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Excellent Separation of Ginseng Root Constituents by HPLC with ELSD

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Introduction

The root of the ginseng plant (Panax quinquefolium L.) has been used in Chinese medicine for thousands of years, due to its many reported health benefits. Ginseng is said to help people with low and high blood pressure, energizes those suffering from fatigue and helps calm people prone to stress or nervousness. It also has a reputation for improving mental clarity and memory, enhancing physical stamina and bolstering the immune system. The biologically active constituents of ginseng are complex mixtures of triterpene saponins, known as ginsenosides. At least 30 ginsenosides have been isolated and characterized, with R_{g1}, R_{b1}, R_{b2}, R_c and R_d being the most important in ginseng root. Many different techniques have been employed to identify and quantify ginsenosides, such as TLC, colorimetry, GC and HPLC. HPLC-UV methods provide excellent separation of ginsenosides. However, ginsenosides possess poor UV chromophores, which limit their sensitivity and the ability to run gradient elution owing to the need to analyze at short wavelengths. The Varian evaporative light scattering (ELS) detector can recognize any compound less volatile than the mobile phase, regardless of its optical properties. It is for this reason that the ELS detector is often referred to as 'universal'.

Instrumentation

Column: C8 5 µm, 300 x 7.7 mm
Detection: Varian ELSD (neb=50 °C, evap=70 °C, gas=1.4 SLM)

Materials and Reagents

Eluent A: Water
Eluent B: Acetonitrile

Conditions

Gradient: 20-60 % B in 30 min
Flow Rate: 0.8 mL/min
Injection Volume: 20 µL

Results and Discussion

The benefits of evaporative light scattering detection with the Varian ELSD is apparent in the analysis of ginseng root powder (Figure 1) and two of its major ginsenosides, R_{g1} and R_{b1} (Figure 2). Since the Varian ELSD evaporates all mobile phase solvents before detection, it shows no response to change in solvent composition during gradient elution.

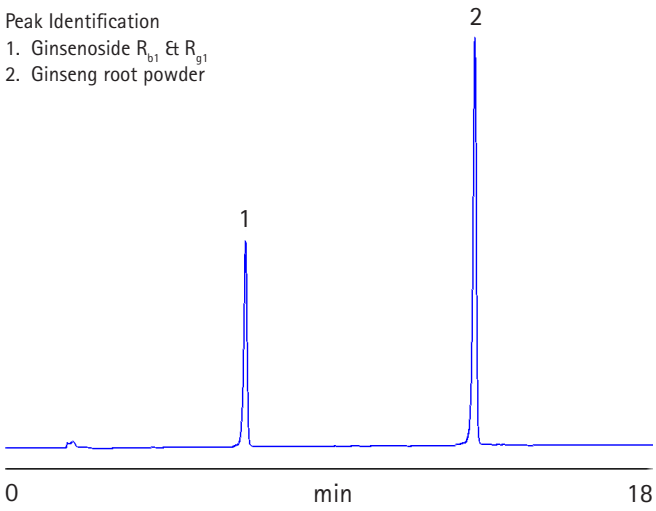

Figure 1. Ginseng root powder separation with the Varian ELSD.

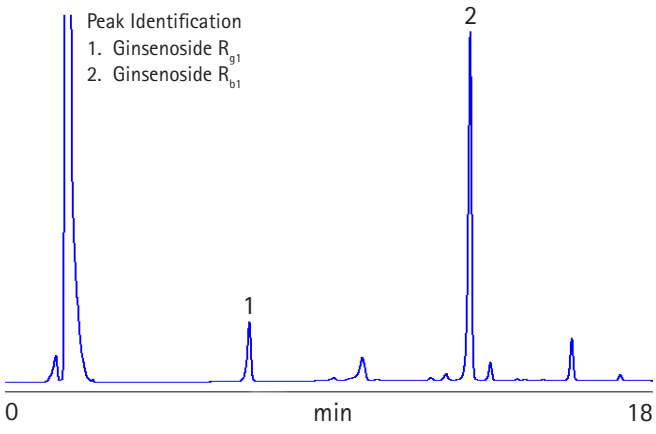

Figure 2. Good discrimination of R_{g1} and R_{b1} ginsenosides by the Varian ELSD.

Conclusion

Separation and identification of ginseng root constituents is straightforward using evaporative light scattering detection at the ambient temperatures available with the Varian ELSD. The Varian ELSD 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 Varian ELSD'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 Varian ELSD provides superior performance compared to detectors from other vendors for the analysis of semi-volatile compounds.

These data represent typical results. For further information, contact your local Varian Sales Office.

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Application Note SI-01219 / TB1053