Explosives by HPLC Analysis per U.S. EPA Method 8330

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Introduction

U.S. Environmental Protection Agency (EPA) Method 8330 is intended for the trace analysis of explosive residues by high performance liquid chromatography (HPLC) using a UV detector. This method is used to determine the concentration of the following compounds in a water, soil, or sediment matrix:

1. HMX
2. RDX
3. 1,3,5-Trinitrobenzene
4. 1,3-Dinitrobenzene
5. Tetryl
6. Nitrobenzene
7. 2, 4, 6-Trinitrotoluene
8. 2-Amino-4,6-Dinitrotoluene
9. 4-Amino-2,6-Dinitrotoluene
10. 2,6-Dinitrotoluene
11. 2,4-Dinitrotoluene
12. 2-Nitrotoluene
13. 4-Nitrotoluene
14. 3-Nitrotoluene

Experimental

The analysis was carried out using a PerkinElmer® Series 200 HPLC System, including Binary Pump, Autosampler and Photo Diode Array (PDA) Detector. The column used was the Brownlee™ Validated C18 column, 250 X 4.6 mm, 5 µm. The mobile phase conditions were 50:50 methanol/water, with a flow rate of 1.5 mL/min, run at ambient temperature. The UV/Vis detector was set to 220 nm and the injection volume was 10 µL. The standard solution was diluted in acetonitrile before injection.

Results

The chromatographic separation is shown in Figure1. The peaks are numbered corresponding to the order provided in the introduction, above.
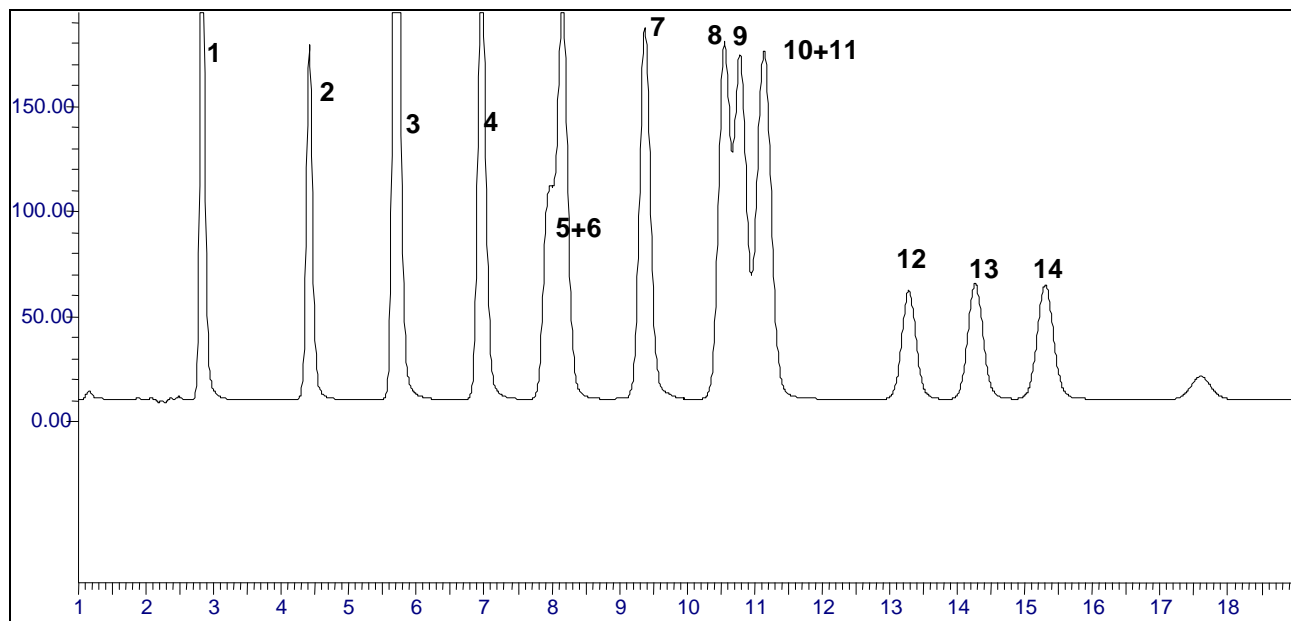

Figure 1: Chromatographic separation of 14 explosives by reversed-phase chromatography. The HPLC method conditions and component identification are provided above.

Conclusion

Using the RP C18 column, baseline separation of 8 explosives is possible. In addition, 2-Amino-4,6-Dinitrotoluene and 4-Amino-2,6-Dinitrotoluene are resolved, though not baseline separated. Tetryl coelutes with nitrobenzene and 2,6-dinitrotoluene coelutes with 2,4-dinitrotoluene.

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