High Resolution Analysis of Triglycerides in Cooking Oil using HPLC with ELSD

Application Note

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Introduction

The composition of triglycerides in cooking oil is very complex and oil contains many chemically similar species. In order to develop a high resolution HPLC separation of these components, gradient elution is required, normally involving solvents with very different properties. For this reason, RI is not viable as a detection method and UV can be difficult due to baseline disturbance arising from the choice of solvents used in the gradient. PLRP-S 100Å columns are ideally suited to the analysis of triglycerides because the very small pore sizes have extremely high surface areas available to the solutes. Evaporative light scattering detection (ELSD) with Agilent's ELS detectors offers significant benefits over RI and UV as it is unaffected by the optical properties of the solvents. Additionally, it offers high sensitivity for detection of low levels of contaminants that may be present in adulterated oils.

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Instrumentation

Column: PLRP-S 100Å 5 µm, 150 x 4.6 mm (p/n PL1111-3500)
Detector:Agilent ELSD (neb=40 °C, evap=40 °C, gas=1.6 SLM)

Materials and Reagents

Eluent A:Acetonitrile
Eluent B:Dichloromethane

Sample Preparation

Concentration: 1 mg oil/mL

Conditions

Gradient: 10% B hold for 5 min, 10-70% B for 30 min
Flow Rate: 0.5 mL/min
Injection Volume: 10 µL

Results and Discussion

The chromatogram in Figure 1 shows an HPLC separation of triglycerides in unadulterated cooking oil using a PLRP-S column and an Agilent ELS detector. The lack of contamination in the sample is evident.

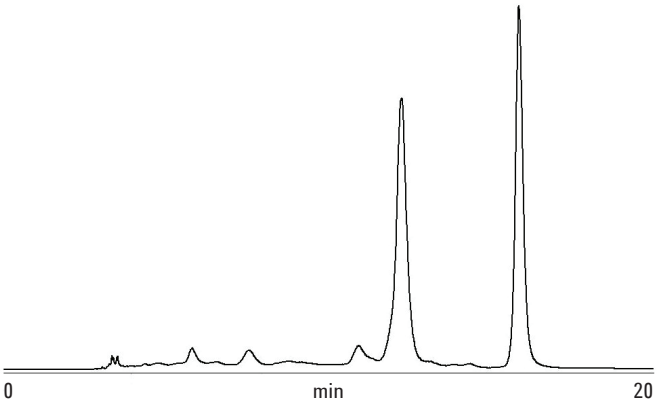

Figure 1. Agilent ELSD and a PLRP-S column produce an extremely stable baseline across the gradient in the analysis of triglycerides.

Conclusion

Using an Agilent ELS detector combined with a PLRP-S 100Å column successfully resolved triglyceride constituents in cooking oil 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. Agilent ELS detectors surpass 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 ELS detector's 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 ELS detector provides superior performance compared to detectors from other vendors for the analysis of semi-volatile compounds.

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