Fingerprinting Isocyanate Pre-polymer Fractions by Agilent PLgel MIXED-E and GPC

Application Note

Materials Testing and Research, Polymers

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Introduction

Isocyanate polymers are important commercial materials. The finished isocyanate resins are produced by setting pre-polymer formulations containing oligomers and low molecular weight polymers with an appropriate hardener. Unsurprisingly, the formulation of pre-polymer mixtures can have a profound effect on the setting characteristics of the oligomers and therefore the physical properties of the final product. Quality and process control requires that the isocyanate pre-polymer formulations be analyzed, and the oligomer distribution and polymer molecular weight distribution characterized accurately.

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1260 Infinity
GPC/SEC System

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For the analysis of samples where both the oligomeric and polymeric components are of interest, high efficiency Agilent PLgel 3 µm MIXED-E, 300 ×7.5 mm columns, with an exclusion limit of 30,000 g/mol, are ideal.

Analysis of Isocyanate Pre-Polymers

Figure 1 shows two overlaid chromatograms of isocyanate pre-polymer A and B. Differences can be detected between the oligomeric distribution of both samples. The presence of different peaks due to polymers can also be identified between the samples, demonstrating how PLgel 3 µm MIXED-E columns could be used to fingerprint a desired oligomer/polymer distribution in a sample as part of a rigorous quality control environment.

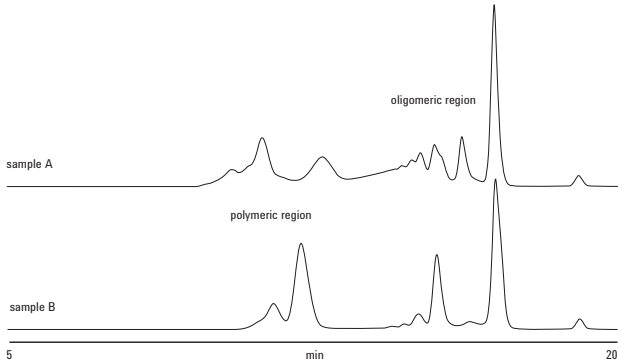

Figure 1. Oligomer and polymer fractions of an isocyanate revealed by an Agilent PLgel 3 µm MIXED-E, three-column set

Conditions

Samples	Isocyanate pre-polymers, 0.4% (w/v)
Column	2 × Agilent PLgel 3 µm MIXED-E, 300 × 7.5 mm (p/n PL1110-6300)
Eluent	THF
Flow Rate	1.0 mL/min
Detector	RI
System	Agilent PL-GPC 50

Conclusion

Agilent PLgel columns with small pore sizes can be used to analyze low MW isocyanates to reveal details of their oligomeric distribution, a property that affects many of their applications in end-use.

For More Information

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