Fast Analysis of Light Stabilizers by HPLC with ELSD

Application Note

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Introduction

Synthetic additives are added to plastics to protect them from degradation by light. There has been a lot of concern about the presence of these compounds in food packaging materials. These molecules contain radical traps in the form of CH_3 and OH groups and, consequently, are important antioxidants, as they are able to eliminate free radicals, which would otherwise cause polymer chain cleavage. Several reviews and papers have been published discussing the possibility that additives may have detrimental effects on health[1,2]. The additives are discrete, complex, organic compounds, some of which have strong UV chromophores, whereas others do not. The compounds analyzed in this study contain good chromophores and are therefore also suited to UV detection.

However, the Agilent evaporative light scattering detector provides even greater sensitivity than detection by UV. The instrument also gives no solvent peaks and exhibits excellent baseline stability. The Agilent ELSD is renowned for its rugged design and ability to deliver high performance for demanding HPLC or GPC applications. 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.

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Instrumentation

Column:	PLRP-S 100Å 5 µm, 250 x 4.6 mm (p/n PL1512-5500)
Detection:	Agilent ELSD (neb=40 °C, evap=80 °C, gas=1.0 SLM)

Materials and Reagents

Eluent: 90% THF, 10% Water

Sample Preparation

Tinuvin 144 (0.8 µg), Mark LA68 (8.2 µg) and Chimassorb 199FL (1 µg)

Conditions

Flow Rate: 0.5 mL/min

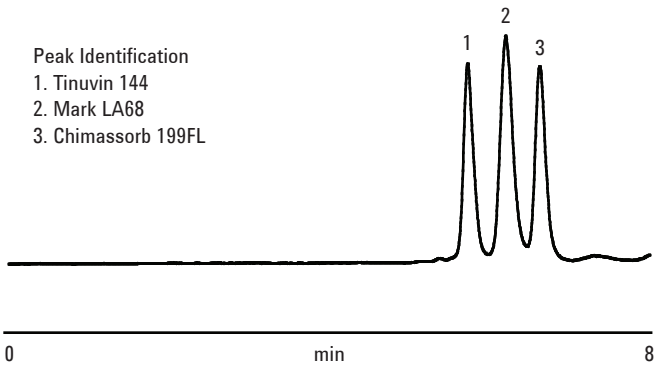

Figure 1. Chromatogram showing good separation of the three light stabilizers.

Conclusion

The Agilent evaporative light scattering detector and a PLRP-S column efficiently resolved three light stabilizing polymer additives. PLRP-S columns are ideally suited to the analysis of many small molecules. These columns are 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. PLRP-S columns used with the Agilent ELSD is an ideal combination for these challenging applications.

References

[1] Arvanitoyannis , I.S and Bosnea, L. 2004. Migration of substances from food packaging materials to foods. *Crit. Rev. Food Sc. Nutr.* 44: 63-76

[2] Barnes, K. Sinclair, R. and Watson, D. (eds) 2006. Chemical Migration and Food Contact Materials. *Woodhead Publishing* Ltd, Cambridge, UK. 480pp.

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