



ZirChrom

Green Separation of Caffeine, Benzoate and Sorbate in Energy Drinks

Merlin Bicking, Ph.D. and Kelly S. Johnson
ACCTA and ZirChrom Separations, Inc.

Technical Bulletin # 339

In this application we examine the superior selectivity of the ZirChrom®-SAX phase for caffeine, benzoate and sorbate in energy drinks.

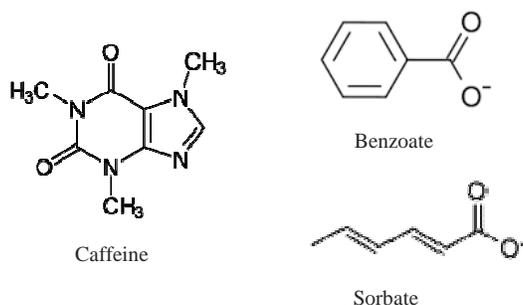


Figure 1: Structures of caffeine, sorbate and benzoate.

Introduction

Benzoate and sorbate are used as preservatives in many foods, including energy drinks. Traditionally the analysis of these compounds using silica C18 phases is hindered by low retention and poor selectivity.

The unique multimodal selectivity of ZirChrom®-SAX can take advantage of differences between the ionized forms, allowing for both ion exchange and reversed phase modes of separation.

Here we present an isocratic method that provides excellent selectivity and retention, resulting in 6 minute baseline resolution of caffeine, sorbate, and benzoate using UV detection at 230 nm. For comparison, we present the analysis of the same compounds using both neutral and acidic conditions on a leading silica C18 column.

Experimental

Three compounds in a common energy drink caffeine, sorbate and benzoate, were separated in 6 minutes using a ZirChrom®-SAX column. The separation conditions were as follows and as noted in Figure 2:

Column:	ZirChrom®-SAX, 100 mm x 4.6 mm i.d. (Part Number: ZR06-1046)
Mobile Phase:	10mM $\text{NH}_4\text{H}_2\text{PO}_4$ + 5 mM NH_4CO_3
Temperature:	50 °C
Flow Rate:	1.5 ml/min.
Injection Vol.:	5 μl
Detection:	UV at 230 nm

Figure 2 clearly demonstrates that the neutral condition on a silica C18 column has too little retention of these compounds and that the acidic condition does not separate sorbate and benzoate. In comparison, the ZirChrom®-SAX column separates all three of the compounds in six minutes using isocratic conditions and UV detection.

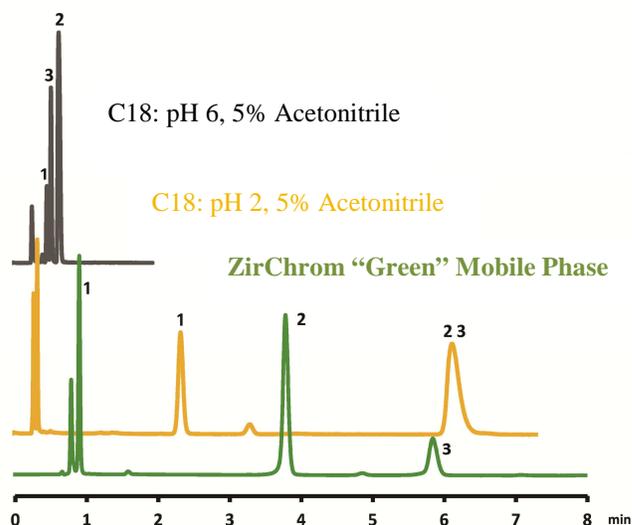


Figure 2: 1 =Caffeine, 2 = Sorbate, 3=Benzoate

This method can be tailored to your specific application needs. ZirChrom technical support 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.