Analysis of Linear and Branched Polyethylene Glycols via GPC Viscometry

Application Note

Materials Testing & Research

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Introduction

Polyethylene glycol is a biocompatible polymer used in many different commercial products because of its low toxicity. It forms the basis of many cosmetic materials and lubricants. More recently, through its conjugation to different protein and therapeutic materials, it finds use in a variety of biomedical application areas. The biomedical interest in branched type PEG materials has increased as a result of their lower viscosity in comparison with equivalent linear type polymers. Investigation of PEGs by gel permeation chromatography (GPC) can be used to elucidate their relatively compact nature in solution.

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Materials and Methods

Analysis of low molecular weight polyethylene materials is easily achieved by GPC with high efficiency Agilent PLgel 5 µm MIXED-D columns and the Agilent PL-GPC 50 Integrated GPC/SEC System. The PL-GPC 50 was equipped with both differential refractive index and viscometry detection. The PEG samples were prepared at 0.2% (w/v) in dimethylformamide at room temperature for 2 hours and injected without further treatment.

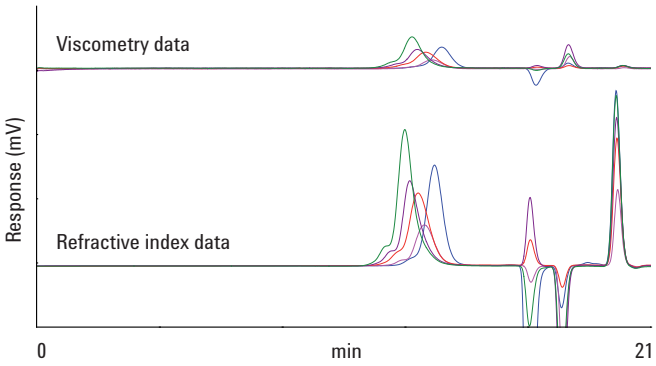

Figure 1. Overlaid raw data chromatograms obtained from a series of linear and branched polyethylene glycol samples

Conditions

Sample:	Polyethylene glycol
Column:	2× PLgel 5 µm MIXED-D, 7.5 × 300 mm (part number PL1110-6504)
Eluent:	Dimethylformamide (+ 0.1% LiBr)
Flow Rate:	1.0 mL/min
Inj Vol:	100 µL
Sample Conc:	2.0 mg/mL
Temp:	50 °C
Calibrants:	Agilent EasiVial PEG/PEO
Detector:	PL-GPC 50 (Differential Refractive Index + Agilent PL-BV 400RT Viscometer)

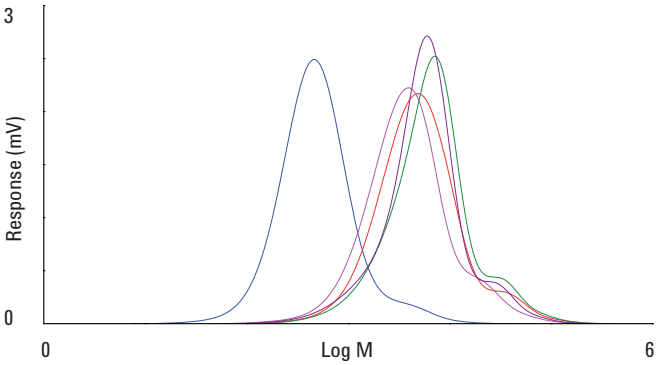

Figure 2. Overlaid raw data chromatograms obtained from a series of linear and branched polyethylene glycol samples

Results

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

Conclusion

This investigation demonstrates how gel permeation chromatography with viscometry detection, delivered by the PL-GPC 50 and PL-BV 400RT, can be used for the analysis of pharmaceutically and commercially interesting materials such as linear and branched polyethylene glycols.

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