Pre-preg Analysis on Agilent PLgel MIXED-E with Gel Permeation Chromatography

Application Note

Materials Testing and Research, Polymers

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Introduction

Pre-pregs are pre-impregnated composite fibers. After impregnation, the pre-preg is then molded or formed, and cured by heat so that it maintains its molded shape. Pre-pregs are used in the automotive and construction industries.

Gel permeation chromatography of pre-pregs is straightforward with Agilent PLgel 3 µm MIXED-E columns. These columns are ideal for low molecular weight samples that contain oligomeric fractions, as well as polymers, up to 30,000 MW.

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Analysis of a Pre-preg

A pre-preg sample consisting of a carbon fiber matrix was impregnated with a polyfunctional epoxy resin. Dissolution was achieved by placing a pre-cut portion of the matrix into a measured volume of eluent. Insoluble matrix was removed by filtration prior to injection. Excellent oligomeric detail was observed through the use of three high efficiency Agilent PLgel 3 µm MIXED-E columns at reduced flow rate of 0.8 mL/min instead of the more usual 1.0 mL/min.

Conditions

Column	3 × Agilent PLgel 3 µm MIXED-E, 300 × 7.5 mm (p/n PL1110-6300)
Eluent	THF
Flow Rate	0.8 mL/min
Detector	UV
System	Agilent PL-GPC 50

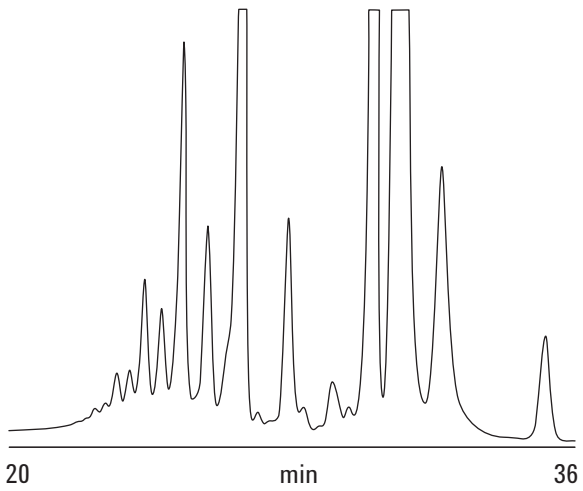

Figure 1. Oligomeric detail in a pre-preg revealed by an Agilent PLgel 3 µm MIXED-E three-column set (some peaks have been cut off to show oligomeric resolution).

Conclusion

Low-pore-size, high-resolution PLgel columns can be used to analyze low MW resins to show the oligomeric distribution, a property that affects many end-use applications.

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