Agilent PL-GPC 50 System

Integrated, dedicated GPC/SEC

Data Sheet

Introduction

The Agilent PL-GPC 50 is a dedicated, cost effective, fully integrated GPC system. Operating from ambient to 50 °C, the system integrates everything required to perform GPC inside a single compact unit, including pump, injection valve, 4-column capacity oven, detector and optional degasser.

Key benefits

- **Maximum flexibility and applicability** – Wide choice of detectors maximizes the amount of information you can extract from your sample
- **GPC detectors inside** – Refractive Index, optional dual-angle light scattering and/or viscometry housed within the system, creating smallest footprint multi-detector GPC system in the market
- **Ease-of-use in every environment** – Design simplicity and the intuitive interface make the PL-GPC 50 extremely easy to operate
- **High performance** – Injection valve and columns situated within the oven, provide excellent thermal stability regardless of conditions at the workplace
- **Comprehensive** – Software control, data acquisition and analysis software provide everything required to get up and running in one integrated package
- **Excellent reproducibility** – Excellent flow rate precision delivers repeatable calibration curves and accurately calculated polymer molecular weight data
- **Strong heritage** – Large installed base to assure pedigree.

Agilent Technologies

System details

Full integration for easy operation

The PL-GPC 50 has everything you require for conventional and advanced GPC inside a fully integrated, compact package. Full control and data analysis is provided with a single software solution.

Maximize sample information from triple detection

Fully integrated triple detection is also easy to perform, with a choice of system enhancements including viscometry and dual angle laser light scattering detectors. Triple detection removes the need for column calibrations and provides insight into the behaviour of the polymer in solution.

Versatility and performance

For optimized performance, the system is designed to significantly reduce extra column dispersion and band broadening, thereby maximizing resolution and accuracy. The refractive index detector flow cell is just 6 µL, the unique low volume flow cell design of the light scatterer is a market leading 10 µL. The PL-GPC 50 Viscometer uses a precision engineered four-capillary bridge, high sensitivity pressure transducers and state of the art low noise electronics to provide online measurement of the highest accuracy.

The PL-GPC 50 holds up to four regular 300 mm GPC columns with easy access to column exchange via the hinged front panel. The refractive index (RI) detector is highly sensitive and has excellent baseline stability for a wide variety of organic and aqueous eluents.

Excellent reproducibility

The flow rate precision of the solvent delivery system is fundamental to achieving the most reliable GPC data. The PL-GPC 50 delivers flow reproducibility better than 0.1 %, in order to generate repeatable calibration curves and precise polymer weight data.

Product features

High accuracy light scattering detection

With the Agilent PL-GPC 50 Dual Angle Light Scattering Detectors you can measure absolute molecular weight averages and distributions, radius of gyration (Rg) and polymer branching data.

High sensitivity viscosity detection

The combination of refractive index detection and viscosity detection provides accurate molecular weight determination for all polymer types based on the universal calibration principle, as well as valuable branching information not otherwise accessible from a concentration detector alone. Combining the refractive index, viscometer and light scattering detectors is known as triple detection. This gives:

- Accurate IV and Rg distributions
- Absolute molecular weights without the need for a column calibration
- Accurate assessment of molecular size, dimensions and molecular viscosity
- Mark-Houwink and conformation plots
- Branching calculations

Agilent GPC/SEC software

The Agilent GPC/SEC software makes GPC calculatons easy, whether in conventional GPC using a concentration detector or for multi detector analysis with light scattering and/or viscosity. The intuitive interface allows full control of all the PL-GPC 50 components, including automation – a dedicated GPC software package to complete the dedicated GPC solution.

Automatic sampling

The Agilent PL-GPC 50 Autosampler is an X-Y style sampler with a 156 vial capacity that maximizes lab productivity. Sample injection is with a flushed fixed loop giving an excellent reproducibility (RSD) of 0.5%.

Applications

Analysis of polycarbonate highlights the value of GPC with triple detection

Polycarbonates are a group of high molecular weight thermoplastic polymers, materials that are deformable, melt when heated and then solidify to a glass-like state when cooled. They can be injection molded or extruded into tubes, rods or sheets. Their versatility finds wide industrial and consumer applications.

A sample of polycarbonate was analyzed on the PL-GPC 50, with triple detection provided by RI, viscometry and dual-angle light scattering.

Conditions

Columns:	2 x Agilent PLgel, 5 µm, MIXED-C 300 mm × 7.5 mm (part number PL1110-6500)
Eluent:	Tetrahydrofuran
Flow rate:	1 mL/min
Temperature:	40 °C
Inj. volume:	100 µL
Detectors:	PL-GPC 50 with integrated RI PL-GPC 50 Viscometer PL-GPC 50 Dual-Angle Light Scattering Detector

Results

- Figure 1 shows an overlay of the triple detector chromatograms (autoscaled) for the polycarbonate sample. The chromatograms obtained on the refractive index and light scattering detectors were clearly monomodal, as expected for a structurally homogeneous material.
- Figure 2 indicates the molecular weight distribution calculated for the polycarbonate.
- Figure 3 shows polymer conformation information by plotting viscometry data against absolute molecular weight from light scattering detection.

This application shows how much the PL-GPC 50 has to offer in the analysis of commercially important materials when using triple detection.

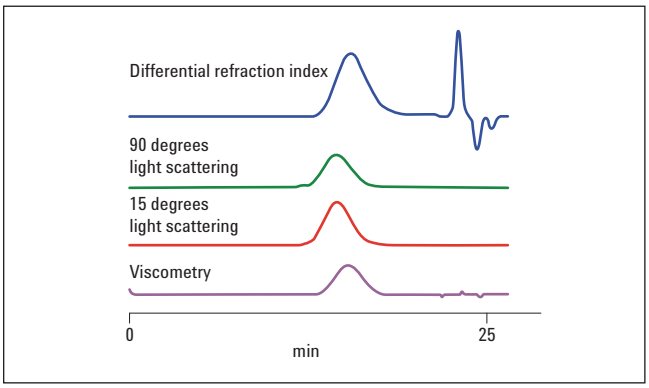

Figure 1
Overlay of polycarbonate chromatograms from triple detection using the PL-GPC 50.

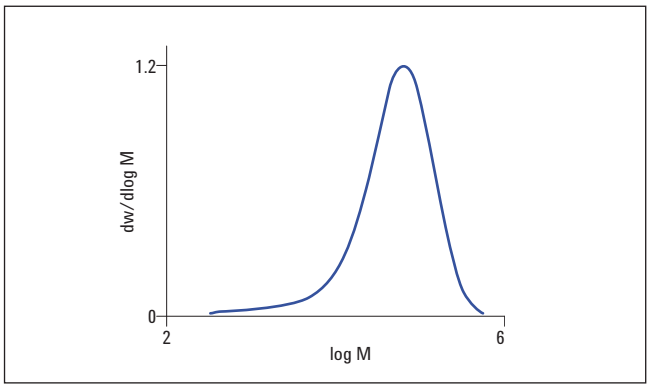

Figure 2
Calculated molecular weight of a polycarbonate.

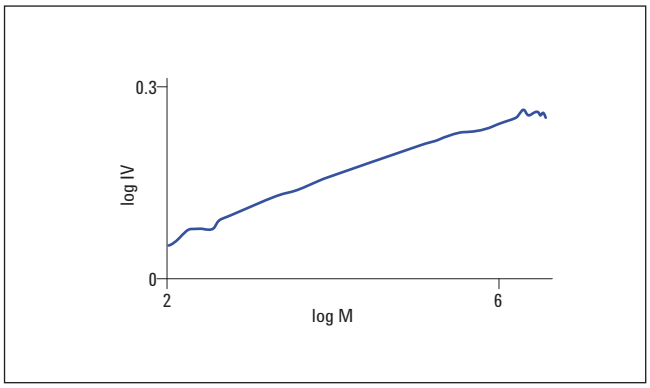

Figure 3
Mark-Houwink plot of a polycarbonate.

Specifications

Component	Parameter	Description
Pump	Flow range Flow rate precision	0.01 – 9.99 mL/min <0.09 %
Oven	Temperature range	Ambient to 50 °C
Refractive Index Detector	Differential refractometer Cell volume Wavelength	Deflection 6 µL 890 nm
PL-GPC 50 Viscometer	Linearity Shear rate (typical) Sensitivity ηsp	0.5% FS 3000 s^{-1} $1x10^{-5}$ Pa.s
PL-GPC 50 Light Scattering Detector	Sample cell volume Light scattering volume Laser wavelength/ power Rayleigh scattering angles	10 µL 0.01 µL 658 nm/30mW (continuous) 15° and 90° (dual)
Injector	Manual injector via integrated Valco six port, two-position valve	
Instrument control		Windows 7
General	Power requirements	115/230 V AC 50/60 Hz, 5A

Ordering Information

Part Number	Description
G7810A	Agilent PL-GPC 50 Integrated GPC System
G7811A	Agilent PL-GPC 50 Viscometer
G7812A	Agilent PL-GPC 50 Dual Angle Light Scattering Detector
G7813A	Agilent PL-GPC 50 Autosampler
G7825A	Agilent PL DataStream
G7850AA	Agilent GPC/SEC Software
G7854AA	Agilent GPC/SEC Instrument Control
G7852AA	Agilent GPC/SEC Multi-Detector Upgrade

www.agilent.com/chem/gpc

Published in the USA, March 5, 2012
5990-9937EN

Agilent Technologies