





# AGILENT ORGANIC GPC/SEC COLUMNS



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<b>1976</b>	<b>1981</b>	<b>1984</b>	<b>1993</b>	<b>1999</b>
<p><b>PLgel columns, individual standards, and standard kits</b></p> <p>Polymer Laboratories founded to develop market-leading products for organic GPC/SEC</p> 	<p><b>PLgel MIXED columns, PL aquagel columns</b></p> <p>MIXED columns improve data quality, and novel chemistries for analysis of water-soluble polymers</p>	<p><b>GPC software</b></p> <p>Dedicated software streamlines GPC/SEC calculations</p> 	<p><b>EasiCal standards</b></p> <p>New format shortens sample preparation time and the speed of calibration</p> 	<p><b>PL-GPC 220 instrument</b></p> <p>Market-leading high temperature GPC system for even the most difficult samples at temperatures up to 220 °C</p> 

# PLGEL GPC COLUMNS

## For molecular weight separation using organic solvents

### Robust

PLgel media is a highly cross-linked Polystyrene-Divinylbenzene (PS-DVB) gel, which offers unequalled stability for a broad range of solvents and temperatures.

### Innovative

As polymer analysis has evolved, so have we. Modern HPLC users can now benefit from Agilent's newest innovations in GPC columns, enabling drastically improved speed and resolution in a wide range of applications.

### Reliable

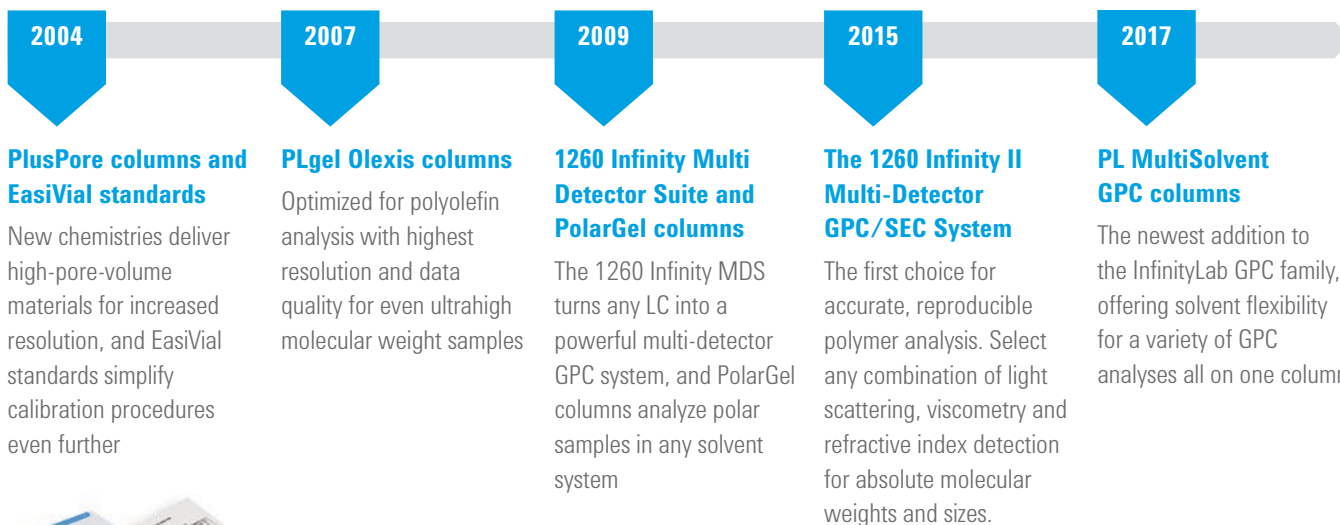
For over 40 years, Agilent has continuously manufactured reliable, reproducible PLgel columns for critical industry applications.

### Agilent Innovations

- **InfinityLab PlusPore** - for next generation fast GPC of a wide range of compounds
- **InfinityLab PLgel Olexis** - for optimized performance during high temperature analysis
- **PLgel MIXED LS** - for noise-free light scattering analysis
- **PLgel Preparative** - for fast sample preparation fractionation, and offline analysis.

### Not sure where to start? Learn more:

- Step-by-Step Method Development for GPC/SEC (5991-7272EN)
- Polymer-to-Solvent Reference Table for GPC/SEC (5991-6802EN)
- Instrument Setup for Fast GPC (5991-7191EN)



# PLGEL GPC COLUMNS

## Solvent compatibility

The choice of solvent in GPC is critical to ensure the prevention of secondary interactions leading to incorrect MW measurements. Analytes must have similar polarity to the solvent to prevent these interactions.

To find the best solvent for your samples, refer to the Polymer-to-Solvent Reference Table for GPC/SEC, publication 5991-6802EN.

### Compatible solvents

Solvent polarity	Solvent
6.0	Perfluoroalkane
7.3	Hexane
8.2	Cyclohexane
8.9	Toluene
9.1	Ethyl acetate
9.1	Tetrahydrofuran (THF) (Stabilized only)
9.3	Chloroform (Stabilized only)
9.3	Methyl ethyl ketone (MEK)
9.7	Dichloromethane
9.8	Dichloroethene
9.9	Acetone
10.0	o-Dichlorobenzene (o-DCB)
10.0	Trichlorobenzene (TCB)
10.2	m-Cresol
10.2	o-Chlorophenol (o-CP)
10.7	Pyridine
10.8	Dimethyl acetamide (DMAc)
11.3	n-Methyl pyrrolidone (NMP)
12.0	Dimethyl sulfoxide (DMSO)
12.1	Dimethyl formamide (DMF)

## PLgel column conditions

- Can be run at temperatures up to 220 °C, and at pressures up to 150 bar
- Tolerate organic solvents at pH 1-14 and up to 10% water can be used in miscible organic solvents
- Are supplied in ethyl benzene and can be transferred between solvents for different polymer analyses without risk of degradation

### PLgel frit porosity

Media Type	Porosity (µm)
PLgel 3 µm	2
PLgel 5 µm	2
PLgel 10 µm	5
PLgel 20 µm	10

### Ordering information

#### PLgel column accessories

Description	Quantity (pk)	Part No.
Frit removal tool for threaded columns only	1	PL1310-0001
Frit (2 µm) kit for threaded columns, 7.5 mm id	5	PL1310-0002
Frit (5 µm) kit for threaded columns, 7.5 mm id	5	PL1310-0012
Frit (10 µm) kit for threaded columns, 7.5 mm id	5	PL1310-0036
PLgel 10 µm column repair gel	1	PL1410-0101
PLgel 5 µm column repair gel	1	PL1410-0501
Column connecting nuts, 1/16 inch tube	5	PL1310-0007
Tubing ferrules, 1/16 inch tube	5	PL1310-0008
Connecting tubing, 10 cm length, 0.01 inch id	10	PL1310-0048

For full instructions on solvent use, refer to the GPC/SEC Column User Guide, publication 5991-3792EN

# INFINITYLAB PLUSPORE COLUMNS

Part of the  
**InfinityLab**  
family

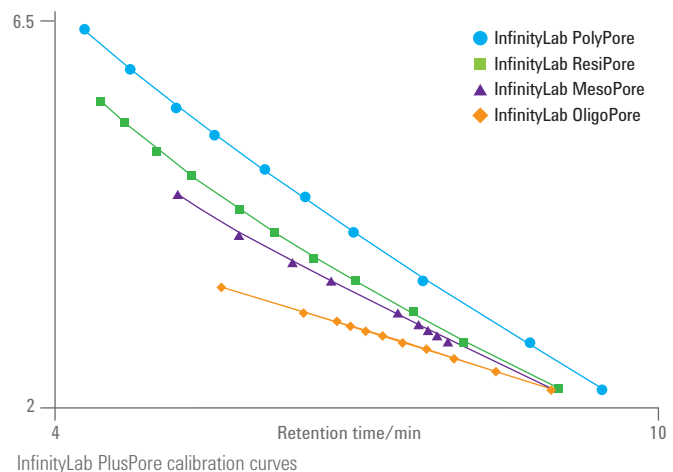
## Next generation GPC particles

- Separate many common samples in under 10 minutes
- High efficiencies and large pore volumes give very high resolution
- Optimized separation over 4 common MW ranges

The InfinityLab PlusPore family of GPC columns uses small, high efficiency media with improved pore volumes to maximize the overall separation.

Multiple pore sizes are present on each PS-DVB particle to further increase efficiency, while still offering a wide MW range with no dislocations.

These columns offer a substantial improvement in both speed and resolution over existing GPC technologies, without sacrificing key factors like reliability and stability.



## PlusPore selection guide

Column	MW Range (g/mol) (PS)	Nominal Particle Size (µm)	Typical efficiency (p/m)	Recommended calibrants	Frit porosity (µm)
InfinityLab PolyPore	200 to 2,000,000	5	>60,000	EasiCal PS-1 or EasiVial PS-H	2
InfinityLab ResiPore	up to 500,000	3	>80,000	EasiCal PS-2 or EasiVial PS-M	2
InfinityLab MesoPore	up to 25,000	3	>80,000	Polystyrene S-L-10 Kit	2
InfinityLab OligoPore	up to 3,300	6	>55,000	Polystyrene S-L2-10 Kit	2

### Agilent InfinityLab Maximize Your LC Workflow Efficiency

How can you make your LC workflow more efficient, so you can spend more time on your analytical priorities?

Find out—with Agilent InfinityLab—an optimized portfolio of LC instruments, columns, and supplies designed to work together in perfect harmony.

Learn more at: [www.agilent.com/chem/infinitylab](http://www.agilent.com/chem/infinitylab)

# INFINITYLAB POLYPORE

Part of the  
**InfinityLab**  
family

## Unrivalled resolution of general polymers

- Optimized for the separation of large polymers and broad MW distributions
- High efficiency particles result in shorter runs and superior resolution
- High performance over the widest range of MWs

### Characteristics

Nominal particle size:	5 µm
Linear MW operating range:	200 to 2,000,000 g/mol (PS equivalent)
Guaranteed column efficiency:	>60,000 p/m
Typical pressure:	1 mL/min (7.5 mm id): ≈ 30 bar (145 psi) per 300 mm (THF @ 25 °C, TCB @ 140 °C)
Maximum flow rate:	7.5 mm id: 1.5 mL/min
Maximum pressure:	150 bar (2175 psi)
Maximum temperature:	150 °C
Recommended number of columns/set:	2x 300 mm

### Recommended calibrants:

- EasiVial PS-H for convenient 12 point calibration in three preweighed vials (2 mL vials: PL2010-0201, 4 mL vials: PL2010-0200)
- EasiCal PS-1 for a 10 point calibration in an easy, stir-in format

See publication 5990-7996EN, GPC/SEC Standards Product Guide

## Ordering Information

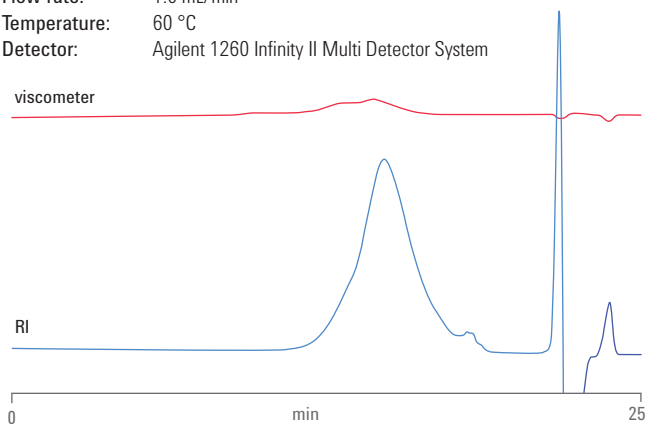
Description	Part No.
InfinityLab PolyPore, 2.1 x 250 mm	PL1913-5500
InfinityLab PolyPore, 4.6 x 250 mm	PL1513-5500
InfinityLab PolyPore, 7.5 x 300 mm	PL1113-6500
InfinityLab PolyPore Guard, 4.6 x 50 mm	PL1513-1500
InfinityLab PolyPore Guard, 7.5 x 50 mm	PL1113-1500

## Typical applications

Polystyrenes, polycarbonates, polyurethanes, polysiloxanes

### Conditions

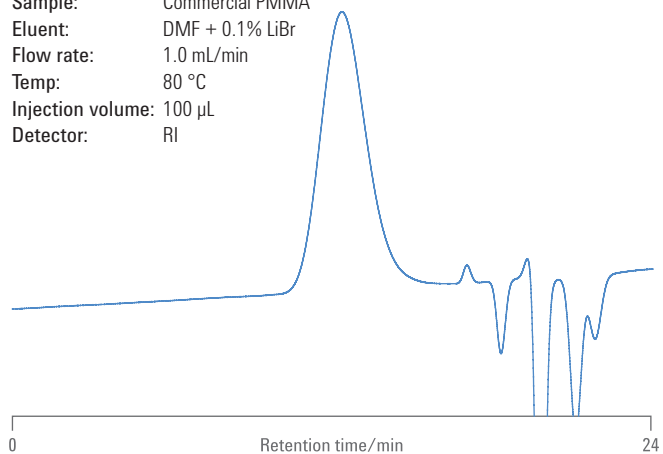
Columns:	2x InfinityLab PolyPore, 7.5 x 300 mm
Eluent:	Toluene
Flow rate:	1.0 mL/min
Temperature:	60 °C
Detector:	Agilent 1260 Infinity II Multi Detector System



Analysis of polydimethylsiloxane (PDMS)

### Conditions

Columns:	2x InfinityLab PolyPore, 7.5 x 300 mm
Sample:	Commercial PMMA
Eluent:	DMF + 0.1% LiBr
Flow rate:	1.0 mL/min
Temp:	80 °C
Injection volume:	100 µL
Detector:	RI



Polymethylmethacrylate in DMF

# INFINITYLAB RESIPORE

Part of the  
**InfinityLab**  
family

## High resolution of resins and condensation polymers

- Optimized for the separation of medium MW polymers
- 3 µm particles offer the highest efficiency and resolution
- Excellent performance over a broad MW range

InfinityLab ResiPore columns are the ideal choice for the analysis of resins and condensation polymers with complex molecular weight distributions that include oligomer content. By combining a low 3 µm particle size and high pore volume, high efficiency InfinityLab ResiPore columns offer maximum resolution of these intermediate molecular weight polymers.

### Characteristics

Nominal particle size:	3 µm
Linear MW operating range:	up to 500,000 g/mol (PS equivalent)
Guaranteed column efficiency:	>80,000 p/m
Typical pressure:	1 mL/min (7.5 mm id): ≈ 50 bar (145 psi) per 300 mm (THF @ 25 °C, TCB @ 140 °C)
Maximum flow rate:	7.5 mm id: 1.5 mL/min
Maximum pressure:	150 bar (2175 psi)
Maximum temperature:	110 °C
Recommended number of columns/set:	2x 300 mm

### Recommended calibrants:

- EasiVial PS-M for convenient 12 point calibration in three pre-weighed vials (2 mL vials: PL2010-0301, 4 mL vials: PL2010-0300)
- EasiCal PS-2 for a 10 point calibration in an easy, stir-in format

See publication 5990-7996EN, GPC/SEC Standards Product Guide

## Ordering Information

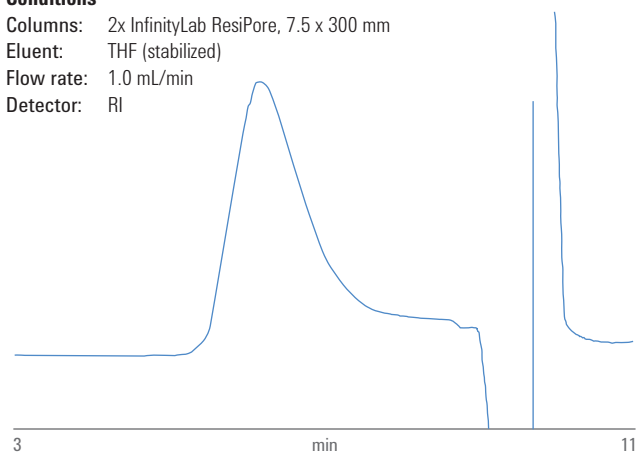
Description	Part No.
InfinityLab ResiPore, 2.1 x 250 mm	PL1913-5300
InfinityLab ResiPore, 4.6 x 250 mm	PL1513-5300
InfinityLab ResiPore, 7.5 x 300 mm	PL1113-6300
InfinityLab ResiPore Guard, 4.6 x 50 mm	PL1513-1300
InfinityLab ResiPore Guard, 7.5 x 50 mm	PL1113-1300

## Typical applications

Epoxy resins, polyester resins, silicone fluids, polyolefin waxes

### Conditions

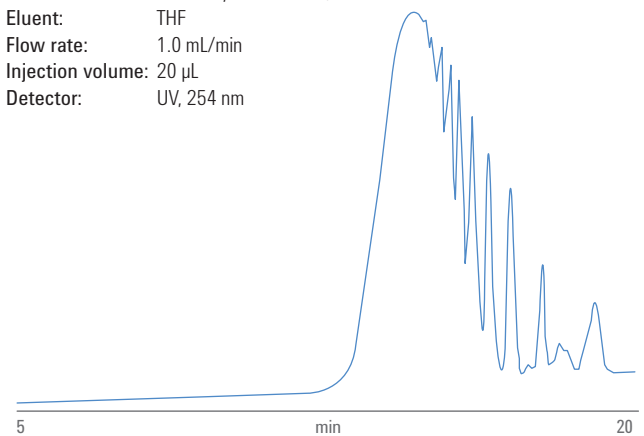
Columns: 2x InfinityLab ResiPore, 7.5 x 300 mm  
Eluent: THF (stabilized)  
Flow rate: 1.0 mL/min  
Detector: RI



Rapid analysis of commercial paint resin

### Conditions

Columns: 2x InfinityLab ResiPore, 7.5 x 300 mm  
Eluent: THF  
Flow rate: 1.0 mL/min  
Injection volume: 20 µL  
Detector: UV, 254 nm



High resolution analysis of a commercial polyester and its oligomers

## Unsurpassed separation of prepolymers and low MW resins

- Optimized for the separation of low MW polymers, prepolymers, and additives
- 3 µm particles offer the highest efficiency and resolution
- Best for identifying higher oligomers, plasticizers, and residues

InfinityLab MesoPore columns have been designed to give optimum results in the analysis of polymeric materials with a large oligomeric content. By combining a 3 µm particle size with high pore volume, InfinityLab MesoPore columns give the highest resolution separations for the analysis of low molecular weight polymers, such as prepolymers, resins, polyols, and siloxanes.

### Characteristics

Nominal particle size:	3 µm
Linear MW operating range:	up to 25,000 g/mol (PS equivalent)
Guaranteed column efficiency:	>80,000 p/m
Typical pressure:	1 mL/min (7.5 mm id): ≈ 50 bar (145 psi) per 300 mm (THF @ 25 °C, TCB @ 140 °C)
Maximum flow rate:	7.5 mm id: 1.5 mL/min
Maximum pressure:	150 bar (2175 psi)
Maximum temperature:	110 °C
Recommended number of columns/set:	1x 300 mm (optimized system), 2x 300 (other systems)

### Recommended calibrants:

- EasiVial PS-L for convenient 12 point calibration in three pre-weighed vials (2 mL vials: PL2010-0401, 4 mL vials: PL2010-0400)
- For polar solvents and alternative calibrations, EasiVial PEG offers the same 12 point calibration in three pre-weighed vials (2 mL vials: PL2070-0201, 4 mL vials: PL2070-0200)

See publication 5990-7996EN, GPC/SEC Standards Product Guide

### Ordering Information

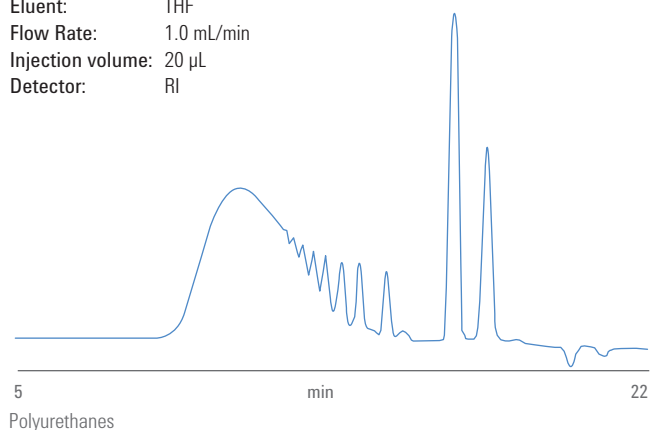
Description	Part No.
InfinityLab MesoPore, 2.1 x 250 mm	PL1913-5325
InfinityLab MesoPore, 4.6 x 250 mm	PL1513-5325
InfinityLab MesoPore, 7.5 x 300 mm	PL1113-6325
InfinityLab MesoPore Guard, 4.6 x 50 mm	PL1513-1325
InfinityLab MesoPore Guard, 7.5 x 50 mm	PL1113-1325

### Typical applications

Prepolymers, resins, polyols, siloxanes

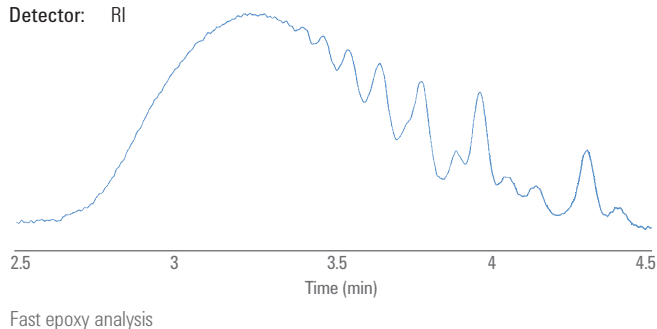
#### Conditions

Columns:	2x InfinityLab MesoPore, 7.5 x 300 mm
Eluent:	THF
Flow Rate:	1.0 mL/min
Injection volume:	20 µL
Detector:	RI



#### Conditions

Columns:	InfinityLab MesoPore, 4.6 x 250 mm
Eluent:	THF (stabilized)
Flow Rate:	1.2 mL/min
Detector:	RI





## Excellent resolution of oligomeric samples with analytical and preparative columns

- Optimized particles for separation of individual compounds by MW
- Unique ultrahigh pore volume particles provide maximum separation of small molecules
- Individual identification of oligomers, additives, and impurities

InfinityLab OligoPore columns use a unique, high pore volume polymeric particle to achieve extremely high levels of resolution for small molecules and oligomers. The highly reproducible and predictable separation allows for easy batch identification ('fingerprinting') as well as quantitation of residues, impurities, and additives.

### Characteristics

Nominal particle size:	6 µm
Linear MW operating range:	up to 3,300 g/mol (PS equivalent)
Guaranteed column efficiency:	>55,000 p/m
Typical pressure:	1 mL/min (7.5 mm id): ≈ 30 bar (145 psi) per 300 mm (THF @ 25 °C, TCB @ 140 °C)
Maximum flow rate:	7.5 mm id: 1.5 mL/min
Maximum pressure:	150 bar (2175 psi)
Maximum temperature:	110 °C
Recommended number of columns/set:	1x 300 mm (optimized system), 2x 300 (other systems)

### Recommended calibrants:

- EasiVial PS-L for convenient 12 point calibration in three pre-weighed vials (2 mL vials: PL2010-0401, 4 mL vials: PL2010-0400)
- For polar solvents and alternative calibrations, EasiVial PEG offers the same 12 point calibration in three pre-weighed vials (2 mL vials: PL2070-0201, 4 mL vials: PL2070-0200)

See publication 5990-7996EN, GPC/SEC Standards Product Guide

### Ordering Information

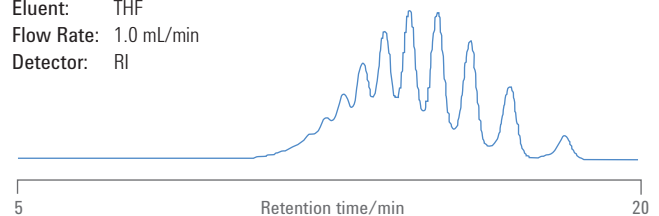
Description	Part No.
InfinityLab OligoPore, 2.1 x 250 mm	PL1913-5520
InfinityLab OligoPore, 4.6 x 250 mm	PL1513-5520
InfinityLab OligoPore, 7.5 x 300 mm	PL1113-6520
InfinityLab OligoPore, 25 x 300 mm	PL1213-6520
InfinityLab OligoPore Guard, 4.6 x 50 mm	PL1513-1320
InfinityLab OligoPore Guard, 7.5 x 50 mm	PL1113-1320

### Typical applications

Polyurethanes, epoxy resins, polystyrenes

#### Conditions

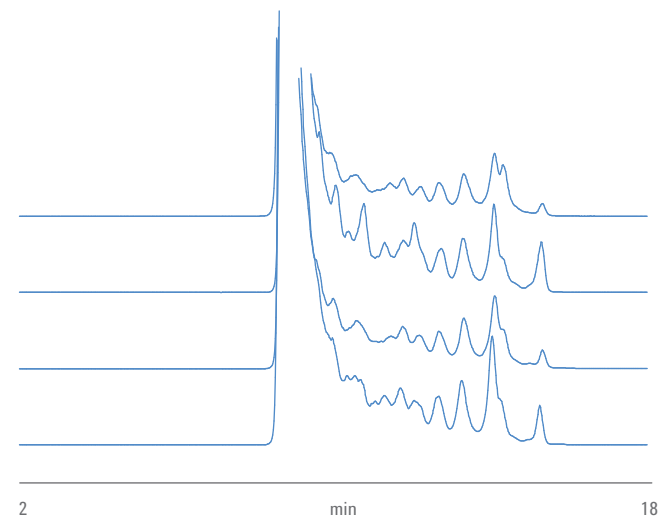
Columns: 2x InfinityLab OligoPore, 7.5 x 300 mm  
Eluent: THF  
Flow Rate: 1.0 mL/min  
Detector: RI



Rapid isolation of individual oligomers in polystyrene sample

#### Conditions

Columns: 2x InfinityLab OligoPore, 7.5 x 300 mm  
Eluent: THF (stabilized)  
Flow Rate: 1.0 mL/min  
Detector: 1260 Infinity II ELSD (neb = 40 °C, evap = 60 °C, gas = 1.5 SLM)



Ultrahigh resolution of oligomers and additives in epoxy batches

# PL RAPIDE COLUMNS

## Maximizing speed and resolution on high dispersion systems

- High-speed analysis even when used with older systems or high dispersion detectors
- Maximizes sample throughput on existing systems with minimal investment
- Simple, drop-in replacement for older technologies

The PL Rapide column offers high speed and resolution on high dispersion systems by combining high efficiency PLgel media with high flow rates.

High flow rates minimize the efficiency loss caused by the high dead volumes found in older instruments and large flowcell detectors. Despite the increase in flowrate, the reduction in runtime means that total solvent consumption is also reduced.

For more information, refer to Instrument Setup for Fast GPC (5991-7191EN)

### Characteristics

Typical pressure:	<30 bar per column
Maximum flow rate:	10 mm id: 3.0 mL/min 7.5 mm id: 1.5 mL/min
Maximum pressure:	150 bar (2175 psi) 100 bar (1450 psi)
Maximum temperature:	220 °C (Rapide H), 150 °C (Rapide M), 110 °C (Rapide L and F)

Recommended number of columns/set: 3x 100 mm or 2x 150 mm

### Recommended calibrants:

- EasiVial PS-H for convenient 12 point calibration in three preweighed vials (2 mL vials: PL2010-0201, 4 mL vials: PL2010-0200)
- EasiCal PS-1 for a 10 point calibration in an easy, stir-in format

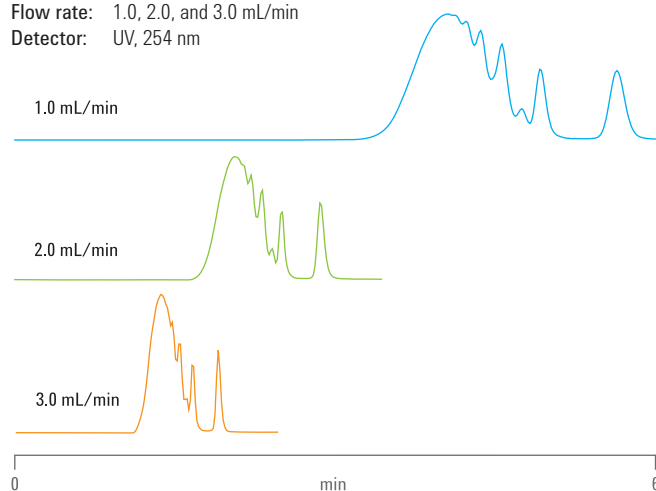
See publication 5990-7996EN, GPC/SEC Standards Product Guide

### Typical applications

Epoxy resins, process monitoring, flow injection analysis

### Conditions

Columns: PL Rapide L, 10 x 100 mm  
Sample: Epoxy resin  
Eluent: THF  
Flow rate: 1.0, 2.0, and 3.0 mL/min  
Detector: UV, 254 nm



PL Rapide columns show minimal resolution loss at high flow rates

### Ordering information

Description	MW range (g/mol)	Guaranteed efficiency (p/m)	Part No.
PL Rapide H, 7.5 x 150 mm	500 to 10,000,000	>40,000	PL1113-3100
PL Rapide H, 10 x 100 mm	500 to 10,000,000	>40,000	PL1013-2100
PL Rapide M, 7.5 x 150 mm	200 to 2,000,000	>60,000	PL1113-3500
PL Rapide M, 10 x 100 mm	200 to 2,000,000	>60,000	PL1013-2500
PL Rapide L, 7.5 x 150 mm	200 to 500,000	>80,000	PL1113-3300
PL Rapide L, 10 x 100 mm	200 to 500,000	>80,000	PL1013-2300
PL Rapide F, 7.5 x 150 mm	up to 3,300	>55,000	PL1113-3120
PL Rapide F, 10 x 100 mm	up to 3,300	>55,000	PL1013-2120

# NARROW BORE COLUMNS

## Reduced solvent use

- Reduce solvent use by 70 % (4.6 mm) to 93 % (2.1 mm).
- Store less solvent and increase operator safety.
- Reduce environmental impact and disposal costs of chlorinated and VOC solvents.

To help customers improve their safety and reduce their environmental impact, Agilent offers columns in 4.6 and 2.1 mm diameters for reduced solvent consumption.

These narrow bore columns reduce flow rates while still meeting the same standards for performance, stability, and solvent compatibility.

## Tips

Narrow bore columns are much more sensitive to instrument dispersion than wider diameters. Before installation, be sure to review Instrument Setup for Fast GPC (5991-7191EN)

For low flow GPC, achieve high resolution and sensitivity with the Agilent 1290 Infinity II Refractive Index Detector (G7162B)

### Conditions

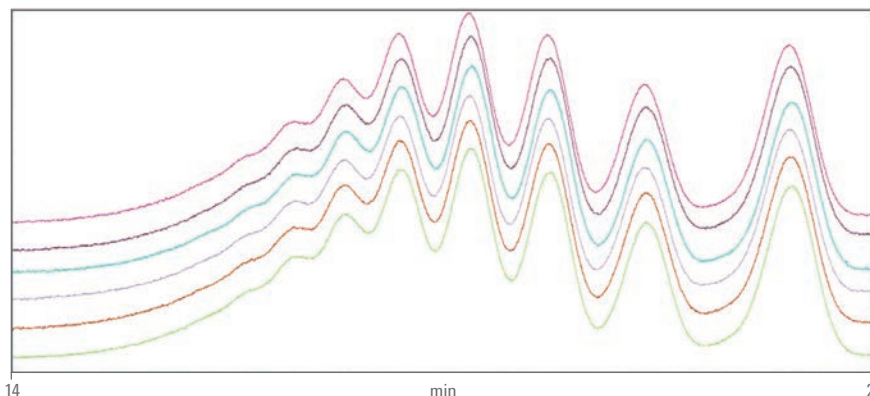
Columns: 2x InfinityLab Oligopore, 2.1 x 250 mm

Sample: Polystyrene

Eluent: THF

Flow rate: 0.06 mL/min

Detector: 1290 Infinity II Refractive Index Detector



Combining a 2.1 mm diameter column with the low dispersion 1290 Infinity II Refractive Index Detector allows for a 94% solvent reduction from a 7.5 mm diameter column

## Ordering information

Description	Linear MW operating range (g/mol) (PS)	Guaranteed efficiency (p/m)	Part No.
InfinityLab PolyPore, 2.1 x 250 mm	200 to 2,000,000	>60,000	PL1913-5500
InfinityLab PolyPore, 4.6 x 250 mm	200 to 2,000,000	>60,000	PL1513-5500
InfinityLab ResiPore, 2.1 x 250 mm	up to 500,000	>80,000	PL1913-5300
InfinityLab ResiPore, 4.6 x 250 mm	up to 500,000	>80,000	PL1513-5300
InfinityLab MesoPore, 2.1 x 250 mm	up to 25,000	>80,000	PL1913-5325
InfinityLab MesoPore, 4.6 x 250 mm	up to 25,000	>80,000	PL1513-5325
InfinityLab OligoPore, 2.1 x 250 mm	up to 3,300	>55,000	PL1913-5520
InfinityLab OligoPore, 4.6 x 250 mm	up to 3,300	>55,500	PL1513-5520

# INFINITYLAB PLGEL OLEXIS

Part of the  
**InfinityLab**  
family

## Optimal performance and lifetime for high molecular weight polymers

- Optimized design for the analysis of polyolefins and performance polymers
- 13  $\mu\text{m}$  particles provide stability and resolution, with no shear degradation
- Extended lifetime at very high temperatures

### Characteristics

Nominal particle size:	13 $\mu\text{m}$
Linear MW operating range:	2,000 to 10,000,000 g/mol (PS equivalent)
Guaranteed column efficiency:	>30,000 p/m
Typical pressure:	1 mL/min (7.5 mm id): $\approx$ 8 bar (116 psi) per 300 mm (THF @ 20 °C, TCB @ 140 °C)
Maximum flow rate:	7.5 mm id: 1.5 mL/min
Maximum pressure:	150 bar (2175 psi)
Maximum temperature:	220 °C
Recommended number of columns/set:	3x 300 mm

### Recommended calibrants:

- EasiVial PS-H for convenient 12 point calibration in three preweighed vials (2 mL vials: PL2010-0201, 4 mL vials: PL2010-0200)
- EasiCal PS-1 for a 10 point calibration in an easy, stir-in format

See publication 5990-7996EN, GPC/SEC Standards Product Guide

## Ordering information

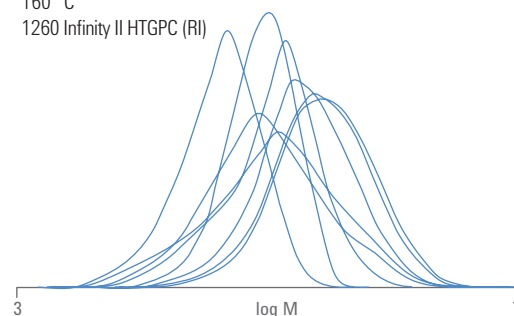
Description	Part No.
InfinityLab PLgel Olexis, 7.5 x 300 mm	PL1110-6400
InfinityLab PLgel Olexis Guard, 7.5 x 50 mm	PL1110-1400

## Typical applications

### Polyolefins

#### Conditions

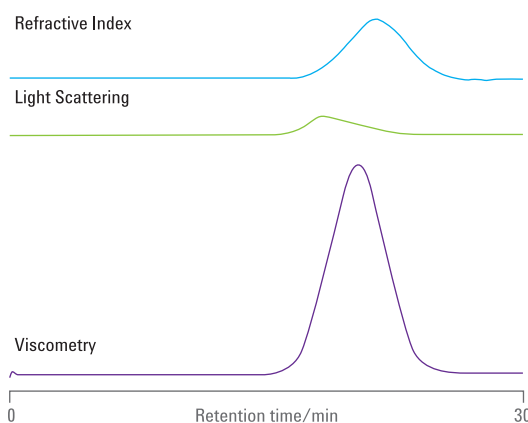
Columns:	3x InfinityLab PLgel Olexis, 7.5 x 300 mm
Sample:	Polyolefins
Eluent:	Trichlorobenzene + 0.0125% BHT
Flow rate:	1.0 mL/min
Injection volume:	200 $\mu\text{L}$
Temperature:	160 °C
Detector:	1260 Infinity II HTGPC (RI)



Reliably predict a polymer's performance with accurate MW distributions

#### Conditions

Columns:	3x InfinityLab PLgel Olexis, 7.5 x 300 mm
Eluent:	Trichlorobenzene + 0.0125% BHT
Injection volume:	200 $\mu\text{L}$
Temperature:	160 °C
Detector:	1260 Infinity II HTGPC (RI) + dual angle LS + viscometry



Accurate molecular weight and branching information for polyethylene is gathered using triple detector data

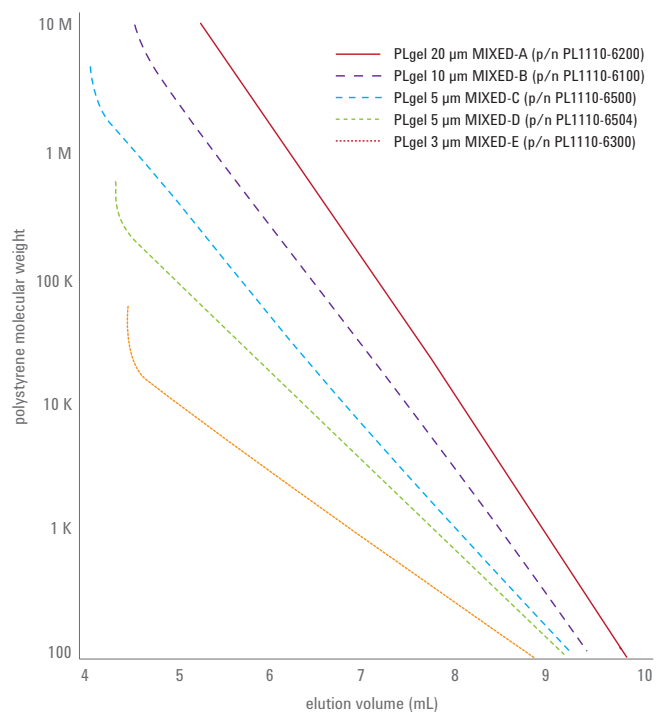
# PLGEL MIXED COLUMNS

## Simplified analysis of a wide variety of samples

- The easiest solution for a GPC analysis, since the chromatogram directly reflects the molecular weight distribution
- MIXED columns are made with individual pore size media precisely blended to create a linear calibration curve over the stated molecular weight range
- Offers a superior alternative to stacking individual pore size columns to extend range, which often leads to mismatched calibration curves and warped molecular weight distributions
- Linear calibration curves offer quick visual identification of peaks, and simplified data processing
- Resolution is easily improved by stacking the same MIXED columns to create the desired level of precision, all while keeping the benefits of a linear calibration curve
- Tight production control of calibration curves means that reproducible chromatograms can be generated with every new column

### Tip

Retention changes as columns age, so regular calibration is crucial for obtaining accurate results.



PLgel MIXED calibration curves

### Reference

Meehan, E. (1998) *Size exclusion chromatography columns from Polymer Laboratories*. In: Chi-San Wu (Ed.) *Column Handbook for Size Exclusion Chromatography*. Academic Press, New York, USA.

# PLGEL 20 $\mu\text{m}$ MIXED-A

## For very high MW materials

- Extremely high exclusion limit tailored to the MW of the application
- Large particle size matched to the MW range for optimum performance
- Wide frit and large particles minimize shear degradation of samples

### Characteristics

Linear MW operating range:	2,000 to 40,000,000 g/mol (PS equivalent)
Guaranteed column efficiency:	>18,000 p/m
Typical pressure:	1 mL/min (7.5 mm id): $\approx$ 3 bar (44 psi) per 300 mm 0.3 mL/min (4.6 mm id): $\approx$ 2.4 bar (35 psi) per 250 mm (THF @ 20 °C, TCB @ 140 °C)
Maximum flow rate:	7.5 mm id: 1.5 mL/min 4.6 mm id: 0.5 mL/min
Maximum pressure:	150 bar (2175 psi)
Maximum temperature:	220 °C

Recommended number of columns/set: 4x 250 mm or 4x 300 mm

### Recommended calibrants:

- EasiVial PS-H for convenient 12 point calibration in three preweighed vials (2 mL vials: PL2010-0201, 4 mL vials: PL2010-0200)
- EasiCal PS-1 for a 10 point calibration in an easy, stir-in format

See publication 5990-7996EN, GPC/SEC Standards Product Guide

## Ordering information

Description	Part No.
PLgel 20 $\mu\text{m}$ MIXED-A, 7.5 x 300 mm	PL1110-6200
PLgel 20 $\mu\text{m}$ MiniMIX-A, 4.6 x 250 mm	PL1510-5200
PLgel 20 $\mu\text{m}$ Guard, 7.5 x 50 mm	PL1110-1220
PLgel 20 $\mu\text{m}$ MiniMIX-A Guard, 4.6 x 50 mm	PL1510-1200

### Tip

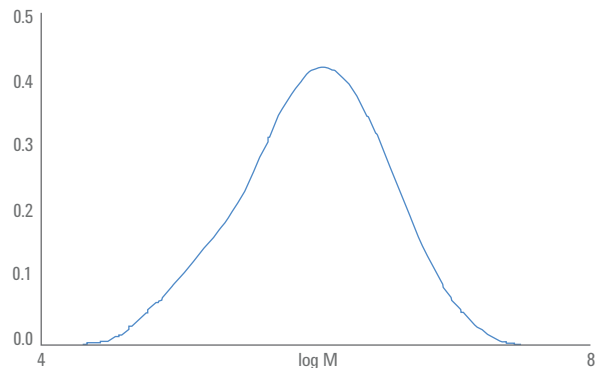
High temperatures mean accelerated degradation. Keep your results accurate with regular calibration.

## Typical applications

Polyolefins, polybutadienes, starches, polyisoprenes

### Conditions

Columns:	4x PLgel 20 $\mu\text{m}$ MIXED-A, 7.5 x 300 mm
Eluent:	TCB + 0.015% BHT
Flow rate:	1.0 mL/min
Temperature:	160 °C
Detector:	1260 Infinity II HTGPC (RI)

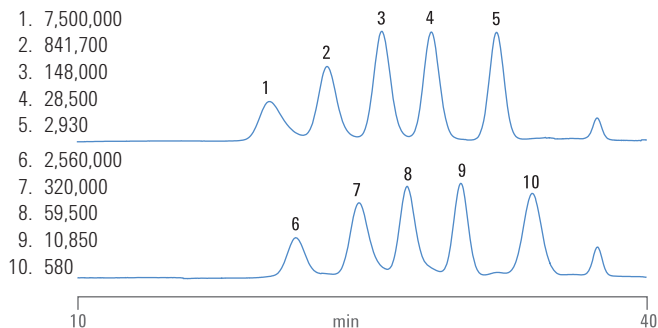


Complete molecular weight distribution of ultrahigh molecular weight polyethylene (UHMWPE) is captured using Agilent PLgel 20  $\mu\text{m}$  MIXED-A columns

### Conditions

Columns:	4x PLgel 20 $\mu\text{m}$ MIXED-A, 7.5 x 300 mm
Sample:	EasiCal PS-1
Eluent:	THF
Flow Rate:	1.0 mL/min
Detector:	UV, 254 nm

### Peak Identification



Polystyrene standards separation demonstrates the ultrahigh range of the Mixed-A

# PLGEL 10 $\mu\text{m}$ MIXED-B

## Maximum resolution for high temperature, high MW applications

- Wide MW operating range maximizes column usefulness
- 10  $\mu\text{m}$  particles offer improved resolution while maintaining high thermal stability
- Wide range of applications simplifies column choice

### Characteristics

Linear MW operating range: 500 to 10,000,000 g/mol (PS equivalent)  
 Guaranteed column efficiency: >35,000 p/m  
 Typical pressure: 1 mL/min (7.5 mm id):  $\approx$  10 bar (145 psi) per 300 mm  
 0.3 mL/min (4.6 mm id):  $\approx$  8 bar (116 psi) per 250 mm (THF @ 20 °C, TCB @ 140 °C)

Maximum flow rate: 7.5 mm id: 1.5 mL/min  
 4.6 mm id: 0.5 mL/min

Maximum pressure: 150 bar (2175 psi)

Maximum temperature: 220 °C

Recommended number of columns/set: 3x 250 mm or 3x 300 mm

### Recommended calibrants:

- EasiVial PS-H for convenient 12 point calibration in three preweighed vials (2 mL vials: PL2010-0201, 4 mL vials: PL2010-0200)
- EasiCal PS-1 for a 10 point calibration in an easy, stir-in format

See publication 5990-7996EN, GPC/SEC Standards Product Guide

## Ordering information

Description	Part No.
PLgel 10 $\mu\text{m}$ MIXED-B, 7.5 x 300 mm	PL1110-6100
PLgel 10 $\mu\text{m}$ MiniMIX-B, 4.6 x 250 mm	PL1510-5100
PLgel 10 $\mu\text{m}$ Guard, 7.5 x 50 mm	PL1110-1120
PLgel 10 $\mu\text{m}$ MiniMIX-B Guard, 4.6 x 50 mm	PL1510-1100

### Tip

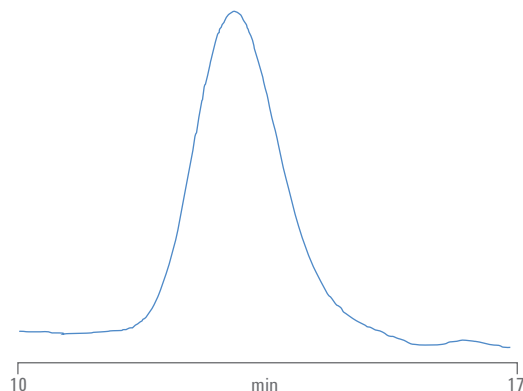
High temperatures mean accelerated degradation. Keep your results accurate with regular calibration.

## Typical applications

Polyolefins, polybutadienes, starches, polyisoprenes

### Conditions

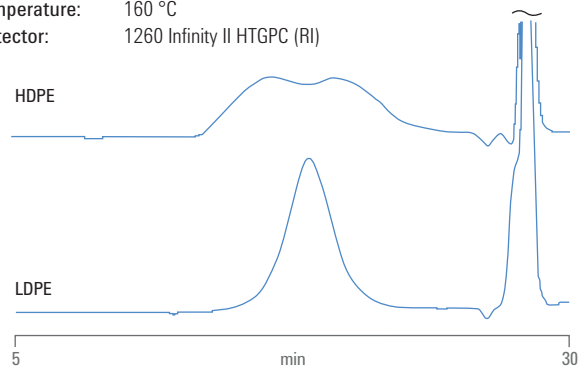
Columns: 2x PLgel 10  $\mu\text{m}$  MIXED-B, 7.5 x 300 mm  
 Eluent: o-Chlorophenol  
 Flow rate: 1.0 mL/min  
 Temperature: 100 °C  
 Detector: 1260 Infinity II HTGPC (RI)



Analysis for challenging Polyethylene Terephthalate (PET) samples on Agilent PLgel MIXED-B columns

### Conditions

Columns: 3x PLgel 10  $\mu\text{m}$  MIXED-B, 7.5 x 300 mm  
 Eluent: TCB  
 Flow rate: 1.0 mL/min  
 Temperature: 160 °C  
 Detector: 1260 Infinity II HTGPC (RI)



Polyethylenes

# PLGEL 5 $\mu$ m MIXED-C

## For simple analysis across a wide MW range

- Excellent reproducibility of chromatograms between columns for easy comparison and overlay
- Optimized MW range for general polymer analysis
- Linear calibration curve ensures consistent resolution across the MW range

### Characteristics

Linear MW operating range:	200 to 2,000,000 g/mol (PS equivalent)
Guaranteed column efficiency:	>50,000 p/m
Typical pressure:	1 mL/min (7.5 mm id): $\approx$ 30 bar (435 psi) per 300 mm 0.3 mL/min (4.6 mm id): $\approx$ 24 bar (348 psi) per 250 mm (THF @ 20 °C, TCB @ 140 °C)
Maximum flow rate:	7.5 mm id: 1.5 mL/min 4.6 mm id: 0.5 mL/min
Maximum pressure:	150 bar (2175 psi)
Maximum temperature:	150 °C
Recommended number of columns/set:	2x 250 mm or 2x 300 mm

### Recommended calibrants:

- EasiVial PS-H for convenient 12 point calibration in three preweighed vials (2 mL vials: PL2010-0201, 4 mL vials: PL2010-0200)
- EasiCal PS-1 for a 10 point calibration in an easy, stir-in format

See publication 5990-7996EN, GPC/SEC Standards Product Guide

## Ordering information

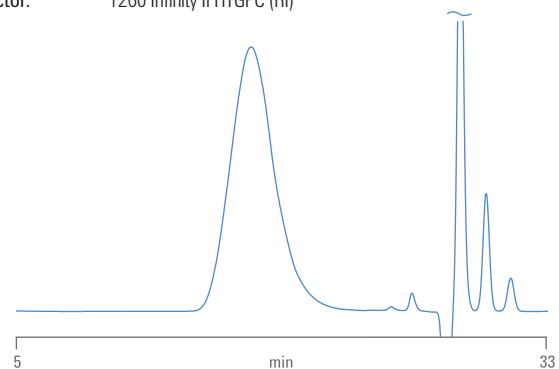
Description	Part No.
PLgel 5 $\mu$ m MIXED-C, 7.5 x 300 mm	PL1110-6500
PLgel 5 $\mu$ m MiniMIX-C, 4.6 x 250 mm	PL1510-5500
PLgel 5 $\mu$ m Guard, 7.5 x 50 mm	PL1110-1520
PLgel 5 $\mu$ m MiniMIX-C Guard, 4.6 x 50 mm	PL1510-1500

## Typical applications

Polystyrenes, polyurethanes, polycarbonates, polysiloxanes

### Conditions

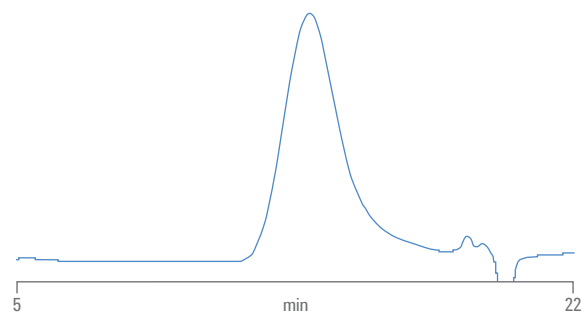
Columns:	2x PLgel 5 $\mu$ m MIXED-C, 7.5 x 300 mm
Eluent:	THF
Flow rate:	1.0 mL/min
Detector:	1260 Infinity II HTGPC (RI)



GPC measures additive content in PVC

### Conditions

Columns:	2x PLgel 5 $\mu$ m MIXED-C, 7.5 x 300 mm
Eluent:	DMF + 0.1% LiBr
Flow rate:	1.0 mL/min
Temperature:	80 °C
Detector:	1260 Infinity II HTGPC (RI)



Polyurethane



# PLGEL 5 $\mu$ m MIXED-D

## For straightforward analysis of midsized polymers

- Easy visual identification of low MW polymers, plasticizers, and oligomers
- Offers excellent low MW resolution while retaining high temperature stability
- Optimum MW range for many free radical and condensation polymers

### Characteristics

Linear MW operating range:	200 to 400,000 g/mol (PS equivalent)
Guaranteed column efficiency:	>50,000 p/m
Typical pressure:	1 mL/min (7.5 mm id): $\approx$ 30 bar (435 psi) per 300 mm 0.3 mL/min (4.6 mm id): $\approx$ 24 bar (348 psi) per 250 mm (THF @ 20 °C, TCB @ 140 °C)
Maximum flow rate:	7.5 mm id: 1.5 mL/min 4.6 mm id: 0.5 mL/min
Maximum pressure:	150 bar (2175 psi)
Maximum temperature:	150 °C
Recommended number of columns/set:	2x 250 mm or 2x 300 mm

### Recommended calibrants:

- EasiVial PS-M for convenient 12 point calibration in three preweighed vials (2 mL vials: PL2010-0301, 4 mL vials: PL2010-0300)
- EasiCal PS-2 for a 10 point calibration in an easy, stir-in format

See publication 5990-7996EN, GPC/SEC Standards Product Guide

### Ordering information

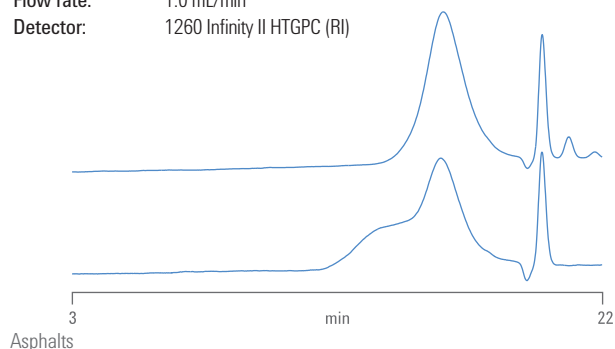
Description	Part No.
PLgel 5 $\mu$ m MIXED-D, 7.5 x 300 mm	PL1110-6504
PLgel 5 $\mu$ m MiniMIX-D, 4.6 x 250 mm	PL1510-5504
PLgel 5 $\mu$ m Guard, 7.5 x 50 mm	PL1110-1520
PLgel 5 $\mu$ m MiniMIX-D Guard, 4.6 x 50 mm	PL1510-1504

### Typical applications

Epoxy resins, silicone fluids, polyester resins, polyolefins

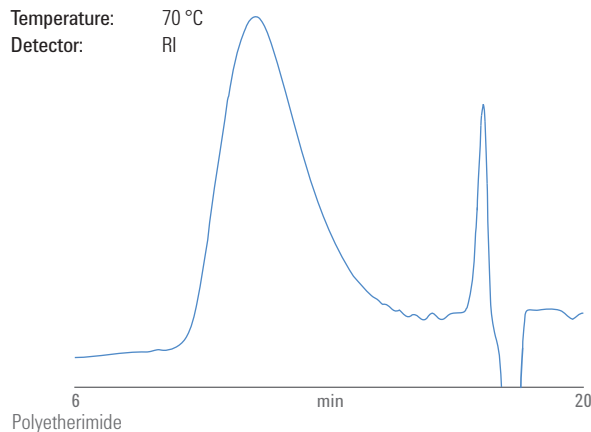
#### Conditions

Columns: 2x PLgel 5  $\mu$ m MIXED-D, 7.5 x 300 mm  
Eluent: THF  
Flow rate: 1.0 mL/min  
Detector: 1260 Infinity II HTGPC (RI)



#### Conditions

Columns: 2x PLgel 5  $\mu$ m MIXED-D, 7.5 x 300 mm  
Eluent: DMF + 0.1% LiBr  
Flow rate: 1.0 mL/min  
Temperature: 70 °C  
Detector: RI



# PLGEL 3 $\mu\text{m}$ MIXED-E

## Oligomers and polymers up to 25,000 MW

- Highest efficiency MIXED bed column
- Fast analysis improves productivity
- Optimized particle size for low MW polymers, oligomers, and additives

### Characteristics

Linear MW operating range:	up to 25,000 g/mol (PS equivalent)
Guaranteed column efficiency:	7.5 x 300 mm: >80,000 p/m 4.6 x 250 mm: >70,000 p/m Highest efficiency/resolution achieved only on high performance, low dead volume equipment.
Typical pressure:	1 mL/min (7.5 mm id): $\approx$ 50 bar (725 psi) per 300 mm 0.3 mL/min (4.6 mm id): $\approx$ 42 bar (609 psi) per 250 mm (THF @ 20 °C)
Maximum flow rate:	7.5 mm id: 1.5 mL/min 4.6 mm id: 0.5 mL/min
Maximum pressure:	180 bar (2611 psi)
Maximum temperature:	110 °C
Recommended number of columns/set:	1-3x 250 mm or 1-3x 300 mm

### Recommended calibrants:

- EasiVial PS-L for convenient 12 point calibration in three pre-weighed vials (2 mL vials: PL2010-0401, 4 mL vials: PL2010-0400)
- For polar solvents and alternative calibrations, EasiVial PEG offers the same 12 point calibration in three pre-weighed vials (2 mL vials: PL2070-0201, 4 mL vials: PL2070-0200)

See publication 5990-7996EN, GPC/SEC Standards Product Guide

### Ordering information

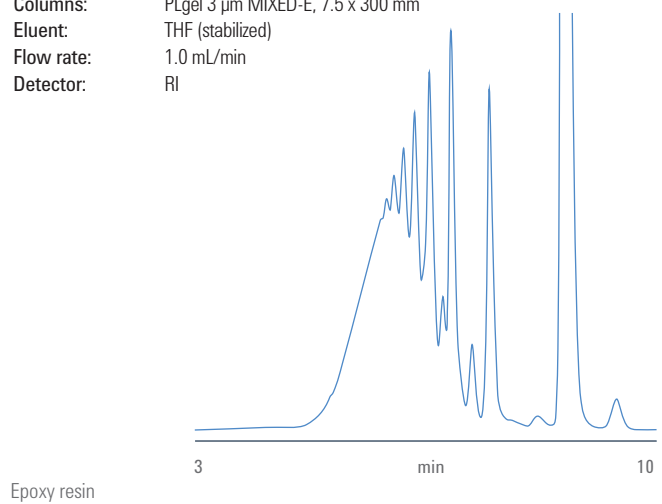
Description	Part No.
PLgel 3 $\mu\text{m}$ MIXED-E, 7.5 x 300 mm	PL1110-6300
PLgel 3 $\mu\text{m}$ MiniMIX-E, 4.6 x 250 mm	PL1510-5300
PLgel 3 $\mu\text{m}$ Guard, 7.5 x 50 mm	PL1110-1320
PLgel 3 $\mu\text{m}$ MiniMIX-E Guard, 4.6 x 50 mm	PL1510-1300

### Typical applications

Prepolymers, polyols, resins, siloxanes

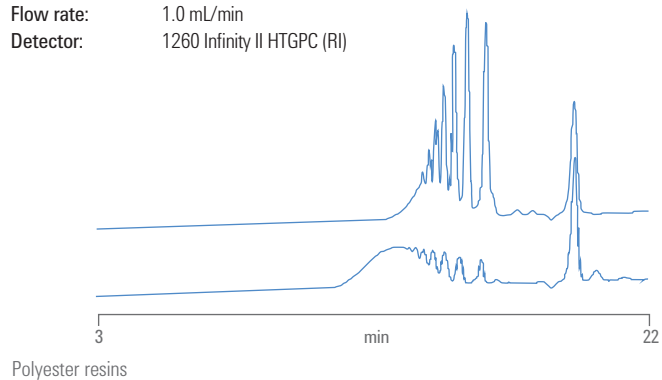
#### Conditions

Columns:	PLgel 3 $\mu\text{m}$ MIXED-E, 7.5 x 300 mm
Eluent:	THF (stabilized)
Flow rate:	1.0 mL/min
Detector:	RI



#### Conditions

Columns:	2x PLgel 3 $\mu\text{m}$ MIXED-E, 7.5 x 300 mm
Eluent:	THF
Flow rate:	1.0 mL/min
Detector:	1260 Infinity II HTGPC (RI)



# PLGEL MIXED-LS

## Eliminates particle leakage to improve data quality with light scattering detection

- Instant improvement in data quality
- No need for conditioning, therefore saving time and solvent costs
- Maximize the potential of light scattering detectors

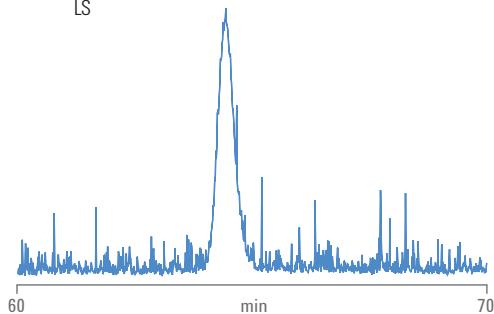
PLgel MIXED-LS uses a proprietary polymerization technique to eliminate the LS noise caused by nanoparticle leakage from GPC columns. Columns can be used straight from the box, without wasting hours washing the column.

### Typical applications

Polyethylenes, polyolefins

#### Conditions

Columns: Conventional GPC column  
Eluent: THF  
Flow rate: 1.0 mL/min  
Detector: LS



Analysis of a polystyrene sample showing nanoparticle noise from a conventional GPC column

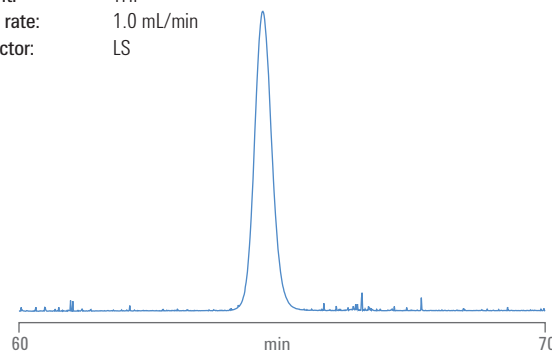
#### Tip

Even a light scattering detector needs calibration.

Agilent offers a complete line of narrow polymer standards, found in the GPC/SEC Standards Product Guide, publication 5990-7996EN

#### Conditions

Columns: PLgel 10  $\mu$ m MIXED-B LS, 7.5 x 300 mm  
Eluent: THF  
Flow rate: 1.0 mL/min  
Detector: LS



Same sample on the PLgel MIXED-B LS, nanoparticle noise is eliminated

### Ordering information

Description	Linear MW operating range (g/mol) (PS)	Guaranteed efficiency ( $\mu$ /m)	Part No.
PLgel 10 $\mu$ m MIXED-B LS, 7.5 x 300 mm	500 to 10,000,000	>35,000	PL1110-6100LS
PLgel 20 $\mu$ m MIXED-A LS, 7.5 x 300 mm	2,000 to 10,000,000	>18,000	PL1110-6200LS
PLgel 10 $\mu$ m Guard, 7.5 x 50 mm			PL1110-1120
PLgel 20 $\mu$ m Guard, 7.5 x 50 mm			PL1110-1220

# PL HFIPGEL

## Improved performance when using HFIP

- Optimized separation range delivers high performance with no artifacts
- Highly durable packing prolongs column lifetime during HFIP exposure
- Avoid warped calibration curves, dislocations, shoulders, and poor resolution caused by HFIP and similar solvents

Hexafluoroisopropanol (HFIP) is a unique solvent that allows near ambient temperature GPC of challenging polyesters, polyamides (Nylon), polyethylene terephthalate (PET), and poly(lactic-co-glycolic acid) (PLGA).

Agilent developed PL HFIPgel to handle HFIP, and related polar fluorinated solvents, such as trifluoroethanol, while offering the high performance of Agilent's PLgel line.

### Characteristics

Nominal particle size: 9  $\mu\text{m}$   
Linear MW operating range: 200 to 2,000,000 g/mol (PS equivalent)  
Guaranteed column efficiency: >30,000 p/m  
Typical pressure: 1 mL/min (7.5 mm id):  $\approx$  10 bar (145 psi) per 300 mm (HFIP @ 40 °C)

Maximum flow rate: 7.5 mm id: 1.5 mL/min  
Maximum pressure: 150 bar (2175 psi)  
Maximum temperature: 50 °C (HFIP)

Recommended number of columns/set: 2x 300 mm

### Recommended calibrants:

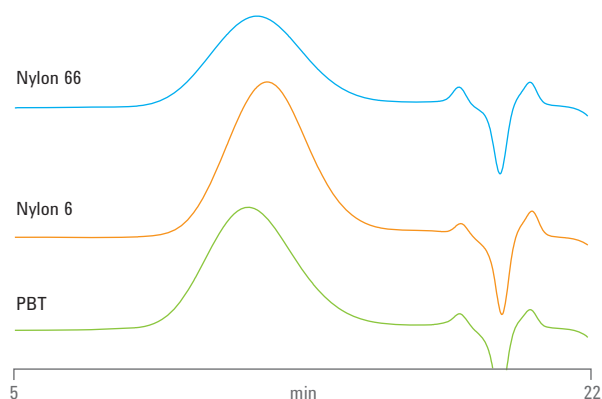
- EasiVial PM for convenient 12 point calibration in three preweighed vials (2 mL vials: PL2020-0201, 4 mL vials: PL2020-0200)
- Polymethylmethacrylate (PMMA) kit M-M-10 (PL2020-0101)

## Typical applications

Polyesters, polyamides, polylactide/glycolide copolymers

### Conditions

Columns: 2x PL HFIPgel, 7.5 x 300 mm  
Eluent: HFIP + 20 mM NaTFAc  
Flow rate: 1.0 mL/min  
Temperature: 40 °C  
Detector: RI



Low temperature analysis challenging polyamides and polyesters

### Tip

Save on expensive HFIP solvent by recycling solvent and using the smaller diameter 4.6 mm columns.

See publication 5990-7996EN, GPC/SEC Standards Product Guide

## Ordering information

Description	Part No.
PL HFIPgel, 4.6 x 250 mm	PL1514-5900HFIP
PL HFIPgel, 7.5 x 300 mm	PL1114-6900HFIP
PL HFIPgel Guard, 7.5 x 50 mm	PL1114-1900HFIP
PL HFIPgel Guard, 4.6 x 50 mm	PL1514-1900HFIP

# ENVIROPREP COLUMNS

## Environmental cleanup with EPA methods

- High sample loading capacity ensures effective concentration of trace compounds
- Enables automation of sample cleanup procedures
- Narrow peaks give both high purity and high recovery

Agilent EnviroPrep columns offer an easy, automated sample cleanup solution for customers performing cleanup of extracts from soil, food, and biological samples.

Interference from large molecules, oils, humic acids, and terpenoids are easily removed from samples with virtually zero loss of target molecules.

Prepacked, stainless steel EnviroPrep columns offer substantial improvements in speed and reproducibility over manually packed glass columns for methods such as EPA Method 3640A.

### Characteristics

Nominal particle size:	10 µm
Pore size:	100 Å
Exclusion limit:	4,000 g/mol (PS equivalent)
Guaranteed column efficiency:	>25,000 p/m
Typical pressure:	10 mL/min (25 mm id): ≈ 8 bar (116 psi) per 300 mm (THF @ 20 °C)
Maximum flow rate:	25 mm id: 16.5 mL/min
Maximum pressure:	150 bar (2175 psi)
Maximum temperature:	220 °C
Recommended number of columns/set:	1-2x 300 mm; 1x 300mm + 1x 150mm
Recommended calibrants:	<ul style="list-style-type: none"> <li>• EasiVial PS-L for convenient 12 point calibration in three preweighed vials (2 mL vials: PL2010-0401, 4 mL vials: PL2010-0400)</li> <li>• EPA Test Mix (refer to publication 5991-1588EN)</li> </ul>

See publication 5990-7996EN, GPC/SEC Standards Product Guide

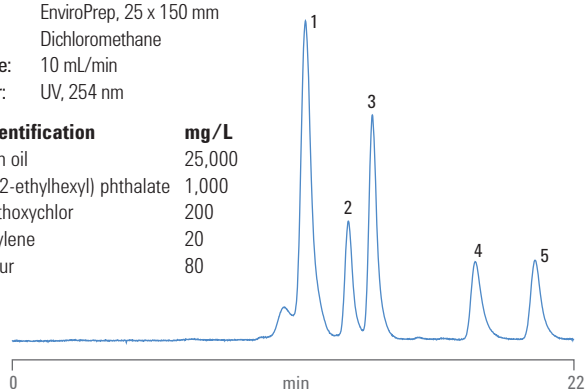
**Case Study:** An Automated System for the Routine Cleanup of Environmental Samples Prior to Instrument Analysis (Publication 5991-5321EN).

### Conditions

Columns: EnviroPrep, 25 x 300 mm  
EnviroPrep, 25 x 150 mm  
Eluent: Dichloromethane  
Flow rate: 10 mL/min  
Detector: UV, 254 nm

### Peak Identification

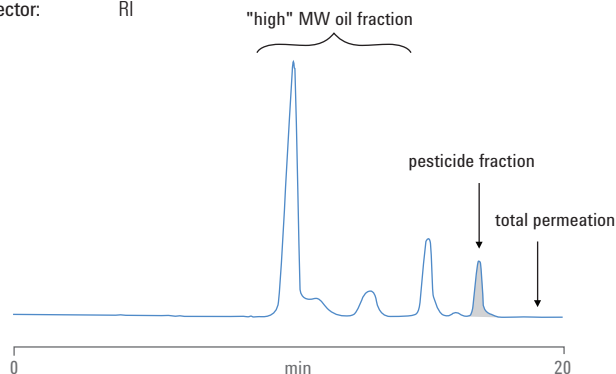
	mg/L
1. Corn oil	25,000
2. Bis(2-ethylhexyl) phthalate	1,000
3. Methoxychlor	200
4. Perylene	20
5. Sulfur	80



Rapid separation of test mix for EPA Method 3640A

### Conditions

Columns: 2x EnviroPrep, 25 x 300 mm  
Eluent: THF (stabilized)  
Flow rate: 10 mL/min  
Detector: RI



Fast, complete recovery of Hexachlorocyclohexane spike in mackerel extract

## Ordering information

Description	Part No.
EnviroPrep, 25 x 150 mm	PL1210-3120EPA
EnviroPrep, 25 x 300 mm	PL1210-6120EPA

# PLGEL INDIVIDUAL PORE SIZE COLUMNS

## High resolution over a specific molecular weight range

- Highest resolution over a narrow MW range
- High efficiency improves data quality
- Fast analysis with fewer columns enables users to save time and money

Individual pore size GPC columns offer high resolution over a narrow molecular weight range. The linear portion of the calibration curve, where the slope is at its shallowest, defines the MW region over which optimum resolution is achieved.

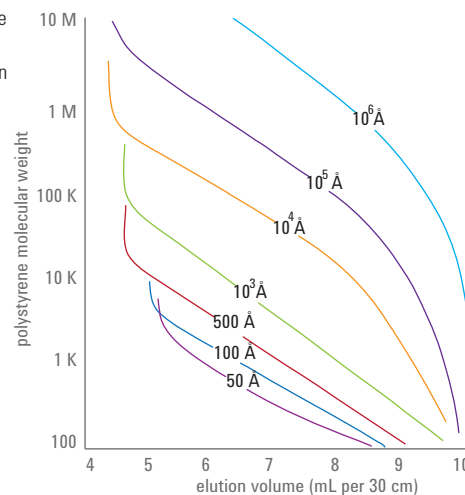
### Tip

Individual pore columns have nonlinear retention times, and raw chromatograms may not reflect the MW distribution. A calibration curve is critical to obtaining correct MW data.

Agilent offers a complete line of narrow polymer standards, found in the GPC/SEC Standards Product Guide, Publication 5990-7996EN

### Conditions

Calibrant: Polystyrene  
Eluent: THF  
Flow rate: 1.0 mL/min



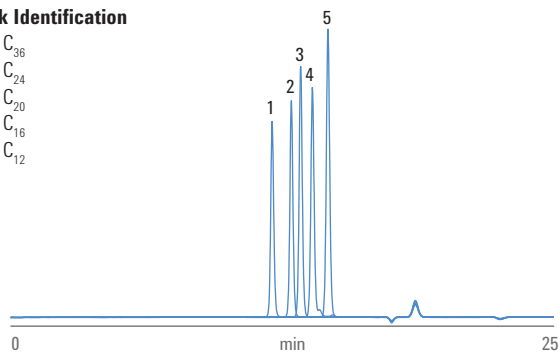
Calibration curves

### Conditions

Columns: 2x PLgel 3  $\mu$ m 100 Å, 7.5 x 300 mm  
Eluent: TCB + 0.015% BHT  
Flow rate: 0.8 mL/min  
Temperature: 145 °C  
Detector: 1260 Infinity II HTGPC (RI)

### Peak Identification

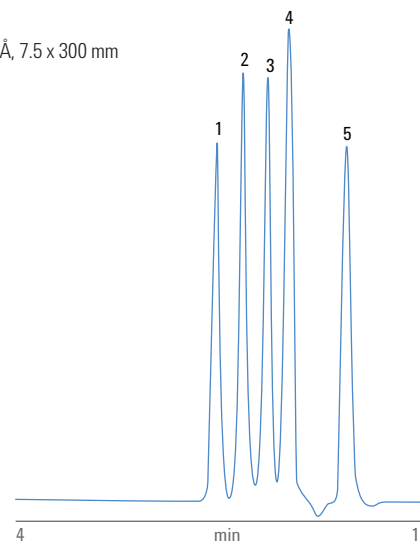
1. C<sub>36</sub>
2. C<sub>24</sub>
3. C<sub>20</sub>
4. C<sub>16</sub>
5. C<sub>12</sub>



Baseline separation of linear aliphatic hydrocarbons

### Conditions

Columns: PLgel 5  $\mu$ m 50 Å, 7.5 x 300 mm  
Eluent: THF (stabilized)  
Flow rate: 1 mL/min  
Detector: RI



Analysis of four dialkyl phthalates

# PLGEL INDIVIDUAL PORE SIZE COLUMNS

## Ordering information

PLgel Individual Pore Size Columns, 7.5 x 300 mm

Description	Pore size (Å)	MW range (g/mol) (PS)	Guaranteed efficiency (p/m)	Part No.	Maximum temperature
PLgel 3 µm	100	up to 5,000	>100,000	PL1110-6320	150 °C
PLgel 5 µm	50	up to 1,500	>65,000	PL1110-6515	
PLgel 5 µm	100	up to 5,000	>65,000	PL1110-6520	
PLgel 5 µm	500	500 to 25,000	>65,000	PL1110-6525	
PLgel 5 µm	10 <sup>3</sup>	500 to 60,000	>50,000	PL1110-6530	
PLgel 5 µm	10 <sup>4</sup>	10,000 to 450,000	>50,000	PL1110-6540	
PLgel 5 µm	10 <sup>5</sup>	60,000 to 1,700,000	>50,000	PL1110-6550	
PLgel 10 µm	50	up to 1,500	>35,000	PL1110-6115	220 °C
PLgel 10 µm	100	up to 5,000	>35,000	PL1110-6120	
PLgel 10 µm	500	500 to 25,000	>35,000	PL1110-6125	
PLgel 10 µm	10 <sup>3</sup>	500 to 60,000	>35,000	PL1110-6130	
PLgel 10 µm	10 <sup>4</sup>	10,000 to 450,000	>35,000	PL1110-6140	
PLgel 10 µm	10 <sup>5</sup>	60,000 to 1,700,000	>35,000	PL1110-6150	
PLgel 10 µm	10 <sup>6</sup>	600,000 to 10,000,000	>35,000	PL1110-6160	

PLgel Guard Columns, 7.5 x 50 mm

Description	Part No.
PLgel 3 µm Guard	PL1110-1320
PLgel 5 µm Guard	PL1110-1520
PLgel 10 µm Guard	PL1110-1120
PLgel 20 µm Guard	PL1110-1220

# PLGEL PREPARATIVE COLUMNS

## Fractionation of samples based on their molecular size in solution

- Isolate MW fractions for chromatography, IR, X-ray, chemical, and physical analysis
- 10  $\mu\text{m}$  particles offer greater speed, purity, and recovery
- High pore volumes can isolate milligram to gram quantities

Preparative GPC allows users to isolate fractions of a specific MW from various samples for further analysis. PLgel Preparative 10  $\mu\text{m}$  particles offer very high loadability and efficiency, while keeping the backpressure low.

### For sample preparation:

GPC easily automates the cleanup and concentration of food, biological, and environmental samples after solvent extraction.

Modern 25 x 300 mm stainless steel columns replace manually packed glass columns for methods such as:

- EPA Method 3640A sample preparation for pesticides.
- Chinese Pharmacopoeia (CHP) sample preparation for pesticides.
- European Pharmacopoeia (Ph. Eur.) determination of mono-, di-, triglycerides, and glycerol.

### For polymer analysis:

Polymer samples can be fractionated to isolate additives, residues, or MW cuts for offline spectroscopic, chemical, electrical, and physical analysis.

Conversely, a polymer's properties may be tested after specific MWs or compounds are cut out of the formulation.



# PLGEL PREPARATIVE COLUMNS

## Typical applications

Polymer fractionation, component isolation, mixture simplification

### Characteristics

Nominal particle size: 10  $\mu\text{m}$  (PLgel), 6  $\mu\text{m}$  (Oligopore)  
 Guaranteed column efficiency: >30,000 p/m, >55,000 (Oligopore)  
 Typical pressure: 10 mL/min (25 mm id):  $\approx$  8 bar (116 psi)  
 per 300 mm  
 (THF @ 20  $^{\circ}\text{C}$ )  
 Maximum flow rate: 25 mm id: 16.5 mL/min  
 Maximum pressure: 150 bar (2175 psi)  
 Maximum temperature: 220  $^{\circ}\text{C}$ , 110  $^{\circ}\text{C}$  (Oligopore)  
 Recommended number of columns/set: 1-2x 300 mm

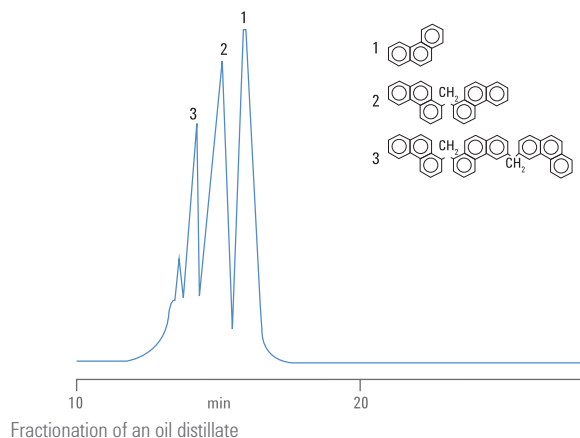
### Recommended calibrants:

- EasiVial for convenient 12 point calibration in three preweighed vials
- EasiCal for a simple stir-in 10 point calibration

See publication 5990-7996EN, GPC/SEC Standards Product Guide

### Conditions

Columns: PLgel 10  $\mu\text{m}$  500  $\text{\AA}$ , 25 x 300 mm  
 Sample concentration: 100 mg/mL, 2 mL  
 Eluent: Dichloromethane  
 Flow rate: 9.0 mL/min  
 Loading: 200 mg on-column  
 Detector: UV, 254 nm



## Ordering information

PLgel Preparative Columns

Description	MW range (g/mol) (PS)	Part No.
InfinityLab OligoPore, 6 $\mu\text{m}$ , 25 x 300 mm	up to 3,300	PL1213-6520
EnviroPrep, 25 x 150 mm	up to 5,000	PL1210-3120EPA
EnviroPrep, 25 x 300 mm	up to 5,000	PL1210-6120EPA
PLgel 10 $\mu\text{m}$ 50 $\text{\AA}$ , 25 x 300 mm	up to 1,500	PL1210-6115
PLgel 10 $\mu\text{m}$ 100 $\text{\AA}$ , 25 x 300 mm	up to 5,000	PL1210-6120
PLgel 10 $\mu\text{m}$ 500 $\text{\AA}$ , 25 x 300 mm	500 to 25,000	PL1210-6125
PLgel 10 $\mu\text{m}$ 103 $\text{\AA}$ , 25 x 300 mm	500 to 60,000	PL1210-6130
PLgel 10 $\mu\text{m}$ 104 $\text{\AA}$ , 25 x 300 mm	10,000 to 550,000	PL1210-6140
PLgel 10 $\mu\text{m}$ 105 $\text{\AA}$ , 25 x 300 mm	60,000 to 1,700,000	PL1210-6150
PLgel 10 $\mu\text{m}$ 106 $\text{\AA}$ , 25 x 300 mm	600,000 to 10,000,000	PL1210-6160
PLgel 10 $\mu\text{m}$ MIXED-B, 25 x 300 mm	500 to 10,000,000	PL1210-6100
PLgel 10 $\mu\text{m}$ MIXED-D, 25 x 300 mm	200 to 400,000	PL1210-6104
PLgel Prep Guard, 25 x 25 mm		PL1210-1120

# AGILENT PUBLICATIONS

## Further reading

GPC/SEC publication	Publication number
<b>Primers</b>	
An introduction to gel permeation chromatography and size exclusion chromatography	5990-6969EN
Calibrating GPC/SEC columns - a guide to best practice	5991-2720EN
Step-by-step method development in GPC	5991-7272EN
Polymer-to-solvent reference table for GPC/SEC	5991-6802EN
Instrument setup for Fast GPC	5991-7191EN
<b>Application compendia</b>	
Analysis of polymers by GPC/SEC - energy & chemicals applications	5991-2517EN
Analysis of polymers by GPC/SEC - food applications	5991-2029EN
Analysis of polymers by GPC/SEC - pharmaceutical applications	5991-2519EN
Excipient analysis by GPC/SEC and other LC techniques	5990-7771EN
Biodegradable polymers - analysis of biodegradable polymers by GPC/SEC	5990-6920EN
Analysis of engineering polymers by GPC/SEC	5990-6970EN
Analysis of elastomers by GPC/SEC	5990-6866EN
Analysis of polyolefins by GPC/SEC	5990-6971EN
Low molecular weight resins - Analysis of low molecular weight resins and prepolymers by GPC/SEC	5990-6845EN
<b>Product guides</b>	
Aqueous and polar GPC/SEC columns	5990-7995EN
GPC/SEC standards	5990-7996EN

# AGILENT GPC/SEC ANALYSIS SYSTEMS

The Agilent 1260 Infinity II GPC/SEC system and 1260 Infinity II Multi-Detector GPC/SEC system are part of Agilent InfinityLab, an optimized portfolio of LC instruments, columns and supplies that work together seamlessly for maximum efficiency and performance.



**The Agilent 1260 Infinity II GPC/SEC system** has been designed to meet the challenges of today's polymer analyst.

The system features the new Infinity II refractive index detector for exceptional improvements in resolution and speed. The newly developed vialsampler offers higher unattended sample throughput, while the multicolumn thermostat provides accurate temperature control to minimize detector noise and baseline drift. The updated isocratic pump allows for extra flow precision to maximize reproducibility and accuracy in MW measurements.



**The Agilent 1260 Infinity II Multi-Detector GPC/SEC system** is the first choice for accurate, reproducible polymer analysis. Select any combination of light scattering, viscometry and refractive index detection for absolute molecular weights and sizes.

The system provides a wealth of information regarding polymer structure and it is also possible to identify and quantify properties such as branching which can influence processing and physical properties. Precise temperature control minimizes equilibration time and maximizes sample throughput.



## **Innovative InfinityLab supplies that simplify your work**

- Handle mobile phases with ease using ergonomic, easy-grip solvent bottles
- Prevent harmful solvents from leaching into the air with InfinityLab Stay Safe caps
- Safely control solvent drainage with InfinityLab Anti-Drain Fitting
- Ensure leak-free column connections with InfinityLab Quick Connect Fittings

Calibration is key to generating reliable and accurate GPC data.  
To learn more, refer to the primer:

## Calibrating GPC Columns—A Guide to Best Practice

Publication 5991-2720EN



Learn more

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