Analysis of Low Molecular Weight Polyethylene via Conventional GPC

Application Note

Materials Testing & Research

Author

Graham Cleaver
Agilent Technologies, Inc.

Introduction

Polyethylene is a structurally simple material with a high commercial relevancy. Currently over 60 million tons of polyethylene is produced worldwide every year. Despite its relatively simple structure, it is the most widely used thermoplastic in the world and has a range of final end user applications from grocery bags to bullet-proof vests.

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Methods and Materials

Analysis of low molecular weight polyethylene materials can be easily achieved by gel permeation chromatography (GPC) with high efficiency Agilent PLgel 5 µm MIXED-D columns, in conjunction with the Agilent PL-GPC 220 Integrated GPC/SEC System.

Conditions

Sample:	Polyethylene
Column:	2 × PLgel 5 µm MIXED-D, 7.5 × 300 mm (part number PL1110-6504)
Eluent:	1,2,4-Trichlorobenzene
Flow Rate:	1.0 mL/min
Inj Vol:	100 µL
Sample Conc:	2.0 mg/mL
Temp:	160 °C
Calibrants:	Agilent EasiVial PS-M
Detector:	PL-GPC 220 (Differential Refractive Index)

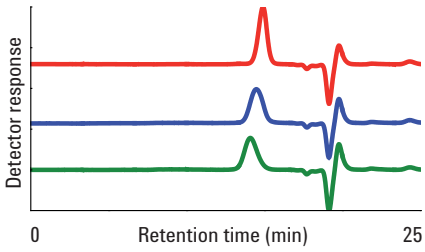

Figure 1. Overlaid raw data chromatograms obtained from series of low molecular weight polyethylene samples

The polyethylene samples were prepared using an Agilent PL-SP260 Sample Preparation System at 0.2% (w/v) in trichlorobenzene at 150 °C for 2 hours and injected without further treatment.

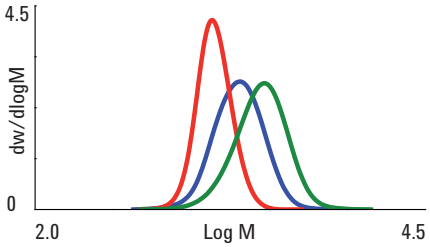

Figure 2. Overlaid molecular weight distributions obtained from series of low molecular weight polyethylene samples

Results

Figure 1 shows the overlaid chromatograms given by the samples and Figure 2 shows the calculated molecular weight distributions.

Conclusion

PLgel MIXED columns and the PL-GPC 220 successfully analyzed samples of polyethylene, demonstrating how the investigation of these structurally simple but commercially important materials can be accomplished by GPC.

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