LC/MS Compatible Separation of Beta-Blockers on ZirChrom®-MS

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The chromatography of basic pharmaceuticals (with amine functionalities) on C18-silica phases can be difficult due to secondary interactions that cause tailed peaks in the neutral pH range where most silica phases are stable. ZirChrom®-MS is a new zirconia-based reversed-phase column that has mixed-mode retention characteristics which allow for LC/MS chromatography of highly basic amines with excellent peak shape and efficiency.

Introduction
The chromatography of basic drugs on C18-silica phases has traditionally been problematic. 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®-MS (cation-exchange and reversed-phase) allows separations that were previously difficult using conventional silica C18 phases. This application note shows an impressive LC/MS compatible separation of beta-blockers in a highly organic, near neutral pH mobile phase.

Experimental
A mixture of five amine-containing compounds was separated using a ZirChrom®-MS column at 35 °C. The separation conditions were as follows:

- **Column:** ZirChrom®-MS, 50 mm x 4.6 mm i.d.
- **Mobile Phase:** Isocratic elution: 65/35 A/B
  - A: acetonitrile
  - B: 10mM ammonium acetate, pH 5.0
- **Temperature:** 35 °C

Flow Rate: 1.0 ml/min.
Injection Vol.: 5 µl
Pressure Drop: 59 bar
Detection: UV at 254 nm

Five Beta-Blockers were separated using simple acetonitrile/water isocratic elution and an LC/MS friendly acetate buffer. The selectivity of all five compounds is excellent using only a short 5 cm long column.

![Figure 1: Structures for the Compounds of Interest.](image1)

![Figure 2: Separation of 1= Lidocaine, 2= Atenolol, 3= Metoprolol, 4= Oxprenolol, and 5= Alprenolol.](image2)

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.

References

Visit [www.zirchrom.com](http://www.zirchrom.com) for more application notes using ultra-stable, high efficiency ZirChrom columns.