

INTRODUCTION

Explosives are typically analyzed by gas chromatography (GC) or liquid chromatography (LC); however, long analysis times are encountered when using these analytical techniques. In addition, GC cannot be used for thermally labile compounds like tetryl. UltraPerformance Convergence™ Chromatography (UPC²™) was successfully used to demonstrate the separation of 14 explosives in five minutes.

METHOD CONDITIONS

System: ACQUITY UPC²™
 Detection: Photodiode Array (PDA)
 PDA 3D Channel: PDA, 205 to 400 nm;
 PDA 2D Channel: 220 nm at 4.8 nm resolution
 (compensated 500 to 600 nm)
 Column: ACQUITY UPC² HSS C₁₈
 3.0 x 100 mm, 1.8 μm
 Mobile phase A: CO₂
 Mobile phase B: Acetonitrile
 Wash solvents: 70:30 methanol/isopropanol
 Separation mode: Start at 1% B for 0.5 min,
 then gradient to 15% B over 2.5 min,
 hold for 0.5 min, back to 1% B in 0.1 min
 Flow rate: 2.0 mL/min
 UPC² Manager: 1500 psi
 Column temp.: 65 °C
 Sample temp.: 10 °C
 Injection volume: 1.0 μL
 Run time: 5.0 min
 Software: Empower™ 3

RESULTS/DISCUSSION

Explosives analysis is performed not only by environmental laboratories but also by manufacturers of reference standards for regulated EPA methods. The current methods have long analysis times, and must be run on orthogonal columns (i.e., C₁₈ and either cyano or phenyl) to achieve the required chromatographic resolution. UPC² achieves baseline resolution for 14 common explosives in a five-minute method.

CONCLUSIONS

Rapid analysis of 14 explosives was achieved. UPC² is amenable to thermally labile compounds like tetryl. It is also possible to separate structural isomers of nitro-aromatic compounds, as demonstrated by the separation of different nitrotoluene isomers.

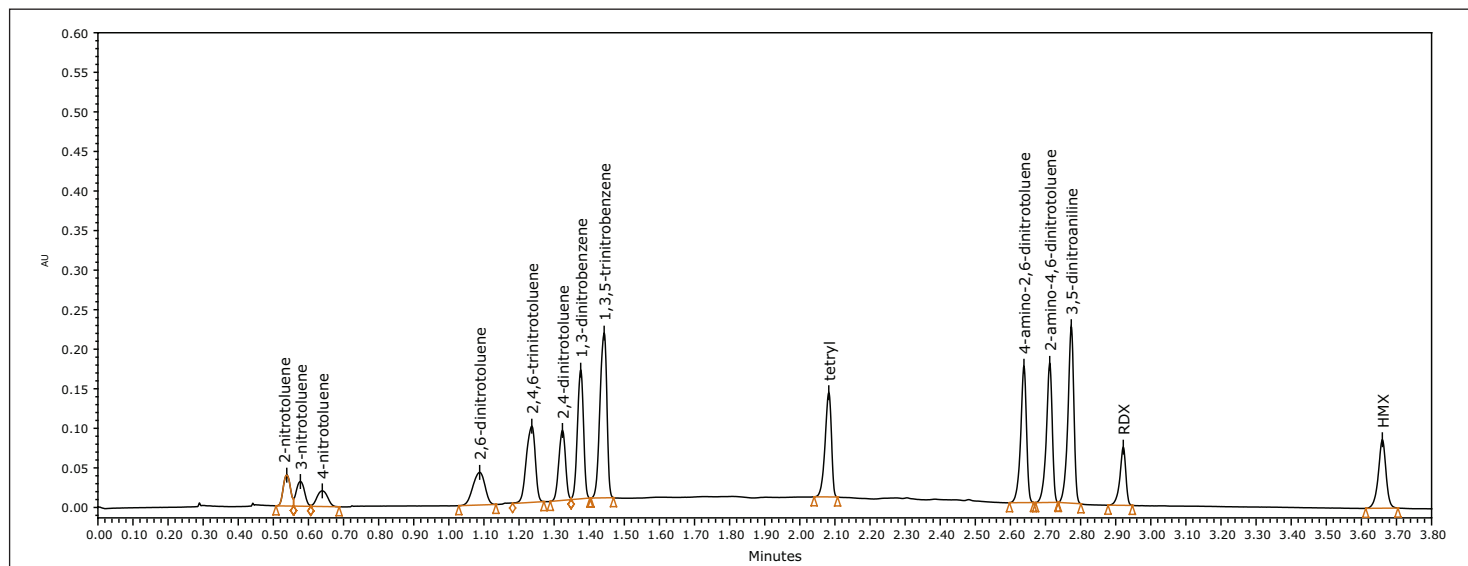


Figure 1. UPC² chromatogram for 14 explosives using 0.07 mg/mL of acetonitrile.

Click on the [underlined blue text](#) for details on the products used in this application.

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