We are the polymer analysis people.

Agilent GPC/SEC Portfolio

Agilent Technologies *the* Total GPC Solution

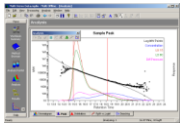
We understand what is needed from a GPC analysis but do we have all of the products to provide a solution? .....

- GPC Columns

  - GPC Standards

    - GPC Instrumentation

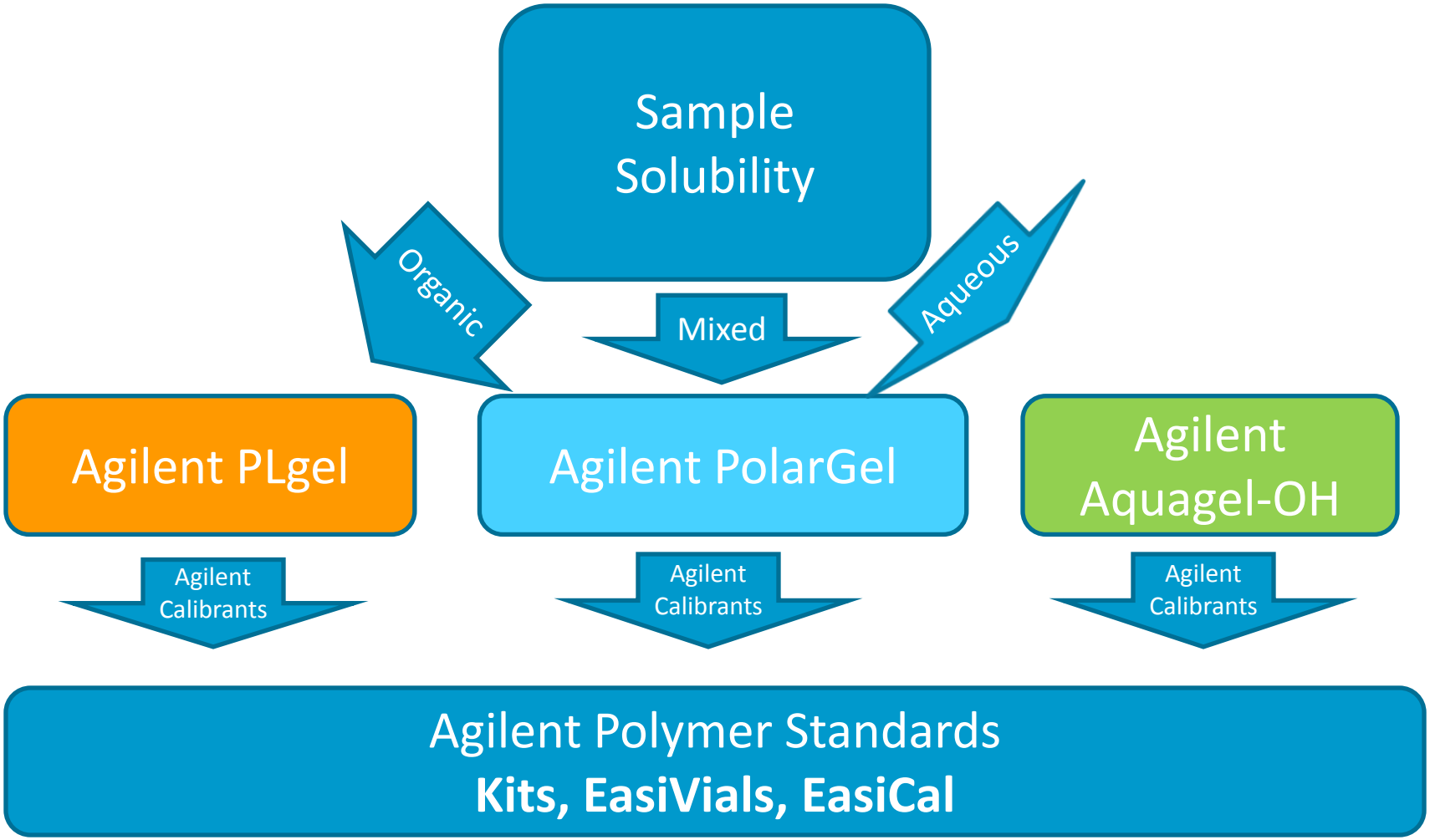
      - GPC Software



        - GPC Expertise

Agilent Technologies

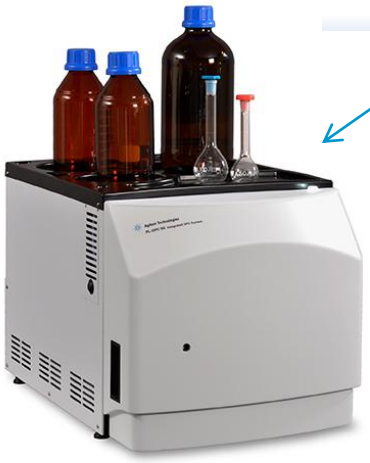
Columns and Standards for all GPC Applications



Agilent GPC Instrumentation Portfolio

Agilent 1260 Infinity
GPC-SEC system

Agilent 1260 Infinity-MDS
Multi Detector Suite



Agilent PL-GPC 50
Ambient to 50 °C

Agilent PL-GPC 220
Ambient to 220 °C

The Heart of the GPC Analysis
New GPC Software from Agilent

- **Written by GPC people for GPC people**
- **A successor to the popular Cirrus GPC Software**
- **Simple but powerful**
- **Control, Collection and Analysis**
- **Clear but customizable**
- **Functionality for conventional and advanced GPC**
- **Comprehensive reviewer**

Simplifies and facilitates your GPC/SEC process

Everything required for GPC/SEC in a single package

Agilent GPC/SEC Software

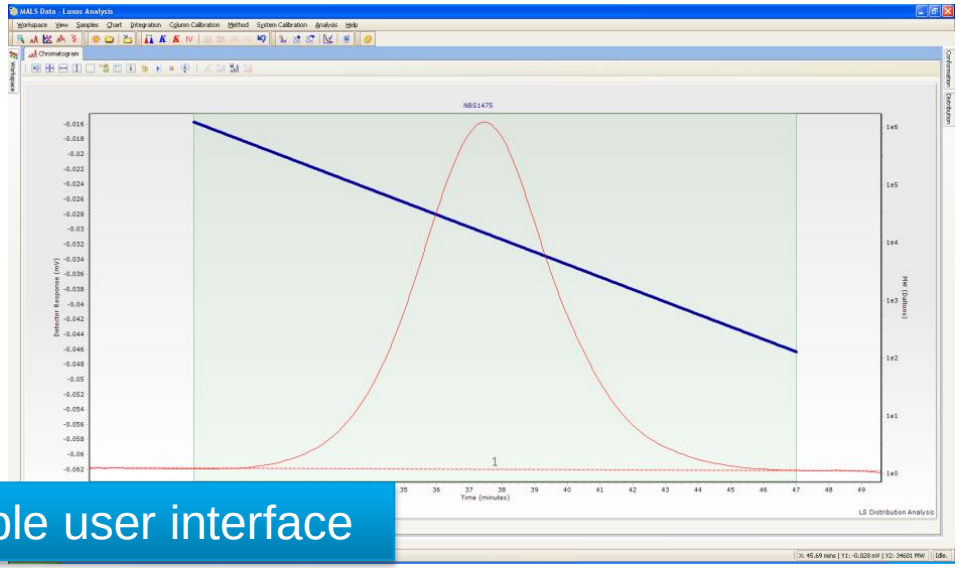
The fastest, easiest way to complete your GPC/SEC Workflow

Agilent GPC/SEC Software

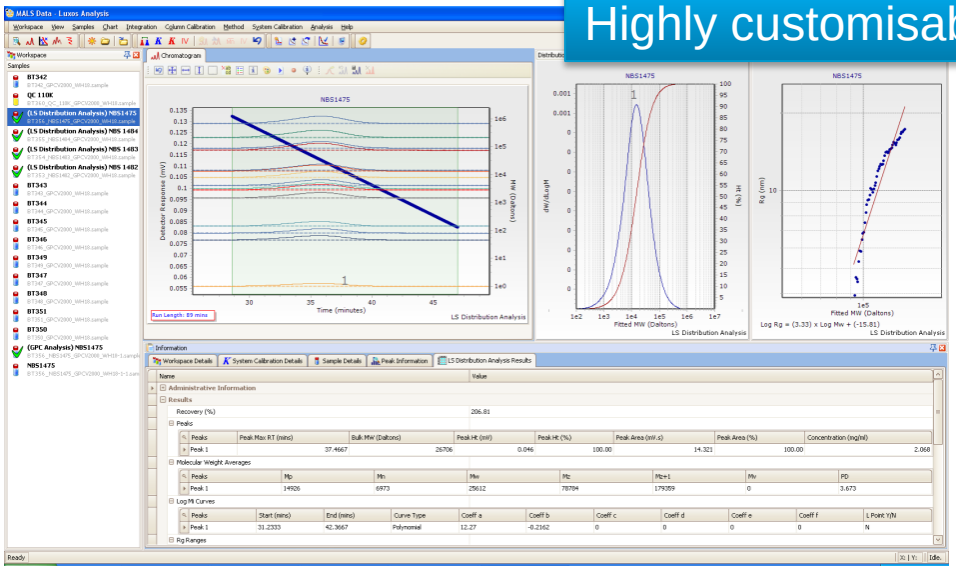
System Setup | Workbook Setup | Collect data | Analyse Data | Review Data

Presented according to your requirements

Simple & uncluttered interface in which only the necessary information is shown



Highly customisable user interface



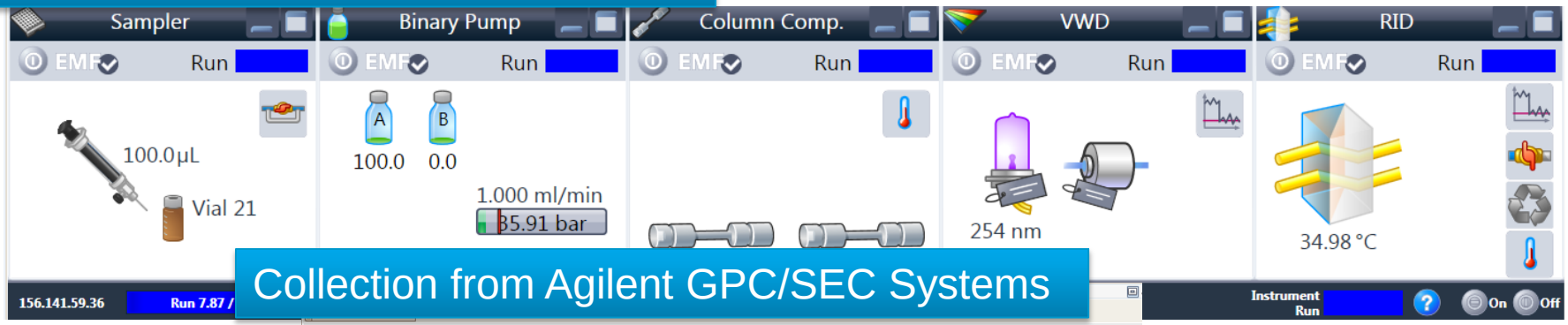
All information presented in a format which is easily accessible & viewable

Agilent GPC/SEC Software

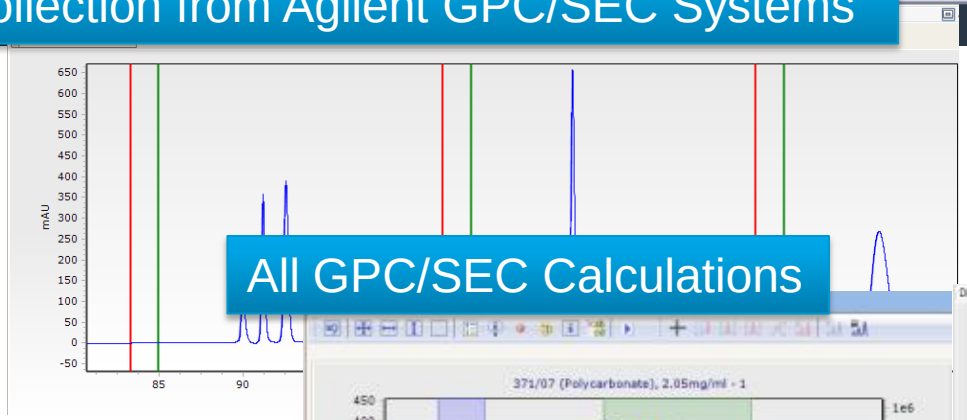
System Setup | Workbook Setup | Collect data | Analyse Data | Review Data

Single solution for all your GPC/SEC Requirements

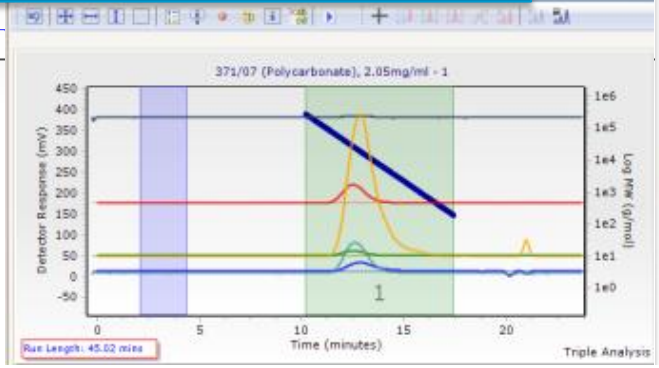
Control of Agilent GPC/SEC Systems

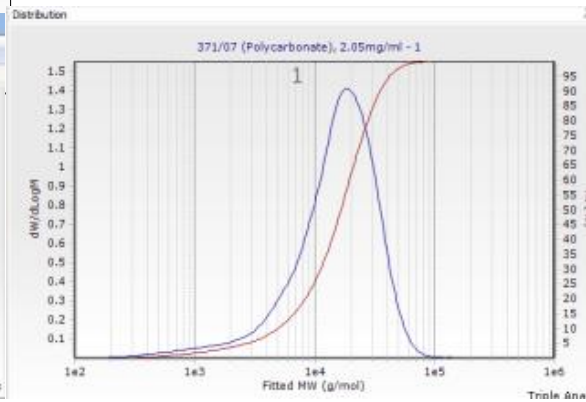


Collection from Agilent GPC/SEC Systems



All GPC/SEC Calculations



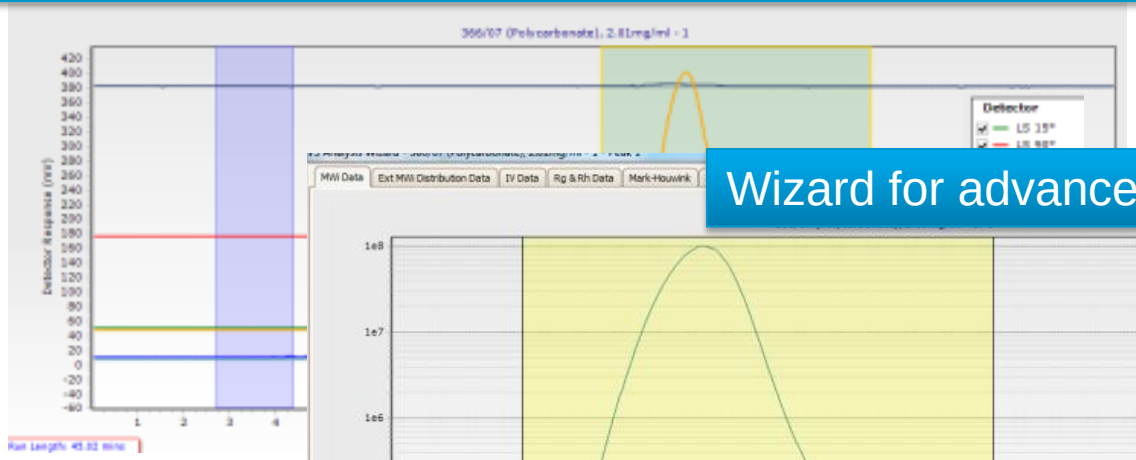


Agilent GPC/SEC Software

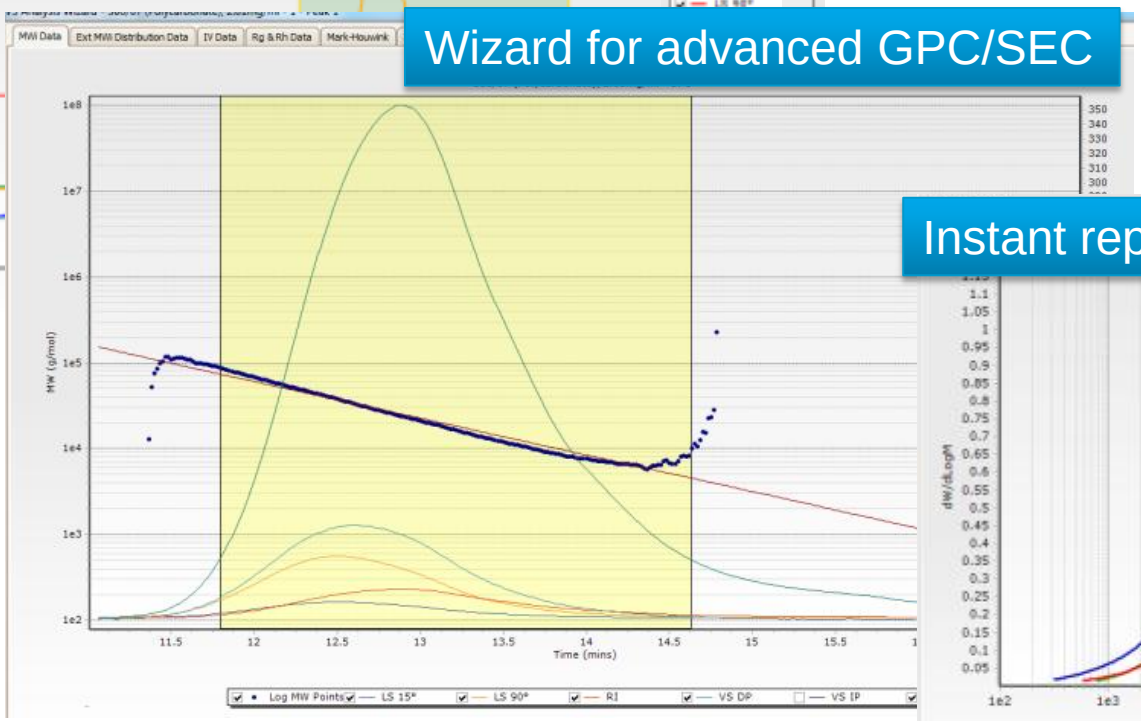
Fast and Easy GPC/SEC

System Setup | Workbook Setup | Collect data | Analyse Data | Review Data

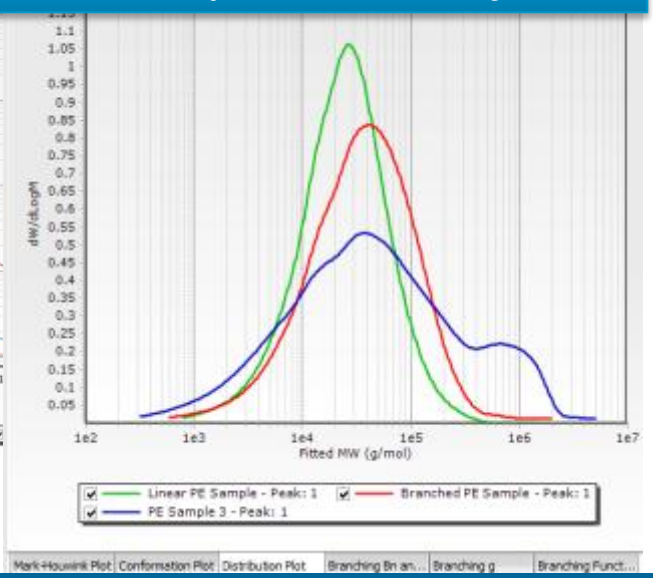
Baselines / integration regions added with single click



Wizard for advanced GPC/SEC

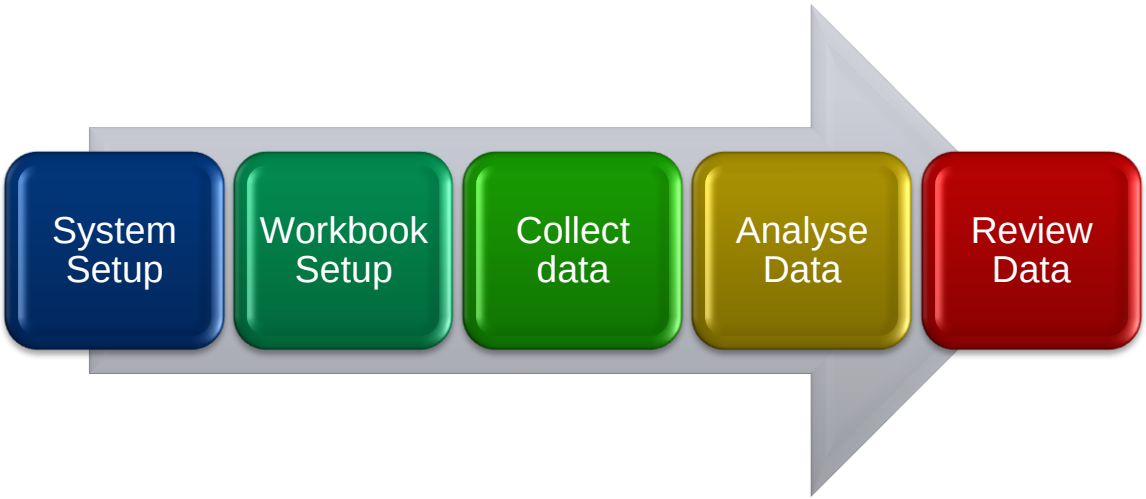


Instant report or overlay data



Agilent GPC/SEC Software

The fastest, easiest way to complete your GPC/SEC Workflow



Single software solution

- Control Agilent GPC/SEC Instrumentation
- Collect and store all information in the sample file
- Perform all GPC/SEC calculations
  – Conventional using RID/UV/ELSD, Viscometry, Light Scattering, Triple, Branching
- Simplified reporting with a single click
- Powerful Reviewer functionality to compare all data for all samples

Agilent 1260 Infinity GPC/SEC System

Reproducible

High Precision

- High performance pump

Extreme Robustness

- Industry-leading Agilent LC systems

Performance

- High quality detectors

New Agilent GPC/SEC Software

Agilent 1260 Infinity GPC/SEC System

Modular approach to Conventional GPC

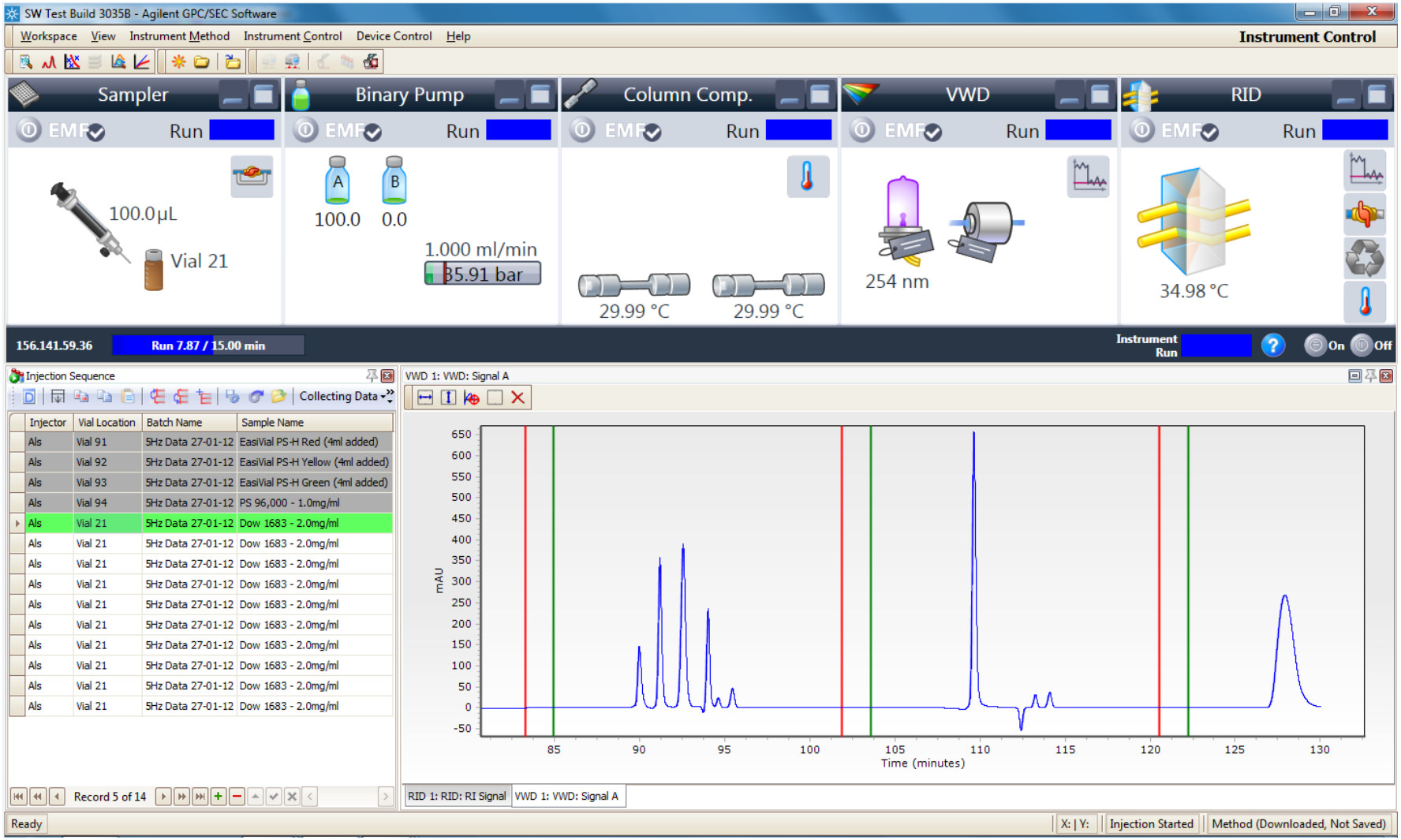
Versatile system with a wide range of modules

- GPC/SEC requirements
  - RID (VWD, DAD, ELSD also supported)
  - Isocratic pump
  - Degasser recommended
  - Column oven recommended
  - Upgrade route to advanced GPC available
  - Supported with the new Agilent GPC Software

Instrument Control View

System Setup | Workbook Setup | Collect data | Analyse Data | Review Data

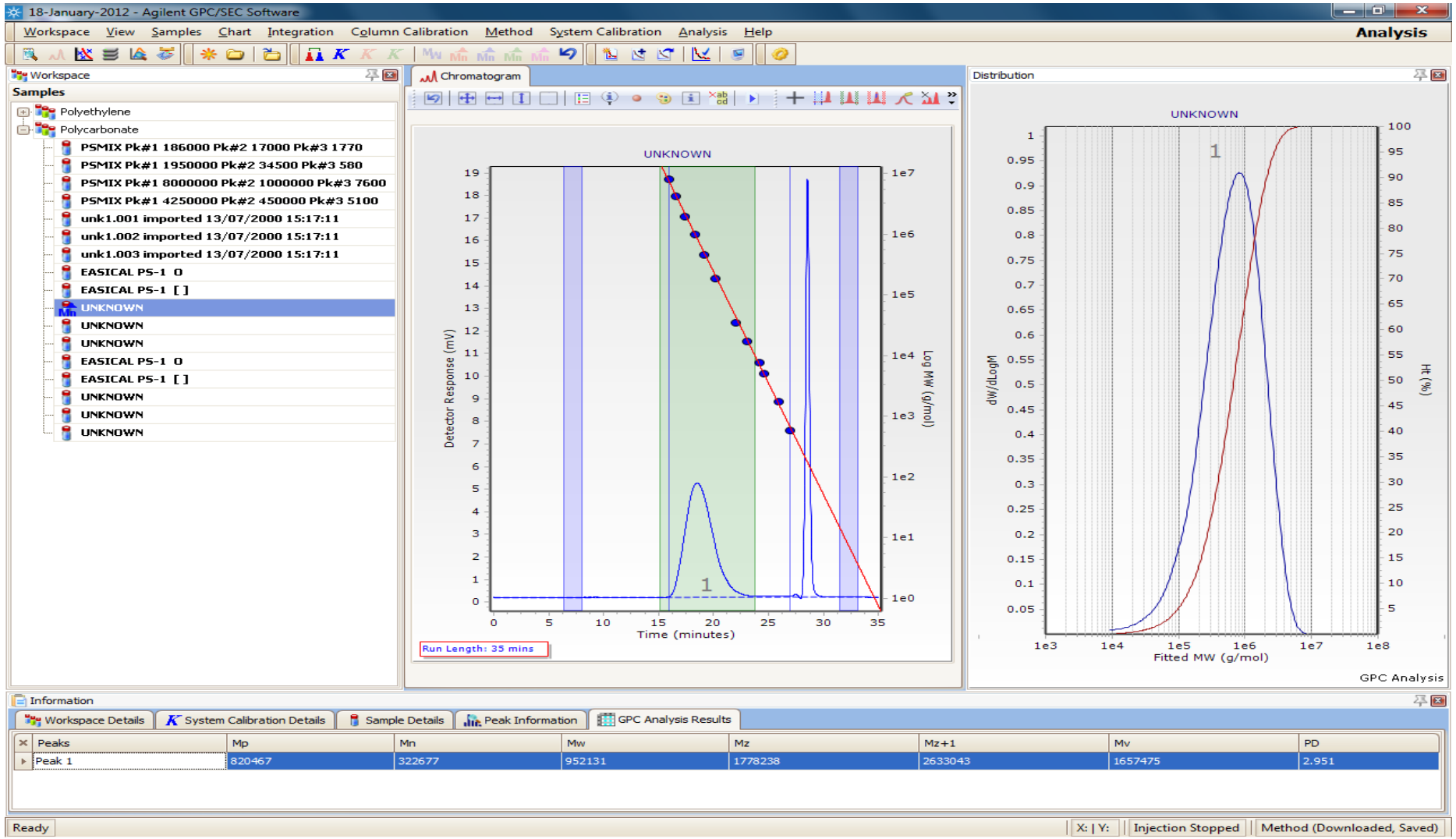
1200 Infinity dashboard



Agilent GPC/SEC Software

System Setup | Workbook Setup | Collect data | Analyse Data | Review Data

Conventional Calculations



1260 Infinity GPC/SEC Multi Detector Suite

Advanced detection for Absolute Accuracy

Information Rich

- Accurately heated (ambient to 60 °C) advanced detector modules :
  - Refractive Index
  - Viscometer
  - Dual Angle Light Scattering

Low Dispersion

- Industry leading detector flow cell technology

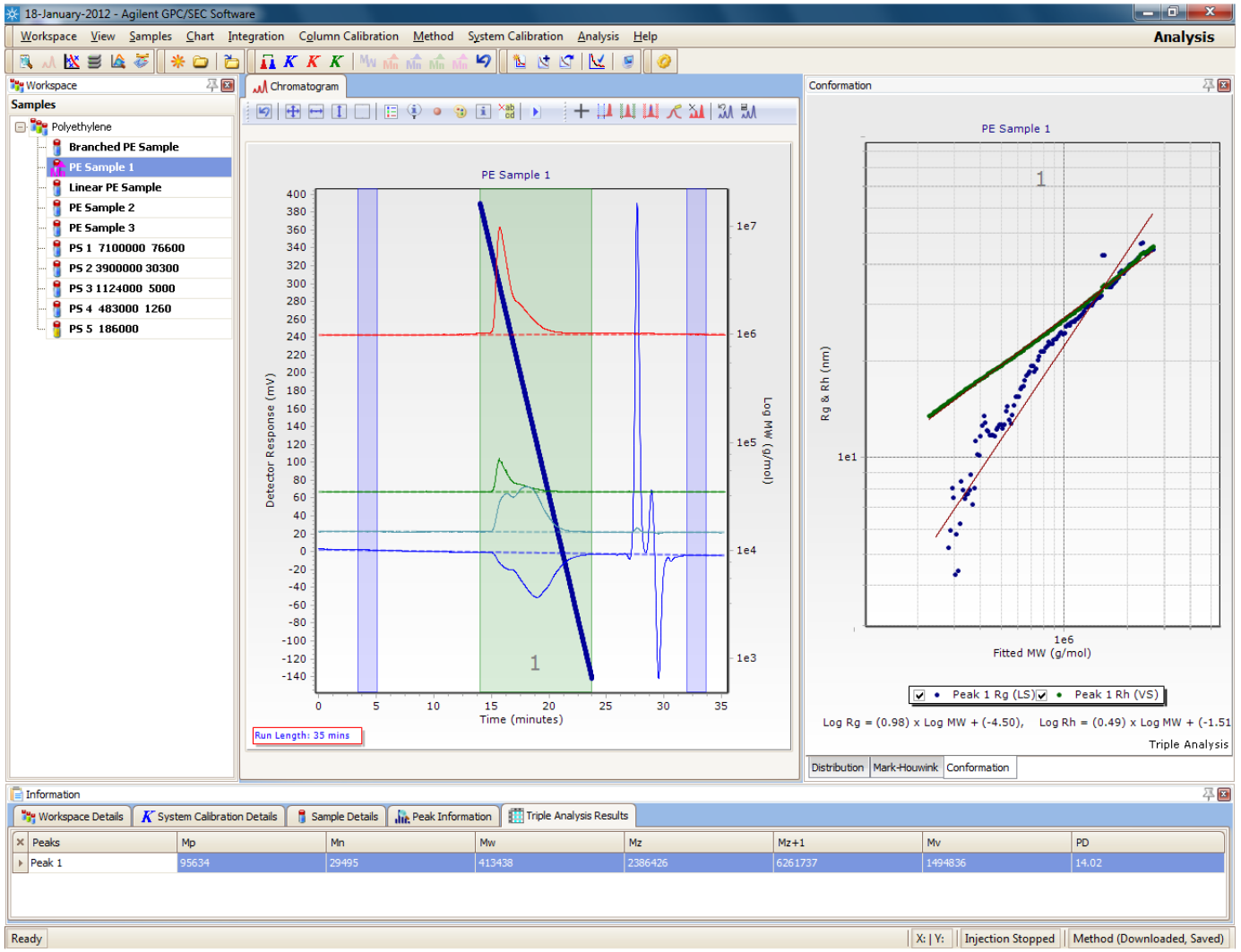
Agilent GPC/SEC Software

- Single software solution

Agilent GPC/SEC Software

Advanced GPC/SEC Calculations

System Setup | Workbook Setup | Collect data | Analyse Data | Review Data



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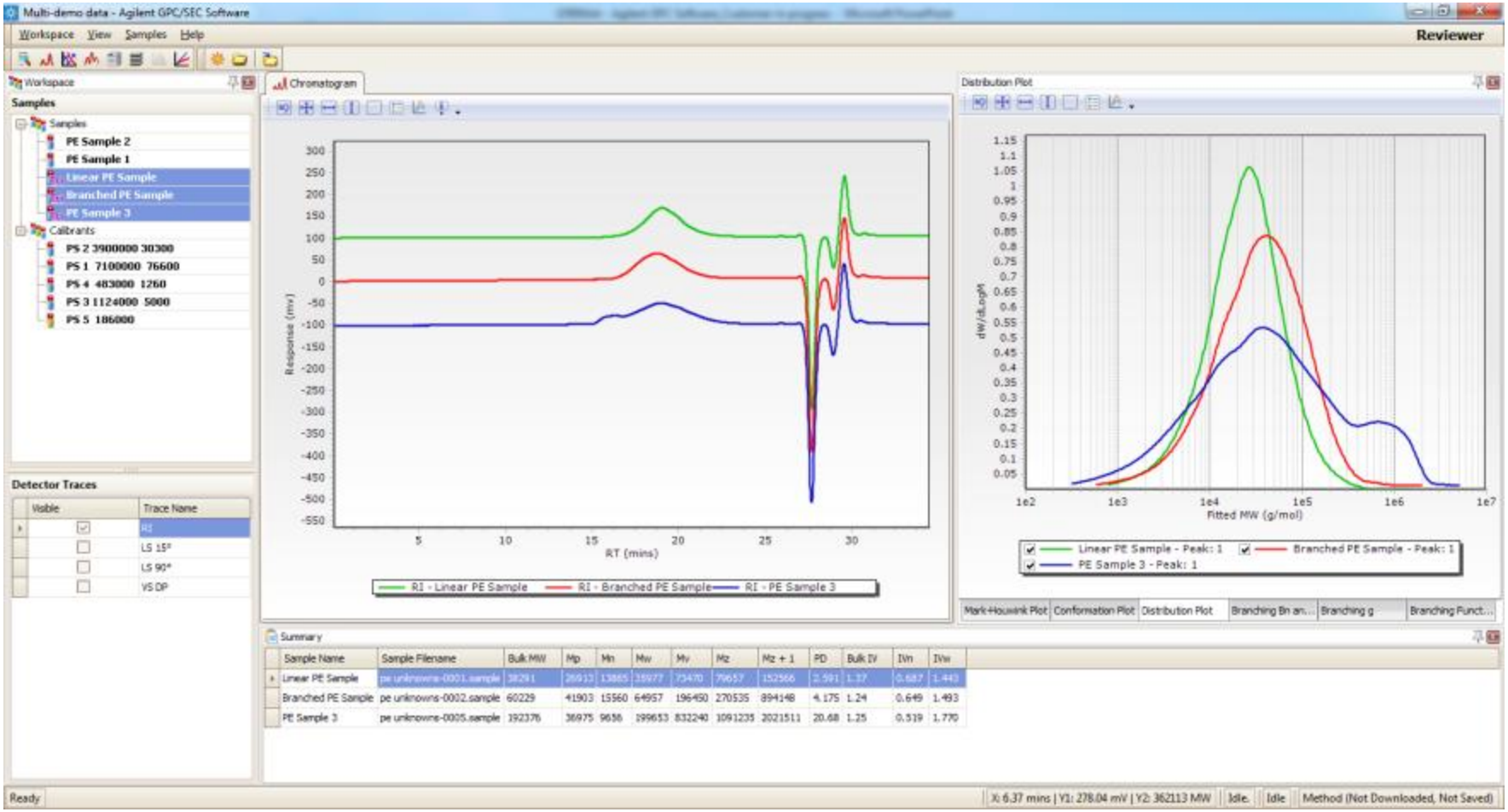
Agilent GPC/SEC Software

System Setup | Workbook Setup | Collect data | Analyse Data | Review Data

Reviewer Functionality



All detector traces, all result plots, all results

Agilent PL-GPC 50

Dedicated system for Conventional and Multi-detector GPC

Integrated

- Everything required for GPC in a single unit
- Advanced detectors
  - RI (Included)
  - Viscometer
  - Light Scattering

Strong Heritage

- Excellent customer loyalty

Fully software controlled

- Agilent GPC/SEC Software (June ’12)

Agilent PL-GPC 50 Integrated GPC System

Pump, degasser, column oven and up to 3 detectors integrated inside the GPC-50 system

Agilent PL-GPC50 GPC System Detection Summary

Agilent PL-GPC 50 GPC system

- Refractive Index Detector
- Viscometer
- Light Scattering Detector
- Cirrus Multi GPC Software
- NEW AGILENT GPC SOFTWARE

• Fully compatible with organic and/or aqueous soluble polymer analysis by GPC

•The perfect solution for those that prefer an integrated system with up to three detectors

Agilent PL-GPC 220

Confidence in extreme GPC

Safe in extreme conditions

- Fully integrated system, heated up to 220 ‘
  - Maintain sample solubility
  - Eliminate blockages
  - Safety

Confidence in Quality of Results

- Dual zone autosampler avoids sample degradation
- Agilent pump ensures reproducible results.
- Low dispersion detector cells

Confidence in Capabilities

- Industry standard for high temperature GPC
- Ability to perform every available GPC application
- Integrated Light Scattering & Viscometry detectors

Agilent PL-GPC 220 HT GPC

Accurately controlled column oven with integrated injection system, columns and detector(s)

Temperature controlled solvent delivery module with solvent reservoirs, Agilent pump and degasser

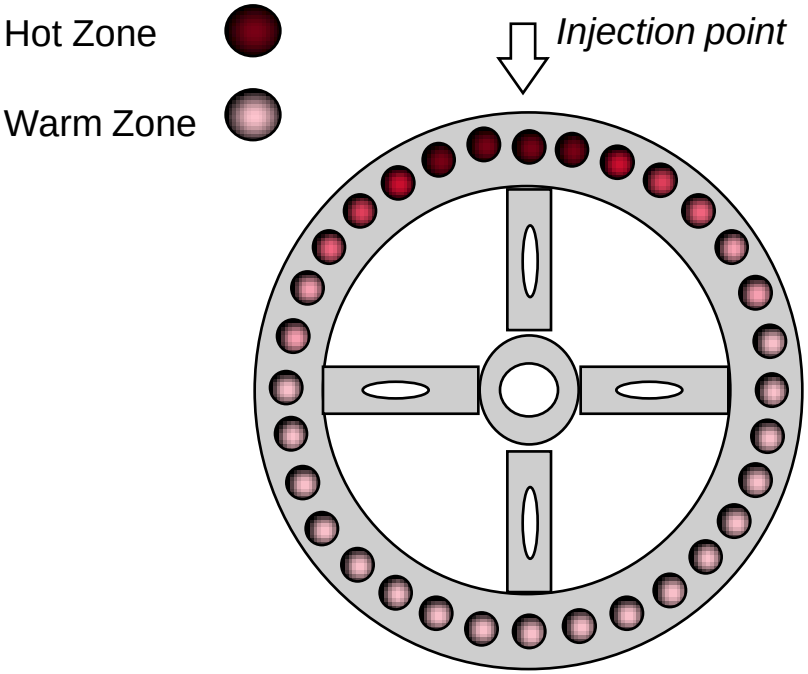
Dual temperature zone autosampler prevents sample degradation

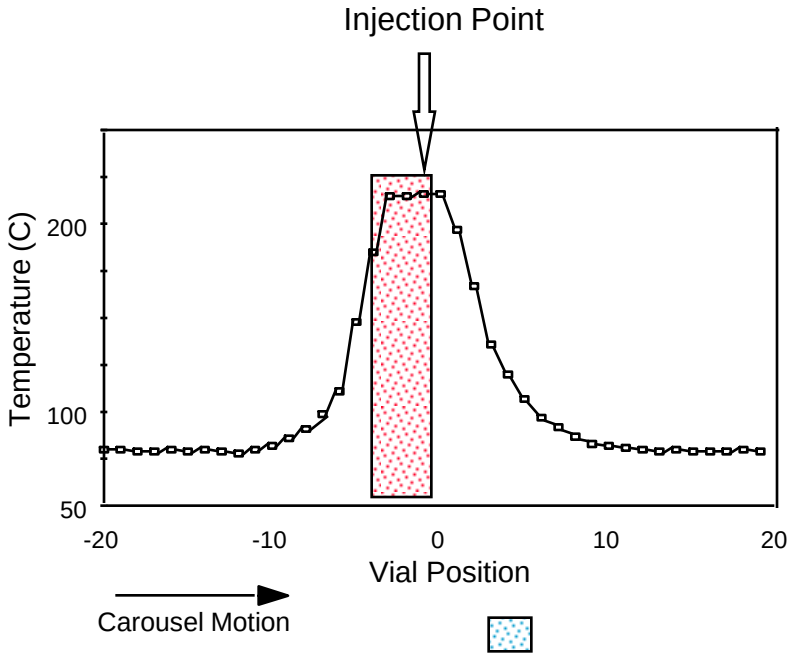
High precision Agilent pump ensures reproducible results even in viscous solvents

Sample is heated from injection to waste to maintain sample solubility & stability

PL-GPC 220 Autosampler

Dual Zone Autosampler
40 vial position carousel
Sample can be slowly stirred prior to injection
Two zone heating, minimized risk of sample degradation

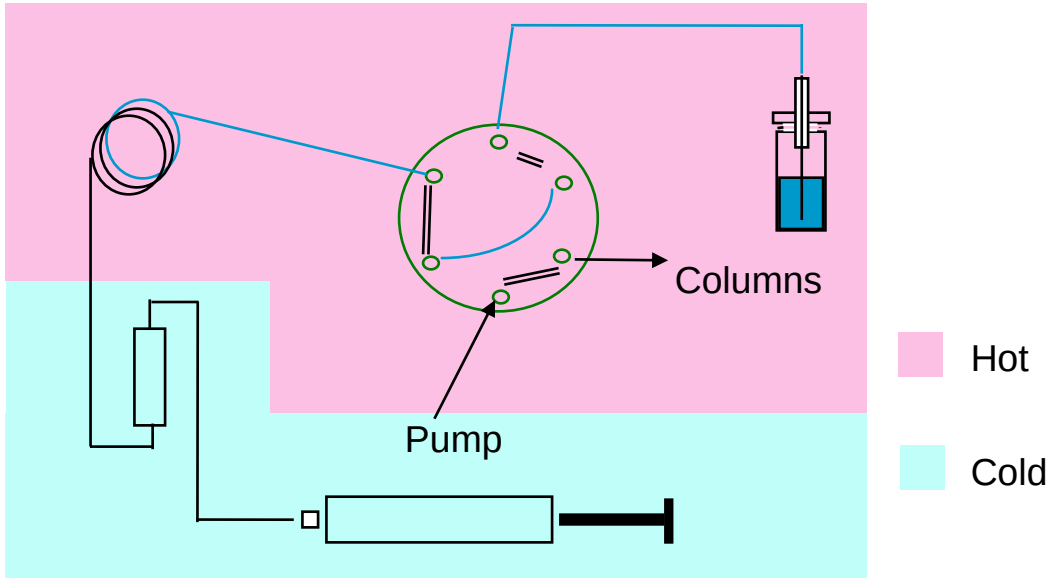




Injection system
Vial is transported up to the column oven
Vial equilibration time in the oven is programmable
Excess solution returned to vial
No risk of polymer precipitation.
Injection precision RSD <1% with no cross contamination

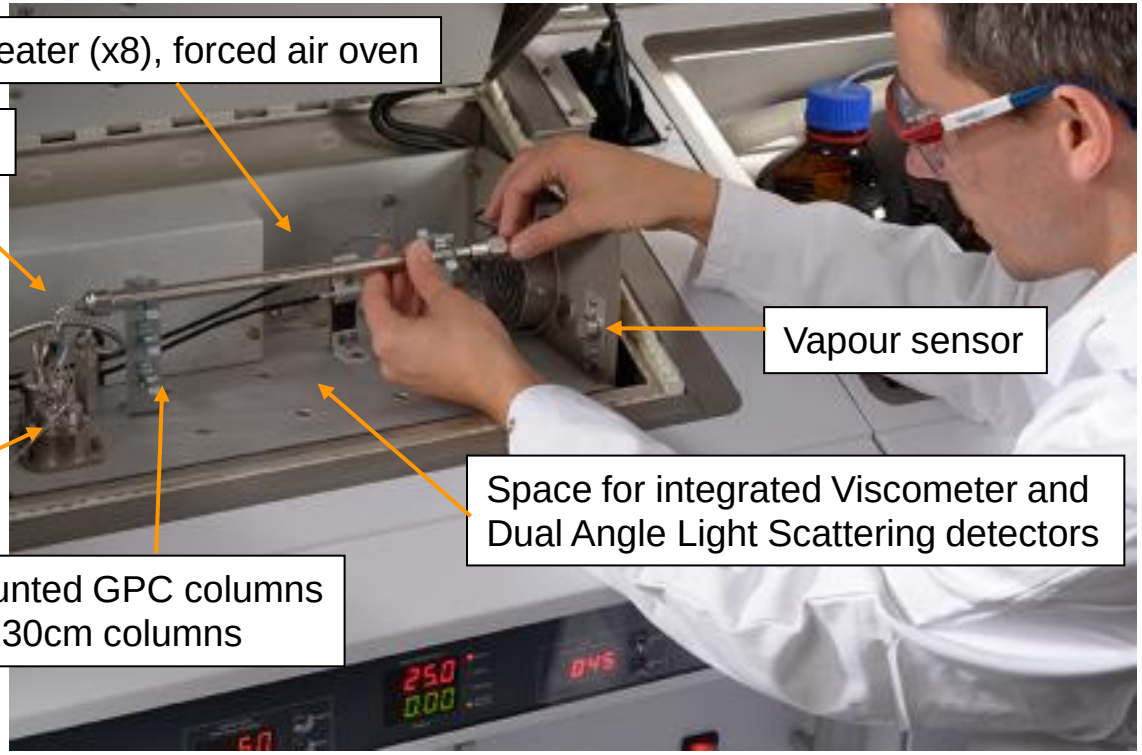
Unique Injection System

Electrically actuated injection valve	
Flushed fixed loop injection	Interchangeable loop volume, 5 - 500 µl
Loop and valve in oven	Eliminates sample precipitation and blockages
No contact between solvent and syringe	Avoids sample carryover and contamination of syringe
	Extends lifetime and reduces maintenance required



Column Oven

High temperature, precise column oven
Easy access for simple column change and routine maintenance
Fully enclosed system, complete outer surface of unit at safe temperature
Temperature range of ambient to 220 C
Temperature stability: ≤0.05 C/hour



Why Consider for Agilent PL-GPC 220 High Temperature GPC System ?

- The established HTGPC with over 370 installations worldwide
- The widest temperature range of any HTGPC (30-220degC) – all applications covered with no compromise on oven heating capability
- Oven heating capacity ideally suited for new development polyolefins which need 160-170degC analysis temperatures for accurate characterization
- Eluent is fully enclosed from solvent to waste – no vapours in laboratory
- The best pumping precision and reproducibility at the heart of the GPC system now available with the Agilent 1260 pump
- The most stable HT GPC oven available 0.05degC/hour drift unmatched by our competition
- True HT GPC integration, from injection to waste – no cold spots – no precipitation – reliable GPC

Points to Consider for Agilent PL-GPC 220 High Temperature GPC System

- Optimum performance from Agilent manufactured RI, Viscometer and LS detectors – low cell volumes and high sensitivity
- Very low cell volume and optimised optics from the most popular HT LS detector (Agilent PL 15/90 dual Angle LS)
- Minimum band broadening from all detectors with the lowest cell volumes available for excellent GPC analyses.
- Total Agilent support – security of supply and service with Agilent as your partner
- All products from the ‘Total’ GPC supplier

Agilent PL-GPC 220

Extreme Confidence

- **Safe in extreme conditions**

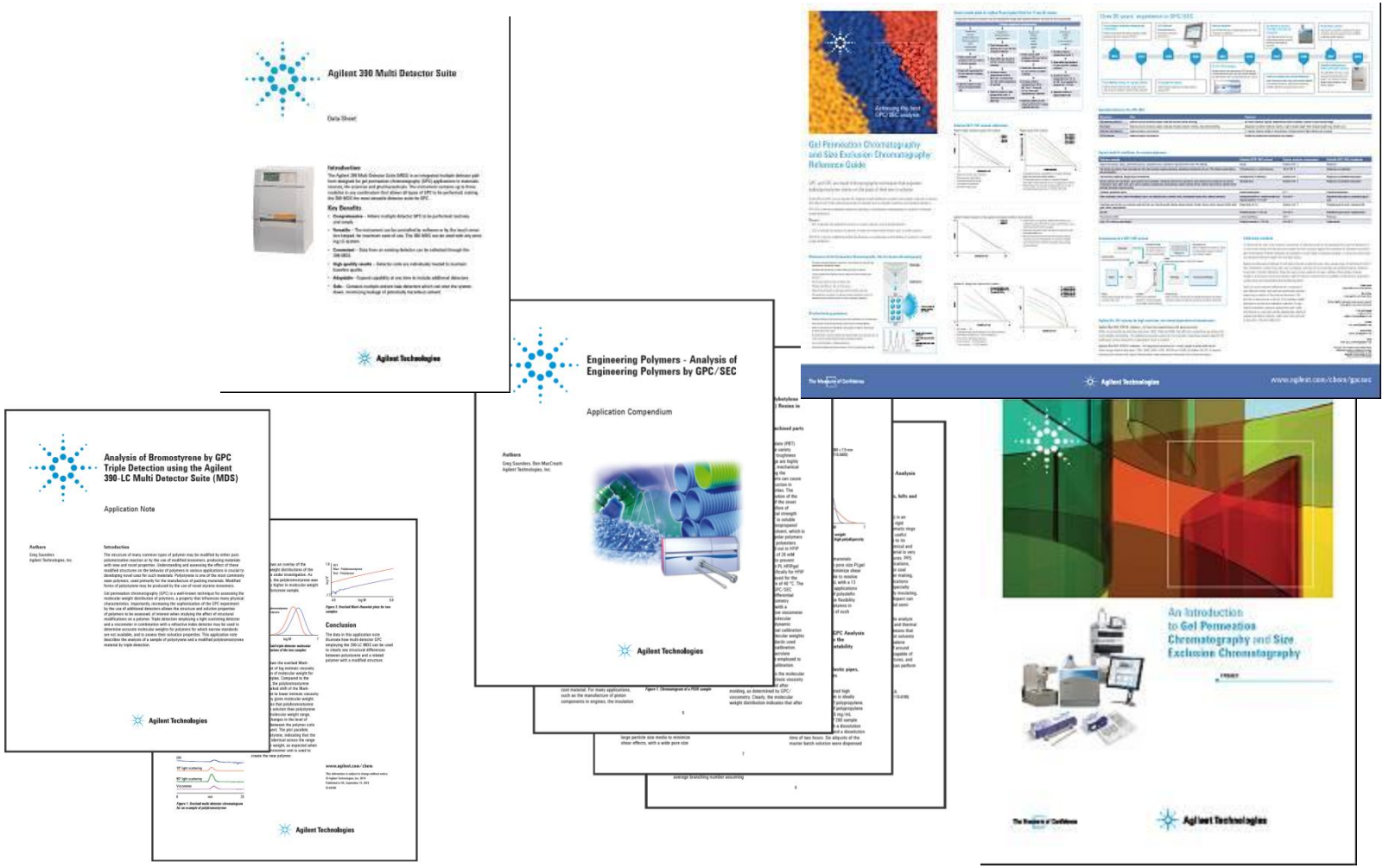
Integrated system with all sample carrying components operated up to 220 °C, for maintained sample solubility

  – Eliminates costly system downtime due to blockages
  – Maximizes operator safety

- **Confidence in Quality of Results**
  – Dual zone autosampler minimises sample degradation.
  – High precision Agilent 1260 Infinity pump ensures reproducible results
  – Market leading low volume detector cells and minimal band-broadening.

- **Confidence in Capabilities**
  – Ability to perform every available GPC application.
  – Integrated Light Scattering and Viscometry detector options.
  – Industry standard for high temperature GPC applications

A Comprehensive collection of Applications, Technical Notes and Teaching Aids to help.



Agilent Technologies

Agilent GPC/SEC Solutions

Over 35 years of innovative contributions to GPC/SEC technology – we are the polymer analysis people

1976

PLgel columns, individual standards and standard kits

Polymer Laboratories founded to develop market-leading products for organic GPC/SEC

1981

PLgel MIXED columns, PL aquagel columns

MIXED columns improve data quality, and novel chemistries for analysis of water-soluble polymers

1984

GPC software

Dedicated software streamlines GPC/SEC calculations

1990

PL aquagel-OH columns

Vastly improve resolution and data quality in queous GPC/SEC

1993

EasiCal standards

New format shortens sample preparation time and the speed of calibration

1999

PL-GPC 220 instrument

Market-leading high temperature GPC system for routine analysis of even the most difficult samples by multi-detector GPC/SEC at temperatures up to 220 °C

2003

PL-GPC 50 instrument with light scattering and viscometry

Cost-effective solution to low temperature polymer analysis, including multi-detector GPC/SEC

2004

PlusPore columns and EasiVial standards

New chemistries deliver high-pore-volume materials for increased resolution, and EasiVial standards simplify calibration procedures even further

2007

PLgel Olexis columns

Optimized for polyolefin analysis with highest resolution and data quality for even ultra-high molecular weight samples

2009

MDS Multi Detector Suite and PolarGel columns

The MDS turns any LC into a powerful multi-detector GPC/SEC system, and PolarGel columns analyze polar samples in any solvent system

2011

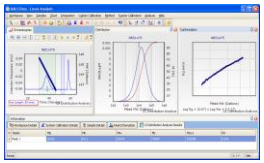
Agilent GPC/SEC software

Creating a complete and comprehensive GPC/SEC instrumentation portfolio

Learn more: www.agilent.com/chem/gpc-sec

Agilent Technologies Total GPC Solution

- GPC Columns
  - GPC Standards
    - GPC Instrumentation
      - GPC Software
        - GPC Expertise



Agilent Technologies

Thanks for Listening

Any Questions