Generating nonlinear calibration curve using ChemStation software for analysis of topiramate with Agilent 1200 Series Evaporative Light Scattering Detector

Application Note

R&D, Manufacturing QA/QC

Authors

Syed S. Lateef
Agilent Technologies, Inc.
Bangalore, India

Udo Huber
Agilent Technologies, Inc.
Waldbronn, Germany

Abstract

Evaporative light scattering detection (ELSD) is useful in detecting and quantifying non-UV active compounds that are either semivolatile or nonvolatile. In this application note, a nonlinear ELSD calibration curve was generated using ChemStation software. Topiramate, a non-UV active compound was quantified in formulation using this curve.

Introduction

ELSD response to concentration is usually nonlinear. A typical response for ELSD is exponential as described in equation 1.

$$y = a\,x^{b} \quad \text{(equation 1)}$$

Where "y" is the response; "a" and "b" are coefficients that depend on experimental and instrumental parameters; and "x" is the analyte mass[1].

Various calibration curve options are available in Agilent ChemStation. In this study, the "power curve" was chosen because the equation used in “power curve” is the same as that shown in equation 1.

Experimental

Sample Preparation

Extracted sample: 25 mg Topiramate tablets, Topamac 25 mg, were dissolved in 50 mL of a 50:50 mixtue of acetonitrile and water. The solution was filtered using a 0.2 µ nylon syringe filter.

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Results and discussion

As shown in Figure 1, a correlation value (R^2) of 0.9995 was obtained for nonlinear calibration curve. This curve was plotted using external standards in the range of 10.3 µg/mL to 137.7 µg/mL. The results of repeated injection of the same solution (n = 7) gave an average value of 26.2 mg with a standard deviation of 1.2.

Conclusion

Topiramate in topiramate tablets was characterized using an Agilent 1200 Series evaporative light scattering detector. Agilent ChemStation was used for generating nonlinear calibration curves, which are typical for ELSD signals. The results show that topiramate is 26.2 ± 1.2 mg compared to the value of 25.0 mg tablets as per the formulation package.

References

1. N.C. Megoulas, M.A. Koupparis, "Twenty Years of Evaporative Light Scattering Detection," *Critical Reviews in Anal Chem,* 35:301–316, **2005**.

Parameters	Details	
Column	Agilent ZORBAX Eclipse XDB phenyl, 50 mm × 3.0 mm, 1.8 µm	
Mobile phase	Buffer A: 0.1% formic acid in Milli-Q water Buffer B: acetonitrile	
Isocratic run	Time (min)	%B
	1.5	40
Flow	1 mL/min	
ELSD parameters	Temperature	55 °C
	Pressure	3.7 bar
	Gain	12
	Filter	1
	Nebulizer	RRLC flow nebulizer

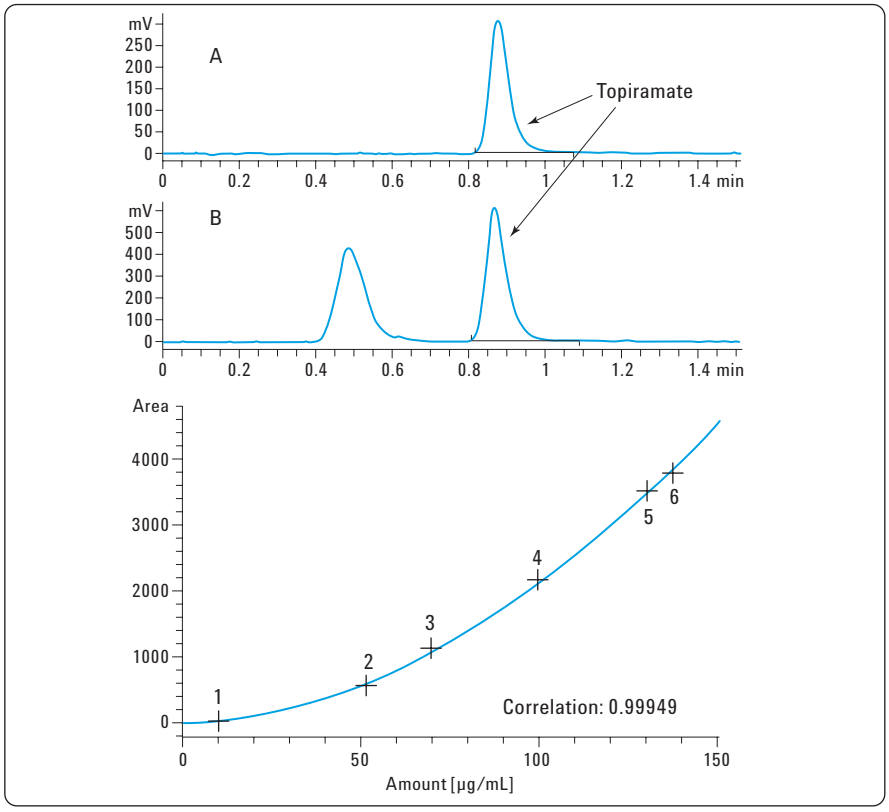

Figure 1.
[Top] Overlay of ELSD chromatogram of (A) topiramate and (B) extracted topiramate from formulation. [Bottom] Nonlinear calibration curve that displays correlation 0.99949.

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