

# Phenolic Resin Analysis with Agilent PLgel Columns and Gel Permeation Chromatography

## Application Note

Environmental

### Author

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### Introduction

Phenol formaldehyde resins are made by the reaction of phenol and formaldehyde, though precursors occasionally include other phenols or aldehydes. Phenolic resins are mainly used to make printed circuit boards, or for adhesives, coatings, and lab bench tops.

Dimethylformamide (DMF) is a polar eluent, and is therefore suitable for the analysis of polar phenolic resins. Elevated temperature is recommended to reduce operating pressures and improve resolution. Good resolution of oligomeric species is achieved using gel permeation chromatography with Agilent PLgel 5  $\mu\text{m}$  500Å columns.

### Analysis of Phenolic Resin

Two different phenolic resins were analyzed on PLgel 5  $\mu\text{m}$  columns. The sample shown in Figure 1 was run on a two-column set at a lower temperature than the second sample, which was run at an elevated temperature (Figure 2). The approach adopted reflects the composition of these simple samples. For more difficult resins, Agilent PolarGel columns are recommended.



## Conditions for Figure 1

Columns Agilent PLgel 5  $\mu\text{m}$  500 $\text{\AA}$ , 7.5  $\times$  300 mm  
(p/n PL1110-6525)  
Agilent PLgel 5  $\mu\text{m}$  100 $\text{\AA}$ , 7.5  $\times$  300 mm  
(p/n PL1110-6520)  
Eluent DMF  
Flow rate 1.0 mL/min  
Temp 50  $^{\circ}\text{C}$   
Detector RI  
System Agilent PL-GPC 50

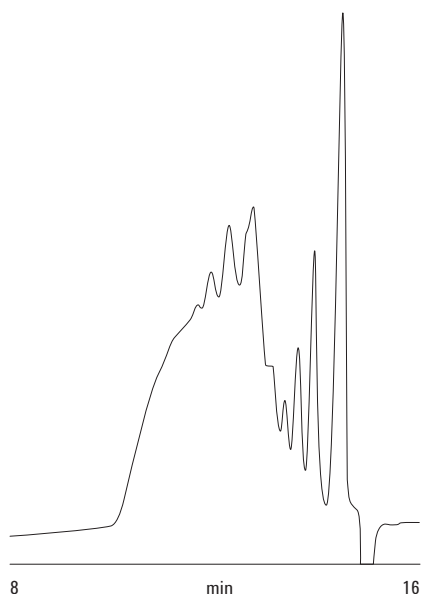


Figure 1. Oligomers in a phenolic resin separated on an Agilent PLgel 5  $\mu\text{m}$  two-column set.

## Conditions for Figure 2

Columns Agilent PLgel 5  $\mu\text{m}$  100 $\text{\AA}$ , 7.5  $\times$  300 mm  
Eluent DMF  
Flow rate 1.0 mL/min  
Temp 50  $^{\circ}\text{C}$   
Detector: RI  
System PL-GPC 50

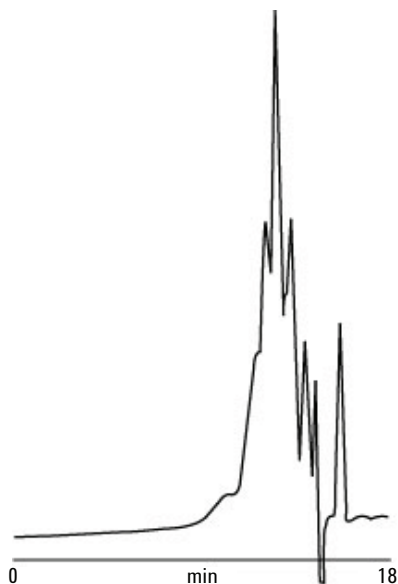


Figure 2. A phenolic resin analyzed on a single Agilent PLgel 5  $\mu\text{m}$  column.

## Conclusion

Agilent PLgel columns in DMF can be used to investigate different samples of phenolic resin by gel permeation chromatography.

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