TB3012: Conventional GPC of Phenolic Resins on ResiPore Columns

Keywords

GPC, RI, ResiPore, Phenolic Resin, THF

The term “phenolic resin” is used to describe a group of thermosetting resins produced through the reaction of phenol with an aldehyde. Phenolic resins were the earliest synthetic polymers to be developed (Bakelite, 1907), and possess useful mechanical and physical properties. Applications of phenolic resins include electrical insulation, moulding, lamination and adhesives. Due to the relatively low cost and favorable properties of phenolic resins, they are produced in the greatest volume of all thermosetting polymers. Key characteristics of phenolic resins are their molecular weight distribution and oligomeric “fingerprint” as these both have significant effects on the end use properties of the resin.

GPC is an ideal analytical tool for the examination of both of these characteristics. In this case, the use of high resolution GPC columns is advantageous, since these allow an optimized oligomeric separation and provide detailed information regarding the oligomeric sample composition.

In the GPC analysis detailed below, four distinct grades of phenolic resin have been analysed by GPC using a Polymer Laboratories’ ResiPore column set. Resulting from the small particle size (3µm) and optimized pore size distribution of this column packing material, good resolution was obtained in the molecular weight range of interest.

The chromatography obtained from the GPC of each phenolic resin sample has been presented in Figure 1 opposite. Differential molecular weight distributions are given in Figure 2 opposite. This plot clearly shows significant differences in molecular weight distribution and the relative amounts of oligomeric material.

Columns:	2xResiPore, 300x7.5mm (1113-6300) (conditioned with 10 injections of a typical sample solution at 10mg/ml)
Eluent:	THF (stabilized with 250ppm BHT)
Flow Rate:	1.0ml/min
Inj Vol:	20µl
Detector:	RI

Figure 1 - Overlay of GPC chromatograms obtained from four samples of phenolic resin

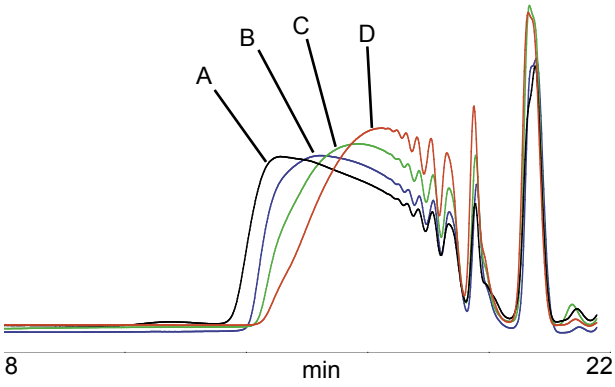
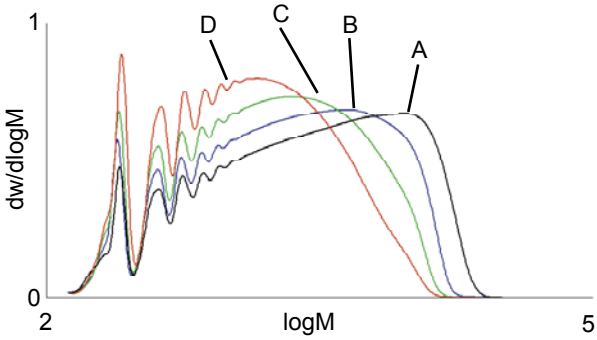


Figure 2 - Overlaid molecular weight distributions from the GPC of four samples of phenolic resin



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