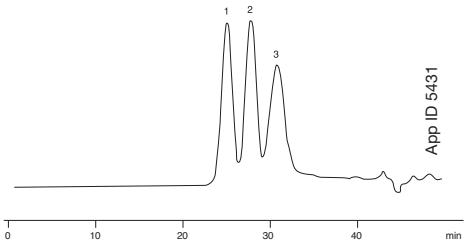
Poly-(α-Methyl Styrene) (Wide MW Range)

Column: Phenogel 5 µm 10^5 Å, 10^4 Å, 10^3 Å, 500 Å
Dimensions: 300 x 7.8 mm
Part No.: 00H-0446-K0 (10^5 Å)
00H-0445-K0 (10^4 Å)
00H-0444-K0 (10^3 Å)
00H-0443-K0 (500 Å)
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



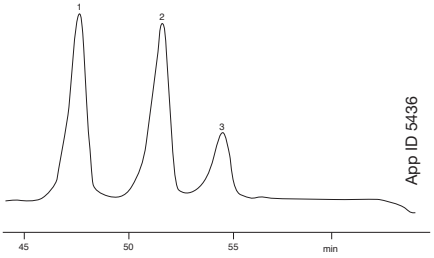
Polymethyl Methacrylates (Wide MW Range)

Column: Phenogel 5 µm 10^5 Å, 10^4 Å, 10^3 Å, 500 Å
Dimensions: 300 x 7.8 mm
Part No.: 00H-0446-K0 (10^5 Å)
00H-0445-K0 (10^4 Å)
00H-0444-K0 (10^3 Å)
00H-0443-K0 (500 Å)
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



Isoprenes from In Vitro Translation on Products

Column: Phenogel 5 µm 50 Å, 100 Å in series
Dimensions: 300 x 7.8 mm
Part No.: 00H-0441-K0 (50 Å)
00H-0442-K0 (100 Å)
Mobile Phase: THF
Flow Rate: 0.25 mL/min
Detection: Differential Refractometer
Sample: 1. Squalene C30
(2, 6, 10, 15, 19, 23-Hexamethyltetracosane)
2. Phytane C20
(2, 6, 10, 14-Tetramethylhexadane)
3. Farnesne C15
(2, 6, 10-Trimethyldodecane)

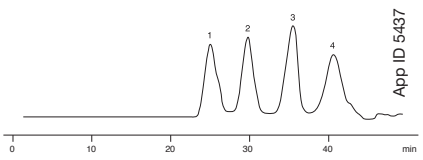


The columns were used in tandem to characterize isoprene chain lengths removed from labeled in vitro translation products or cell proteins. The isoprenoids were removed by treatment with Raney nickel and extracted into pentane. The pentane extractable material was hydrogenated over platinum catalyst and injected onto the column. Fractions were collected at 0.5 minute intervals and radioactivity was monitored by liquid scintillation. These saturated hydrocarbon chains were characterized by comparing radioactive peaks to standard retention times.

Chromatogram courtesy of W.Maltese and R.Erdman, Weis Center for Research, Geisinger Clinic.

Polybutadienes (Wide MW Range)

Column: Phenogel 5 µm 10^5 Å, 10^4 Å, 10^3 Å, 500 Å
Dimensions: 300 x 7.8 mm
Part No.: 00H-0446-K0 (10^5 Å)
00H-0445-K0 (10^4 Å)
00H-0444-K0 (10^3 Å)
00H-0443-K0 (500 Å)
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

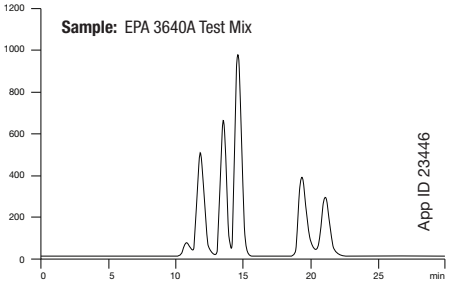


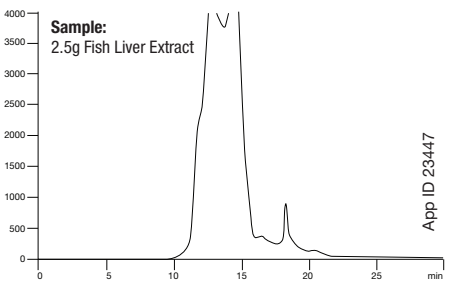
50 Å - 500 Å Fixed Pore Columns *(cont'd)*

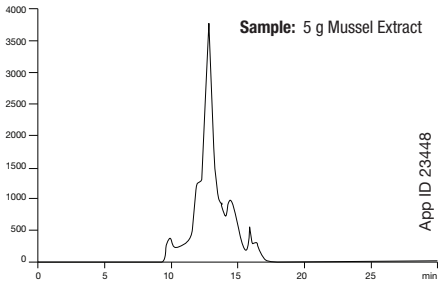
Environmental and Biomonitoring

An application of preparative GPC columns for the automated purification of environmental samples in concordance to the 3640A EPA method. Results shown are the analysis and purification of PAHs by Phenogel GPC columns and the removal of biomaterial matrix interferences that are known to complicate the analysis of PAHs in biological tissues.

This method showed that Phenogel 5 µm 100 Å preparative GPC columns efficiently removed lipids from salmon and mussel samples with high recovery of the target 49 PAHs while demonstrating good repeatability and that it could easily be automated for overnight injection.







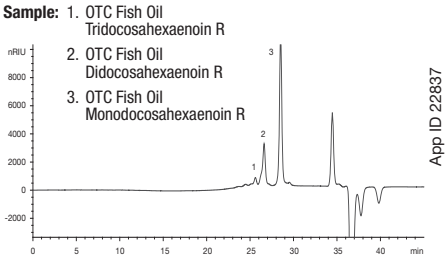
Column: Phenogel 5 µm 100 Å
Dimensions: 300 x 21.2 mm
Part No.: 00H-0442-P0

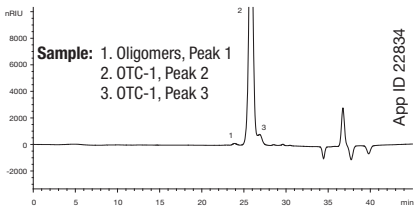
Mobile Phase: Methylene chloride
Flow Rate: 5 mL/min
Detector: Agilent® 1100

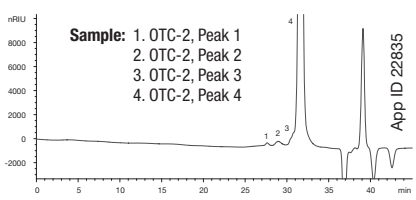
Oligomer Composition of Over-the-Counter Omega-3 Fish Oil Capsules

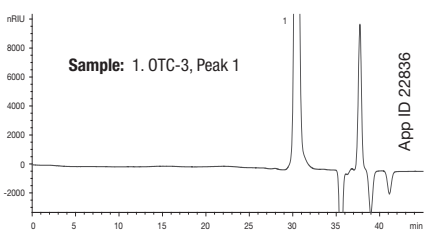
Among the variety of over-the-counter (OTC) vitamin and nutraceutical products sold to consumers, fish oils containing omega-3 fatty acids are some of the most widely endorsed by healthcare professionals. Three different OTC fish oil supplements were analyzed by GPC chromatography to determine oligomer composition.

One of the three samples analyzed had an oligomer content that would not have met the acceptance criteria of the Ph. Eur. monograph. Further analysis would need to be performed to characterize the exact composition of omega-3 fatty acids in sample OTC-1.









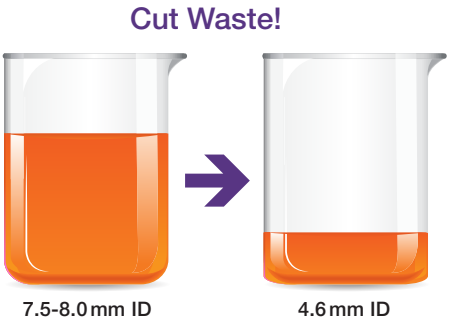
Columns: Phenogel 5 µm 50 Å
Phenogel 5 µm 100 Å
Phenogel 5 µm 500 Å
Dimensions: 300 x 7.8 mm
Part No.: 00H-0441-K0 (50 Å)
00H-0442-K0 (100 Å)
00H-0443-K0 (500 Å)
Mobile Phase: THF
Flow Rate: 0.8 mL/min
Detection: RI (35° C)
Injection: 40 µL
Column Temp: 30° C

Reduce Solvent Consumption with Phenogel 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 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.

Phenex™ Syringe Filters

- Consistent, reproducible results
- Increased column lifetime

Phenex Syringe Filters	4 mm Diameter for ≤ 2 mL sample volumes		15 mm Diameter for 2 – 10 mL sample volumes		25 - 28 mm Diameter for 10 – 100 mL sample volumes	
Membrane Type/Size	**Part No.**	**Unit**	**Part No.**	**Unit**	**Part No.**	**Unit**
0.20 µm						
Phenex-RC (Regenerated Cellulose)	AF0-3203-12	100/pk	AF0-2203-12	100/pk	AF0-8203-12	100/pk
	AF0-3203-52	500/pk	AF0-2203-52	500/pk	AF0-8203-52	500/pk
Phenex-PTFE [3] (Polytetrafluoroethylene)	AF0-3202-12	100/pk	AF0-2202-12	100/pk	AF0-1202-12	100/pk
	AF0-3202-52	500/pk	AF0-2202-52	500/pk	AF0-1202-52	500/pk
0.45 µm						
Phenex-RC (Regenerated Cellulose)	AF0-3103-12	100/pk	AF0-2103-12	100/pk	AF0-8103-12	100/pk
	AF0-3103-52	500/pk	AF0-2103-52	500/pk	AF0-8103-52	500/pk
Phenex-PTFE [3] (Polytetrafluoroethylene)	AF0-3102-12	100/pk	AF0-2102-12	100/pk	AF0-1102-12	100/pk
	AF0-3102-52	500/pk	AF0-2102-52	500/pk	AF0-1102-52	500/pk
1.20 µm						
Phenex-GF [1,2] (Glass Fiber)	Prefiltration of heavily contaminated or highly viscous samples. When used in-series preceding a membrane filter, clogging of the membrane filter is prevented and sample clean up is optimized. Outlet connection is luer lock.				AF0-8515-12	100/pk
					AF0-8515-52	500/pk

BE-HAPPY™ guarantee

Your happiness is our mission. Take 45 days to try our products. If you are not happy, we'll make it right.

www.phenomenex.com/behappy

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

1. *Glass fiber filters are 28 mm diameter and made of borosilicate. They will remove 90 % of all particles >1.2 µm.*
2. *Housing material is methacrylate butadiene styrene (MBS) polymerisate. Also known as Cryolite®.*
3. *Hydrophobic membrane. Can be made hydrophilic by pre-wetting with IPA.*

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

Phenogel™
Organic GPC/SEC

5 µm Analytical Columns (mm)		Shipping Solvent THF	Chloroform	DMF	Guards	SecurityGuard™ Cartridges* (mm)
		300 x 7.8	300 x 7.8	300 x 7.8	50 x 7.8	4 x 3.0
Pore Size	**MW Range**					**/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	00H-0445-K0-CL	—	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	300 x 7.8	50 x 7.8	4 x 3.0
Mixed Beds						**/3pk**
Linear(2)	100-10,000 K	00H-3259-K0	00H-3259-K0-CL	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**			**/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				**/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**			**/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				**/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**		
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**		
100 Å	500-6 K	00H-0642-P0	03B-0642-P0

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 KF-200 Series
Tosoh Bioscience®	TSKgel® Hxl TSKgel Hhr
Waters®	Styragel® Ultrastyragel™ HSPgel™

Guard Cartridge Holder		
Part No.	**Description**	**Unit**
KJ0-4282	Reusable holder (SecurityGuard kit)	/kit

*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282
Note: SecurityGuard cartridges for Non-Aqueous Polymer GPC columns are not compatible with HFIP solvent.

Column Union		
Part No.	**Description**	**Unit**
AQ0-8507	Zero Dead Union, SS, with 10-32 fittings	/ea

Recommended for temperature sensitive analysis and ensuring fit inside column oven when using SecurityGuard.

BE-HAPPY™ guarantee
Your happiness is our mission. Take 45 days to try our products. If you are not happy, we'll make it right.
www.phenomenex.com/behappy

Phenogel™
Organic GPC/SEC

Australia
t: +61 (0)2-9428-6444
auinfo@phenomenex.com

Austria
t: +43 (0)1-319-1301
anfrage@phenomenex.com

Belgium
t: +32 (0)2 503 4015 (French)
t: +32 (0)2 511 8666 (Dutch)
beinfo@phenomenex.com

Canada
t: +1 (800) 543-3681
info@phenomenex.com

China
t: +86 400-606-8099
cninfo@phenomenex.com

Denmark
t: +45 4824 8048
nordicinfo@phenomenex.com

Finland
t: +358 (0)9 4789 0063
nordicinfo@phenomenex.com

France
t: +33 (0)1 30 09 21 10
franceinfo@phenomenex.com

Germany
t: +49 (0)6021-58830-0
anfrage@phenomenex.com

India
t: +91 (0)40-3012 2400
indiainfo@phenomenex.com

Ireland
t: +353 (0)1 247 5405
eireinfo@phenomenex.com

Italy
t: +39 051 6327511
italiainfo@phenomenex.com

Luxembourg
t: +31 (0)30-2418700
nlinfo@phenomenex.com

Mexico
t: 01-800-844-5226
tecnicomx@phenomenex.com

The Netherlands
t: +31 (0)30-2418700
nlinfo@phenomenex.com

New Zealand
t: +64 (0)9-4780951
nzinfo@phenomenex.com

Norway
t: +47 810 02 005
nordicinfo@phenomenex.com

Poland
t: +48 (12) 881 0121
pl-info@phenomenex.com

Portugal
t: +351 221 450 488
ptinfo@phenomenex.com

Singapore
t: +65 800-852-3944
sginfo@phenomenex.com

Spain
t: +34 91-413-8613
espinfo@phenomenex.com

Sweden
t: +46 (0)8 611 6950
nordicinfo@phenomenex.com

Switzerland
t: +41 (0)61 692 20 20
swissinfo@phenomenex.com

Taiwan
t: +886 (0) 0801-49-1246
twinfo@phenomenex.com

United Kingdom
t: +44 (0)1625-501367
ukinfo@phenomenex.com

USA
t: +1 (310) 212-0555
info@phenomenex.com

All other countries/regions
Corporate Office USA
t: +1 (310) 212-0555
info@phenomenex.com

phenomenex®
. . . breaking with tradition℠

www.phenomenex.com

Phenomenex products are available worldwide. For the distributor in your country/region, contact Phenomenex USA, International Department at international@phenomenex.com

Terms and Conditions
Subject to Phenomenex Standard Terms & Conditions, which may be viewed at www.phenomenex.com/TermsAndConditions.

Trademarks
Phenogel, Phenex, SecurityGuard, and BE-HAPPY are trademarks of Phenomenex. Agilent Technologies is a registered trademark and PLgel is a trademark of Agilent Technologies, Inc. Waters and Styragel are registered trademarks, Ultrastyragel and HSPgel are trademarks of Waters Technologies Corporation. Shodex is a registered trademark of Showa Denko K.K. Tosoh Bioscience and TSKgel are registered trademarks of Tosoh Corporation. Resolve is a trademark of Jordi Labs. Cryolilte is a registered trademark of CY/RO Industries. SDV and POLEFIN are registered trademarks of PSS Polymer Standards Service GmbH.

Disclaimer
Phenomenex is in no way affiliated with Waters Technologies Corporation, Agilent Technologies, Jordi Labs, Tosoh Corporation, or CY/RO Industries.

SecurityGuard is patented by Phenomenex. U.S. Patent No. 6,162,362.
CAUTION: this patent only applies to the analytical-sized guard cartridge holder, and does not apply to SemiPrep, PREP or ULTRA holders, or to any cartridges.

© 2020 Phenomenex, Inc. All rights reserved.

BR73140320_W