Fast Separation of Eleven Nitroaromatic Compounds on ZirChrom®-CARB

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This technical bulletin details the separation of eleven closely related nitroaromatic compounds, namely RDX, HMX, Nitrobenzene, 2-Nitrotoluene, Tetryl, 2,6-Dinitrotoluene, 4-Nitrotoluene, 1,3-Dinitrobenzene, 2,4-Dinitrotoluene, 2-amino 4,6-dinitrotoluene, 1,3,5-Trinitrobenzene. Our customers have reported that similar separations on silica-based phases produce run times as long as thirty minutes. Here we report a method on ZirChrom®-CARB at a column temperature of 125ºC in under 4 minutes using a Metalox™ 200-C heater.

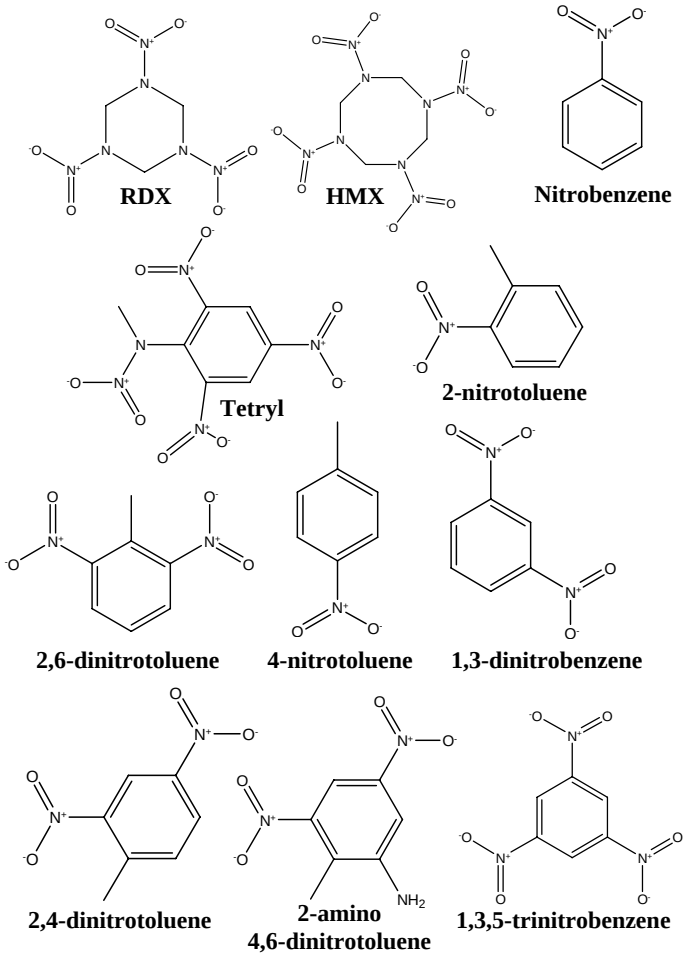

Figure 1: Structures of Explosives

Introduction

The rapid and accurate detection of nitroaromatic compounds is difficult due to the structurally similarity of the compounds (see Figure 1). A new method developed at ZirChrom employs the unique temperature stability and surface chemistry of zirconia to achieve baseline resolution of these compounds in less than 4 minutes.

Experimental

A mixture of nitroaromatics was separated at 125ºC using a ZirChrom®-CARB column (See Figure 2). The separation conditions were as follows:

Column:	ZirChrom®-CARB, 150mm x 4.6mm i.d., (part#ZR01-1546)
Mobile phase:	Isocratic Pre-mixed 35/15/50 Acetonitrile/Tetrahydrofuran/20mM ammonium carbonate pH 5.7, 10mM octylamine
Flow Rate:	2.0 ml/min.
Temperature:	125ºC (Metalox™ 200-C Heater)
Detection:	254 nm
Inj. Volume:	1µl

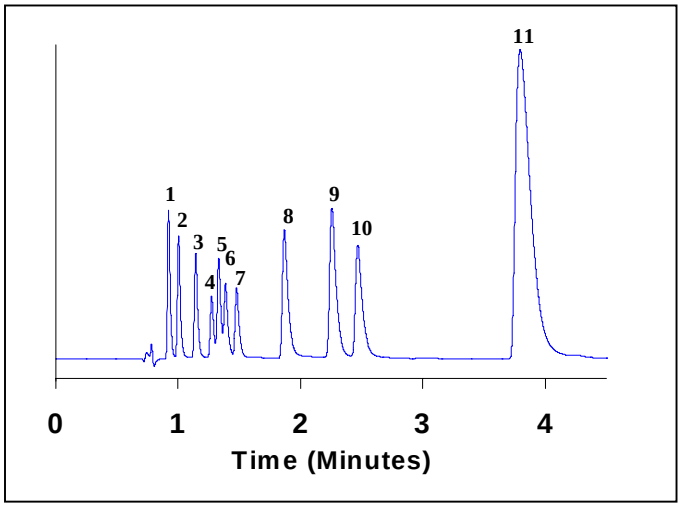

Figure 2: Separation of eleven nitroaromatics on ZirChrom®-CARB. 1=RDX, 2=HMX, 3=Nitrobenzene, 4=2-Nitrotoluene, 5=Tetryl, 6=2,6-Dinitrotoluene, 7=4-Nitrotoluene, 8=1,3-Dinitrobenzene, 9=2,4-Dinitrotoluene, 10=2-amino 4,6-dinitrotoluene, 11=1,3,5-Trinitrobenzene

This separation allows for clear identification and quantification of these compounds without the use of expensive MS detection. The separation is also completed using isocratic conditions, thus facilitating a more reproducible transfer from LC to LC.

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