



Fast LC/MS Compatible Separation of Tricyclic Antidepressants

Clayton McNeff, Ph.D. and Dwight Stoll
ZirChrom Separations, Inc.

Technical Bulletin # 289

The chromatography of the tricyclic family of antidepressants on C18-silica phases has traditionally resulted in broad and tailed peaks in the neutral pH range where most silica phases are stable. ZirChrom®-EZ is a new zirconia-based reversed-phase column that has mixed mode retention characteristics which allow chromatography of these highly basic amines with excellent peak shape and efficiency.

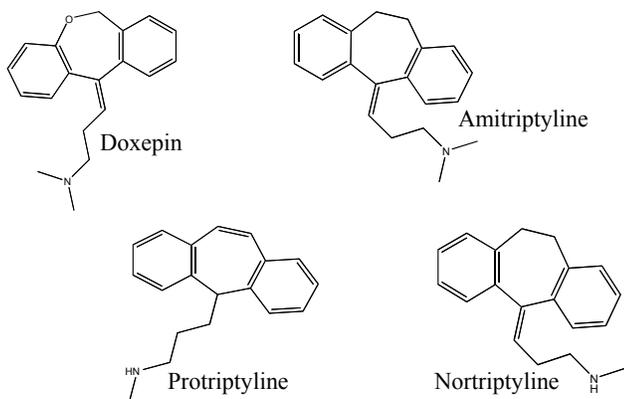


Figure 1: Structures of tricyclic antidepressants

Introduction

The chromatography of the tricyclic antidepressants on C18-silica phases has traditionally been so problematic that amitriptyline is commonly used as a probe solute for quantifying silanophilicity of silica phases. The surface chemistry of zirconia-based phases is dominated by Lewis acid sites, rather than the Bronsted acid sites which dominate the surface chemistry of silica phases. The mixed-mode retention character of ZirChrom-EZ® (cation-exchange and reversed-phase) allows separations that were previously difficult using conventional silica C18 phases. This application note shows the exceptional separation of four tricyclic antidepressants in less than three minutes.

Experimental

A mixture of four tricyclic antidepressants was separated at 35 °C using a ZirChrom®-EZ column. The separation conditions were as follows:

Column:	ZirChrom®-EZ, 50 mm x 4.6 mm i.d. (Part Number: EZ01-0546)
Mobile Phase:	Isocratic elution: 35/65 A/B A: 20mM ammonium acetate, pH 6.0 B: acetonitrile
Temperature:	35 °C with Metalox™ 200-C column heater

Flow Rate: 2.0 ml/min.
Injection Vol.: 5 µl
Pressure Drop: 110 bar
Detection: UV at 254 nm

Four tricyclic antidepressant pharmaceuticals were separated using simple acetonitrile/water isocratic elution and a LC/MS friendly acetate buffer. The selectivity of all four compounds is excellent which allows for a very fast separation using only a short 5 cm column.

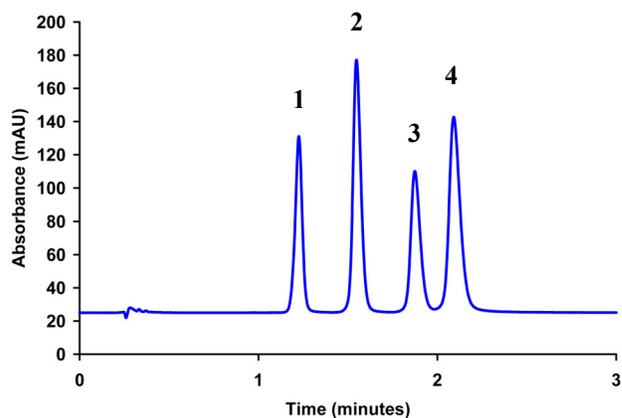


Figure 2: Separation of 1=Doxepin, 2=Protriptyline, 3=Amitriptyline, and 4=Nortriptyline

This method can be tailored to your specific application needs. ZirChrom method developers can help to optimize and transfer this method to your site. Please contact ZirChrom technical support at 1-866-STABLE-1 or support@zirchrom.com for details.

ZirChrom phases offer unique selectivity, high efficiency, and excellent chemical and thermal stability.

ZirChrom Separations, Inc.
617 Pierce Street, Anoka, MN 55303
1-866-STABLE-1
support@zirchrom.com

Visit www.zirchrom.com for more application notes using ultra-stable, high efficiency ZirChrom columns.