Novolac Resin Analysis on Agilent PLgel MIXED-E with Gel Permeation Chromatography

Application Note

Materials Testing and Research, Polymers

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Introduction

Pre-polymer novolacs are thermo-plastic phenol-formaldehyde resins manufactured with an excess of phenol in the reaction using an acid catalyst. Methylene groups mainly link the phenol units. The molecular weights of novolac resins are in the low thousands, for example, approximately 10–20 phenol units.

Novolacs are used in varnishes, and are mixed with diazonaphthoquinone to make light sensitive photoresists in photoengraving and photolithography to form patterned coatings on surfaces.

Analysis of novolac resins by gel permeation chromatography is straightforward with Agilent PLgel 3 µm MIXED-E columns, which are ideal for low molecular weight samples that contain oligomeric fractions, as well as polymers, up to 30,000 MW.

Verified for Agilent
1260 Infinity
GPC/SEC System

Agilent Technologies

Analysis of polysiloxane

This separation shows good resolution of the sample oligomers achieved using a single high-efficiency Agilent PLgel 3 µm MIXED-E column, with a total run time of 10 minutes.

Conditions

Column	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

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

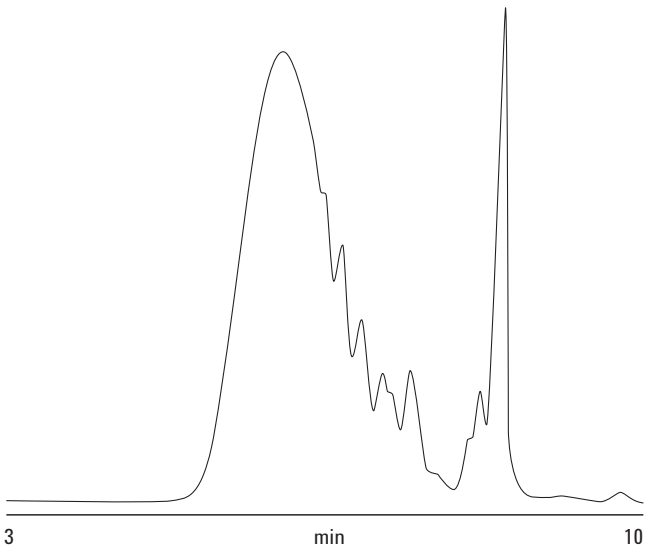

Figure 1. Good separation of oligomers in a novolac resin on an Agilent PLgel 3 µm MIXED-E column.

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