

Analysis of Melamine Resins by Conventional GPC using Agilent PolarGel-L Columns and the Agilent PL-GPC 50

Application Note

Materials Testing & Research

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Introduction

Melamine resins are durable thermosetting plastics formed by the condensation polymerization of melamine with formaldehyde. They are commonplace in the home as they are employed to laminate chipboard, creating inexpensive furniture, as well as being used in the manufacturing of kitchen tableware and food packaging. The molecular weight distribution of melamine resins determines many of the final properties of the polymer and therefore their end-use suitability for particular applications. Subtle differences in the molecular weight distributions of these materials can have large consequences on their final properties, and so accurate characterization of the molecular weight distribution of melamine resins is essential.



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Methods and Materials

Conditions

Samples: Two samples of melamine resin
Columns: 2 × PolarGel-L,
7.5 × 300 mm (p/n PL1117-6830)
Eluent: Dimethylacetamide + 0.1% LiBr
Flow Rate: 1.0 mL/min
Temperature: 50 °C
Detection: PL-GPC 50 Integrated GPC/SEC
System with DRI

Results and Discussion

It is apparent from the chromatograms (Figure 1) and overlaid molecular weight distributions (Figure 2) that the two samples of melamine resins had quite different molecular weight distributions, with differing ratios of the various oligomers present. These differences suggest that the samples will have markedly dissimilar properties, which will affect their end use.

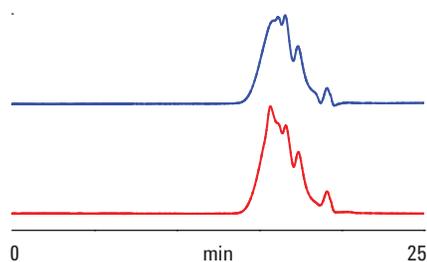


Figure 1. Chromatograms for two melamine samples with different oligomer ratios

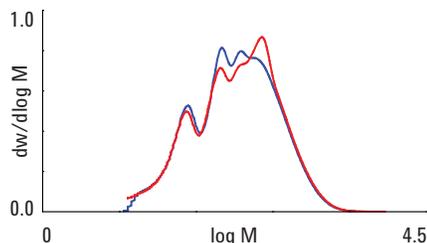


Figure 2. Overlaid molecular weight distributions for two melamine resin samples suggest differences in performance

Conclusion

The PL-GPC 50 Integrated GPC/SEC System fitted with two PolarGel-L columns successfully analyzed two samples of melamine resin, indicating clear differences between the samples. The PolarGel-L columns are well suited to operation in highly polar solvents such as dimethylacetamide. The stability of the PL-GPC 50 column over ensured that a low column pressure and stable baselines were observed throughout the analysis.

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