Jordi Labs

Material Solutions. Uncompromising Integrity.

Resolve 13 µm GPC Columns

High Resolution GPC

- Monodisperse Polymer Particles
- 100% Divinylbenzene (DVB)
- Broad Pore Size Range

Key Features

No Dislocations in Pore Distribution
Clean Light Scattering Background
Highly Symmetrical Peaks
Improved Calibration
Low Back Pressure
Stable up to 220ºC
Long Column Life
Repeatability
Plate Count
Resolution

1. **Why Jordi Resolve Columns?**
   - Improved regularity
   - Increased separation efficiency
   - Highly linear calibration means increased accuracy
   - Measures every MW between 500 and 12 million
2. **What makes our new columns better?**
   - Monodisperse bead size
   - Novel 100% DVB column packing
   - Enhanced mechanical stability
3. **For what industries are these columns best suited?**
   - Petroleum
   - Chemical
   - Consumer Product Goods
4. **What are some common applications for Jordi Resolve Columns?**
   - High molecular weight polymers
   - Polyethylene and Polypropylene at high temperature

Jordi Gel DVB Resolve 13 µm GPC Columns

Jordi Labs has recently developed a novel packing material for the high temperature molecular weight analysis of polyethylene and other polyolefins. This column packing is based on 100% divinylbenzene providing enhanced mechanical stability and utilizes a new synthetic process which results in a monodisperse polymer column packing. The increased regularity of the polymer packing results in improved chromatographic performance as compared to traditional GPC columns. This second generation GPC column provides improved separation efficiency (plates, symmetry, resolution and total pore volume), highly linear calibrations (R2 = .999), no dislocations, low light scattering bleed, low back pressure and a highly reproducible column.

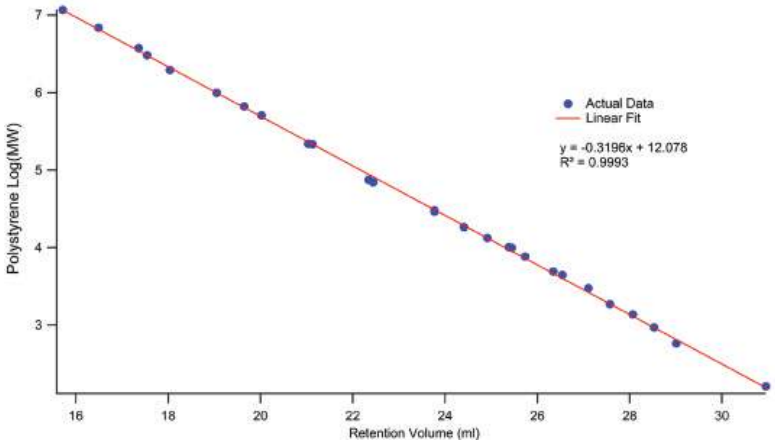

Figure 1: Resolve 13 µm Calibration Curve

It is well known that broad particle size distributions in particle based columns produces variations in packing density, lowers column resolution, reduces the column permeability and generates high back pressure. New generation Jordi GPC columns prepared with monodisperse 100% divinylbenzene particles with precisely controlled particle diameter and finely controlled pore structure provide high efficiency, high separation capacity and low back pressure with greater bed stability. Scanning electron micrographs and particle size distributions of 13 µm macroporous column packing materials with 10 Å pore sizes are shown in Figure 2. The uniform size distributions and perfect spherical shapes are clearly seen.

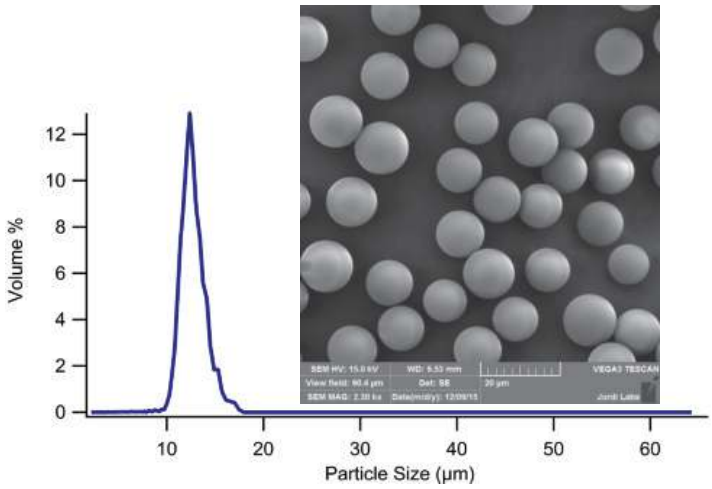

Figure 2: SEM and particle size distributions of 13 µm resin

To maximize GPC resolution, the key is to use a column containing the maximum number of pores of the desired size to separate the molecular weight range of interest. New generation Jordi Resolve Columns (7.8 mm x 300 mm) are produced to allow separation over the molecular weight range from 500 to 12,000,000 g/mol (PS equivalent) for 13 µm particle size packing materials. Polyolefins often have broad molecular weight ranges characterized by high polydispersity values. Jordi Labs has developed mixed bed columns especially for these broad distribution samples which were designed by blending a large number of individual pore size packing materials. Jordi Mixed bed 13 µm columns have highly linear calibration curves with a coefficient of determination (R2) of 0.999 over the molecular weight range 500 to 12,000,000 g/mol (PS equivalent) for 13 µm. These columns have the ability to separate very broad samples without peak dislocations/shoulders for highly polydisperse samples. Analysis of NIST polyethylene standards including NIST 2887, 1475a and 1476a along with industry samples of polypropylene, polyethylene and polystyrene have been performed to demonstrate column performance at elevated temperatures (160ºC).

The large particle size of the new Jordi 13µm column provides high efficiency and minimum shear degradation for high molecular weight polymers. Polyethylene samples analyzed in trichlorobenzene at 160ºC are shown in Figure 3. In addition, Resolve Columns provide a long operating lifetime due to the highly crosslinked (100% DVB) structure and can be operated at 220ºC without column bed degradation. This new column has the added advantage of very low bleed of fine particulates rendering it especially useful for light scattering detection. Light scattering background (0.4 mV baseline thickness, equivalent to instrument background levels) was observed with negligible amounts of spiking after less than 24 hours of column introduction, enabling high signal to noise ratios.

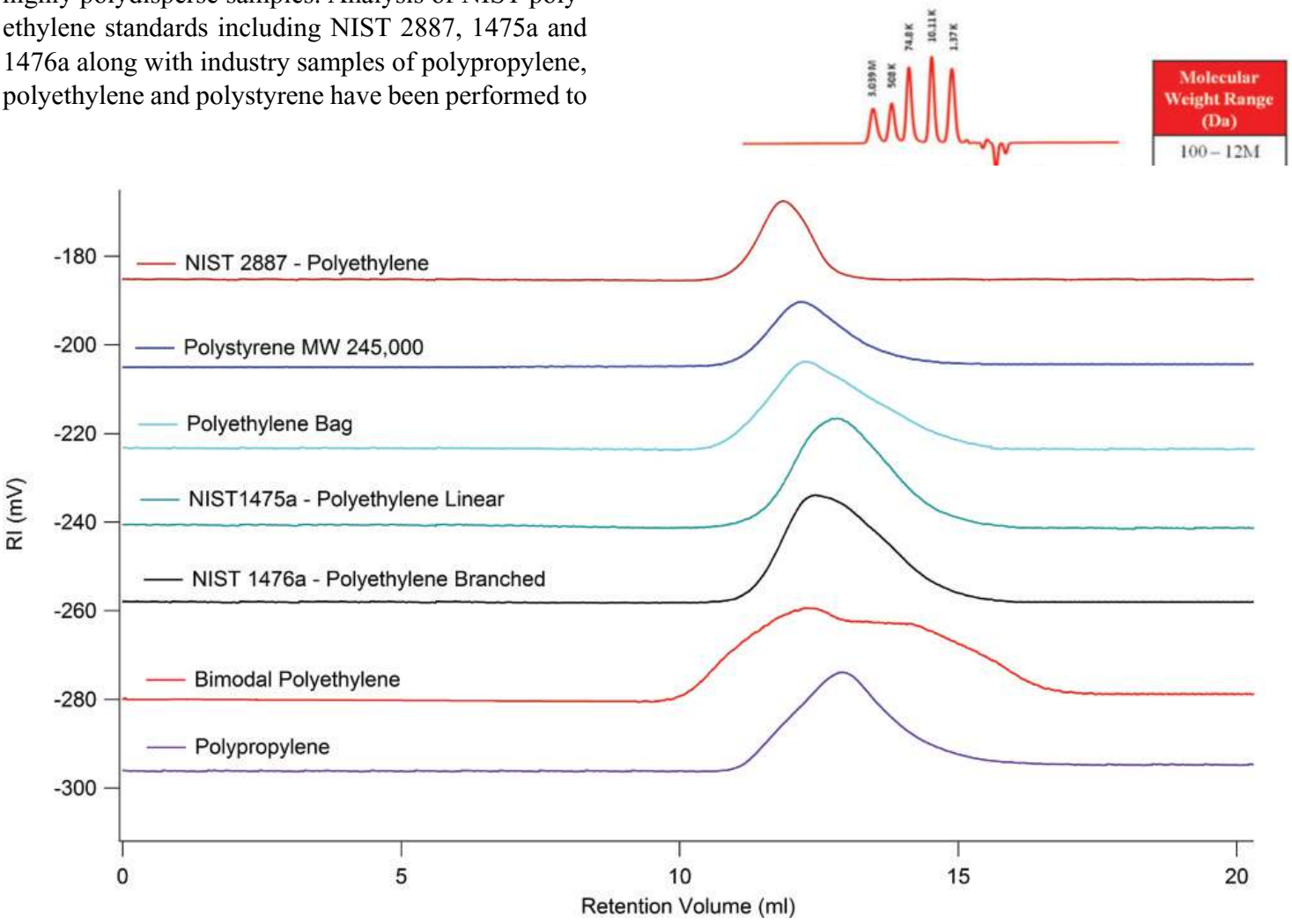

Figure 3: Chromatograms obtained with Resolve 13 µm (7.8mm x 300mm) column for PE and related samples at 160°C.

Jordi Labs

A leader in polyethylene analysis

- Extensive polyolefin characterization experience
- Investigative analyses
- Regulatory submissions
- Extractables and Leachables
- Deformulation
- Best contract high temperature GPC lab

Polymer Branching
- NMR (short chain, PE ID)
- TREF/CRYSTAF (branching comparisons)
- GPC-T (long chain branching)

Additives Package
- QTOF-MS (additive type and quantity)
- TGA (filler content)
- SEM-EDX (filler type and size)

Thermal Properties
- DSC (melt point, glass transition)
- Capillary Rheometry (extrusion properties)
- Melt Flow

Mw Characterization
- GPC-H (relative molecular weight)
- GPC-HT (absolute molecular weight)

Film Characterization
- FTIR-Microscopy (film layer structure)
- SEM (film layer thickness)