



## GPC/FIPA Application Note #12

### Advanced GPC/FIPA Analysis of Polyolefin Xylene Solubles

Polyolefins (Polypropylene, Polyethylene, and Copolymers) is the most widely used type of synthetic organic polymer in the world. They are classified as semi-crystalline materials that are heavily used in automotive, household, medical, and construction applications. Xylene Solubles is a traditional gravimetric (Wet) measurement for the percent amorphous fraction. %XS content is highly important for the property and performance specific for different grades. The tediousness and variability of the Wet method prompted the development of a more reliable chromatographic (FIPA) alternative that follows the ASTM extraction chemistry. FIPA (Flow Injection Polymer Analysis) is the simplest form of GPC where all the polymeric materials are excluded from a small porosity FIPA column. Using a Malvern Triple Detector GPC system, we can measure the %XS, Mw and IV of the amorphous XS extract all in a single injection. The analysis conditions are listed below.

Dissolution Solvent/Mobile Phase	Xylene/THF	Sample Conc	20 mg/mL
Columns	H-100-3078 (HMJ)	Dissolution Temp	135C
Flow Rate	1 mL/min	Dissolution Time	60 Minutes
Column Temp	45C	Sample Filtration	0.2 um Nylon

Figure: Triple Chromatogram of an EPR Sample

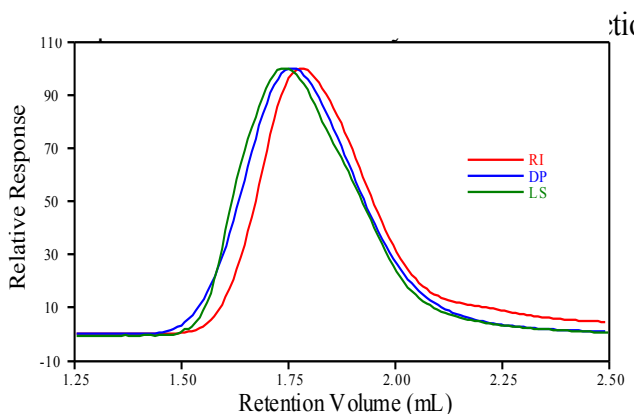


Table: Summary of Analysis for an EPR sample

EPR Results	Runs	dn/dc	Mw	IV	% XS
Average	6	0.08	299,367	2.39	15.27
SD			1,718	0.02	0.09
RSD			0.57%	0.57%	0.59%

The results show consistent %XS, Mw and IV data for the EPR sample.