High Resolution Analysis of Polyethylene Glycol using HPLC with ELSD

Application Note

Materials, Testing and Research

Author

Graham Cleaver
Agilent Technologies, Inc.

Introduction

PEGs are low molecular weight polymers of the general formula $H(OCH_2CH_2)_nOH$ and they are widely used as excipients or drug delivery agents in the pharmaceutical industry, as well as additives in cosmetics and home care products.

Oligomeric separation of low molecular weight PEGs by gradient reversed-phase HPLC is widely used to verify the composition of the polymer. However, PEG has no UV chromophore and, as a gradient elution is required, RI detection is not a viable alternative.

For non-UV absorbing compounds, the Agilent evaporative light scattering detector is the primary choice since the principle of detection does not rely on the optical properties of the solute. RI detectors generally suffer from relatively low sensitivity and poor baseline stability. In this respect, the Agilent 380-ELSD offers significant benefits as it operates over very rapid changes in eluent composition and temperature with no effect on the baseline stability, and offers very high sensitivity.

PLRP-S 100Å columns are ideally suited to the analysis of low molecular weight compounds because the very small pore sizes have extremely high surface areas available to the solutes. An excellent demonstration of the capability of the Agilent 380-ELSD with this type of column is illustrated by the analysis of polyethylene glycols.

Agilent Technologies

Instrumentation

Column:	PLRP-S 100Å 5 µm, 150 x 4.6 mm (p/n PL1111-3500)
Detection:	Agilent 380-ELSD (neb=50 °C, evap=70 °C, gas=1.6 SLM)

Materials and Reagents

Eluent A:	Water
Eluent B:	ACN

Conditions

Gradient:	10-30% B in 12 min
Flow Rate:	1.0 mL/min

Results and Discussion

Figure 1 is an overlay of the chromatograms obtained for two PEGs, with molecular weights of 400 and 1080. The high resolution achieved for the separation of individual PEG oligomers present in the two samples is clearly evident.

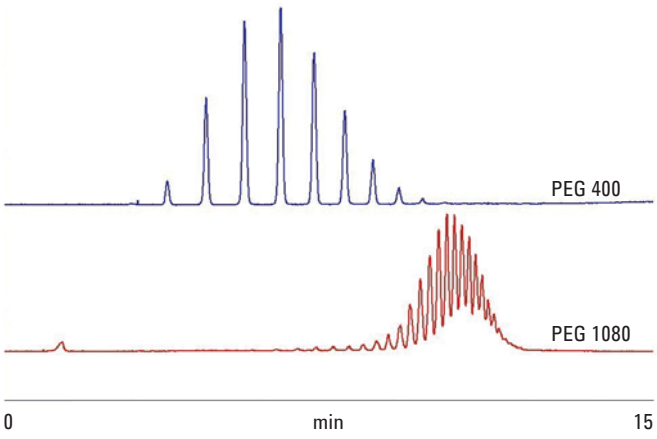

Figure 1. High resolution of PEGs with different molecular weights using a PLRP-S column and Agilent 380-ELSD.

Conclusion

The Agilent 380-ELSD combined with a PLRP-S 100Å column successfully responded to all of the PEG samples' components and offered high sensitivity and low limits of detection because of the optimum match of column, detector and sample.

PLRP-S columns are ideally suited to the analysis of many small molecules. The 100Å pore size has an exceptionally high surface area that is accessible to the solutes. It is more retentive for small molecules than the majority of alkyl bonded silicas.

PLRP-S media possess a much greater surface area than alkyl bonded silicas and therefore even polar molecules such as carboxylic acids may be retained much longer, resulting in greater resolution.

The Agilent 380-ELSD evaporative light scattering detector surpasses other ELSDs for low temperature HPLC applications with semi-volatile compounds. Its innovative design represents the next generation of ELSD technology, providing optimum performance across a diverse range of HPLC applications. The Agilent 380-ELSDs unique gas control permits evaporation of high boiling solvents at very low temperatures. For example, 100% water at a flow rate of 5 mL/min can be removed at 30 °C. The novel design of the Agilent 380-ELSD provides superior performance compared to competitors' detectors for the analysis of semi-volatile compounds.

www.agilent.com/chem

Published in USA, August 1, 2015
5990-8313EN

Agilent Technologies