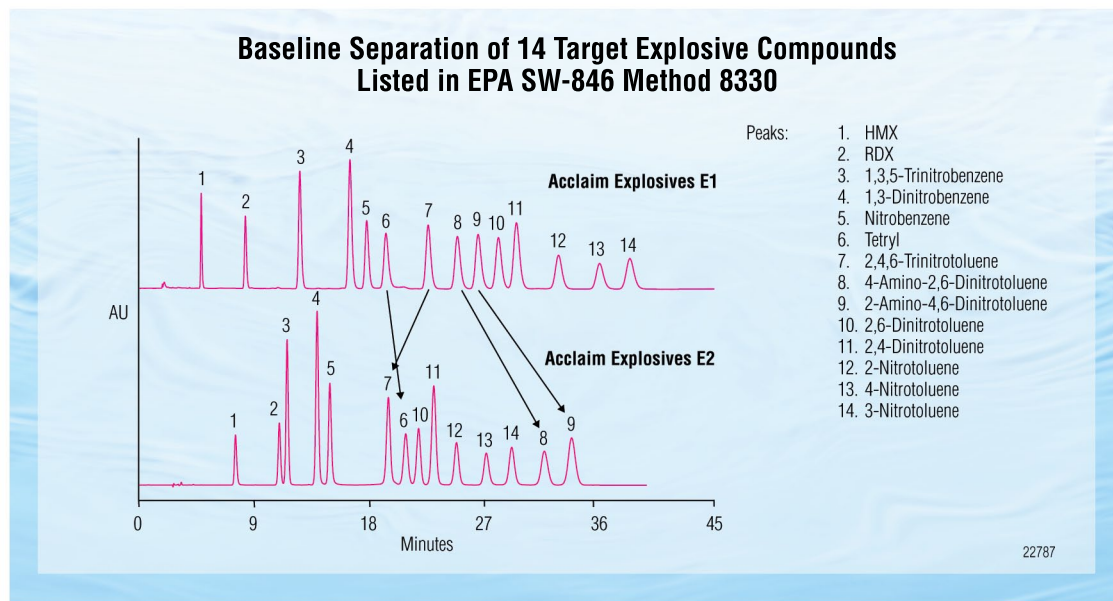


Thermo Scientific Acclaim Explosives Columns A Total Solution for Explosives Analysis



The Thermo Scientific Acclaim™ Explosives E1 and E2 columns are reversed-phase columns that have been specifically designed to resolve all 14 explosives listed in EPA SW-846 Method 8330 Nitroaromatics and Nitramines by HPLC. Their novel and unique column chemistries allow for superior resolution with selectivities complementary to one another as shown in the figure above. Thus, the Acclaim Explosives E1 is recommended for use as a direct replacement for C18 columns as the primary separation column and the Acclaim Explosives E2 may be used as a confirmatory column.

Features

Acclaim Explosives columns are a new family of high efficiency, silica-based columns for explosives analysis that provide:

- Baseline resolution of 14 target explosives listed in U.S. Environmental Protection Agency (EPA) SW-846 Method 8330
- Direct replacement of the C18 primary columns with the Acclaim Explosives E1
- Complementary selectivity for use as a confirmatory column with the Acclaim Explosives E2 column
- Unique selectivity of the Acclaim E2 for simultaneous separation of nitrate ester explosives

Baseline Separation of Explosives

The highly toxic nature of explosive compounds, coupled with their persistence in the environment, has generated increasing concern for the safety of the environment surrounding army firing ranges, munitions plants, and battlefields. The EPA now requires thorough characterization of these sites and regulates 14 explosives and related compounds that are commonly found in the surrounding soils, groundwater, and sediments. The demand to analyze explosives and their degradation products has also increased for forensic analysis of terrorist activities.

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EPA Method 8330 recommends the use of a C18 reversed-phase column as the primary column for separating these 14 priority explosives compounds. Because some of these compounds are co-eluted on C18 columns, Method 8330 requires a secondary, complementary separation for confirmatory purposes, typically using a cyano reversed-phase packing.

Acclaim Explosives E1 Column

The analysis of explosives residues by HPLC is usually accomplished using a C18 reversed-phase column as the primary column. Despite the fact that many C18 reversed-phase HPLC stationary phases are available and have been used for explosives analysis, none of them are capable of baseline resolution of all 14 explosives in EPA Method 8330 (Figure 1).

The Acclaim Explosives E1 column surmounts the difficulties long associated with explosives analysis, providing chromatographers with an effective, simple, and direct replacement for standard C18 columns. Figure 2 shows the baseline separation of the 14 target explosives compounds on the Acclaim Explosives E1 column. Note the high efficiency, symmetrical peaks for easier and more accurate quantification.

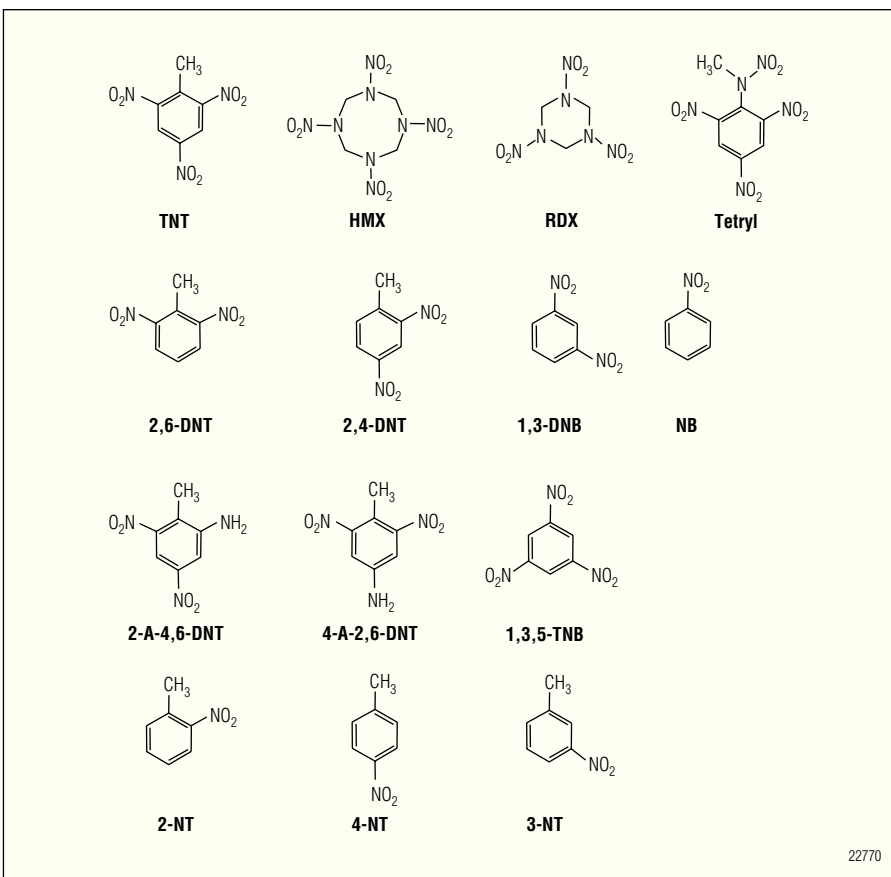


Figure 1. Fourteen target explosives listed in EPA Method 8330.

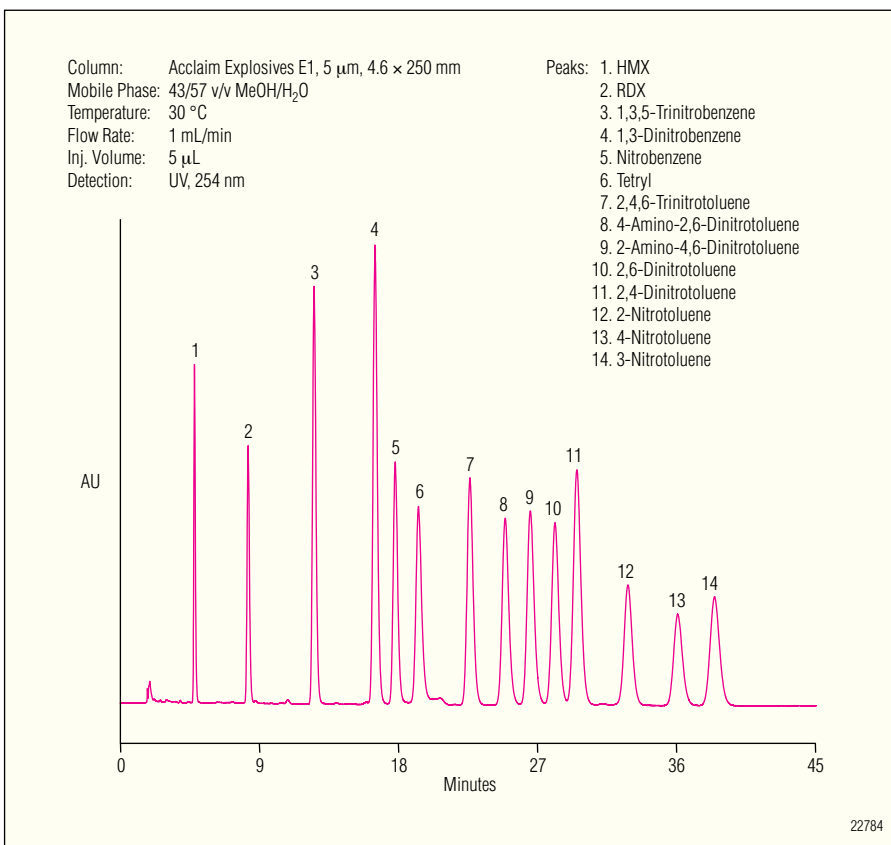


Figure 2. Baseline separation of 14 target explosives compounds in EPA Method 8330 using the Acclaim Explosives E1 column.

Acclaim Explosives E2 Column

Because C18 reversed-phase columns are incapable of providing baseline resolution of the 14 target compounds listed in EPA Method 8330, the current method requires confirmation of peak assignment using a secondary column with complementary selectivity, such as a cyano column. Separation on a confirmatory column also safeguards against false positives. However, due to severe peak overlapping on these columns, peak identification can be ambiguous and the process tedious. As shown in Figure 3, not only can the Acclaim Explosives E2 column provide complete separation of these same 14 compounds targeted by EPA Method 8330, but the selectivity is complementary to that of the Acclaim Explosives E1 column. The Acclaim E2 is therefore ideal as a confirmatory column for this application.

Simultaneous Separation of All Explosives, Including Nitrate Esters

The unique selectivity of the Acclaim E2 allows for simultaneous separation of nitrate ester explosives. The unique selectivity of the Acclaim Explosives E2 column is illustrated in Figure 4 which shows baseline separation of all 14 explosive compounds targeted by EPA Method 8330 in addition to nitrate ester explosives such as pentaerythrite tetranitrate (PETN) and ethylene glycol dinitrate (EGDN). This separation is not possible using any other commercially available column.

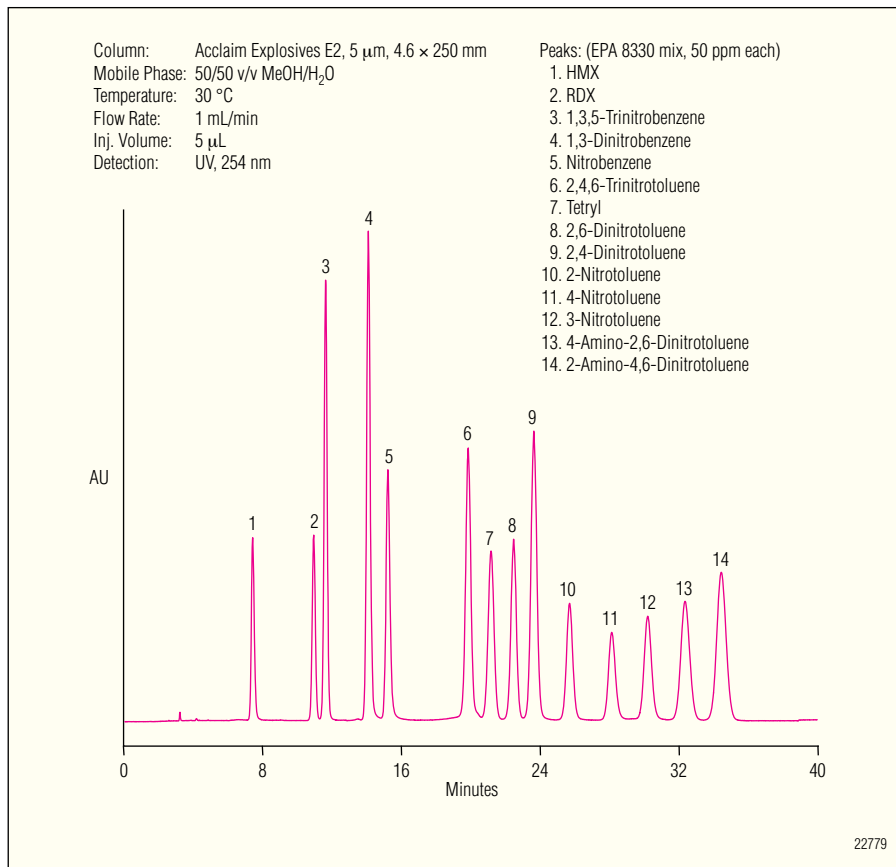


Figure 3. Baseline separation of 14 target explosives compounds in EPA Method 8330 using the Acclaim Explosives E2 column.

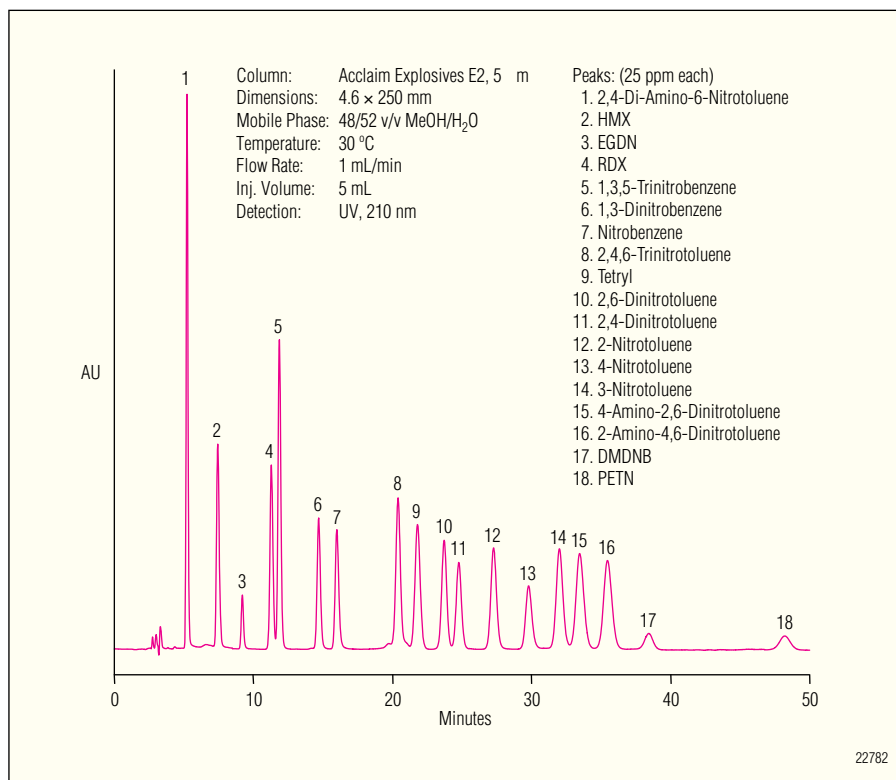


Figure 4. Separation of 18 explosives showing the unique selectivity of the Acclaim Explosives E2 Column.

A Simple Solution for Explosives Analysis

Operation of both Acclaim Explosives columns is simple and straightforward and requires only isocratic elution for baseline resolution of all 14 target explosives. While both columns perform reproducibly under their optimized conditions, separation conditions for the Acclaim Explosives E2 can be readily changed to accommodate inclusion of additional explosives compounds. As shown in Figures 5 and 6, the organic content of the mobile phase and temperature are two important factors that can be altered to optimize the separation. As a result, depending upon the specific nature of the explosives in the sample, the chromatographic conditions can be optimized easily and effectively.

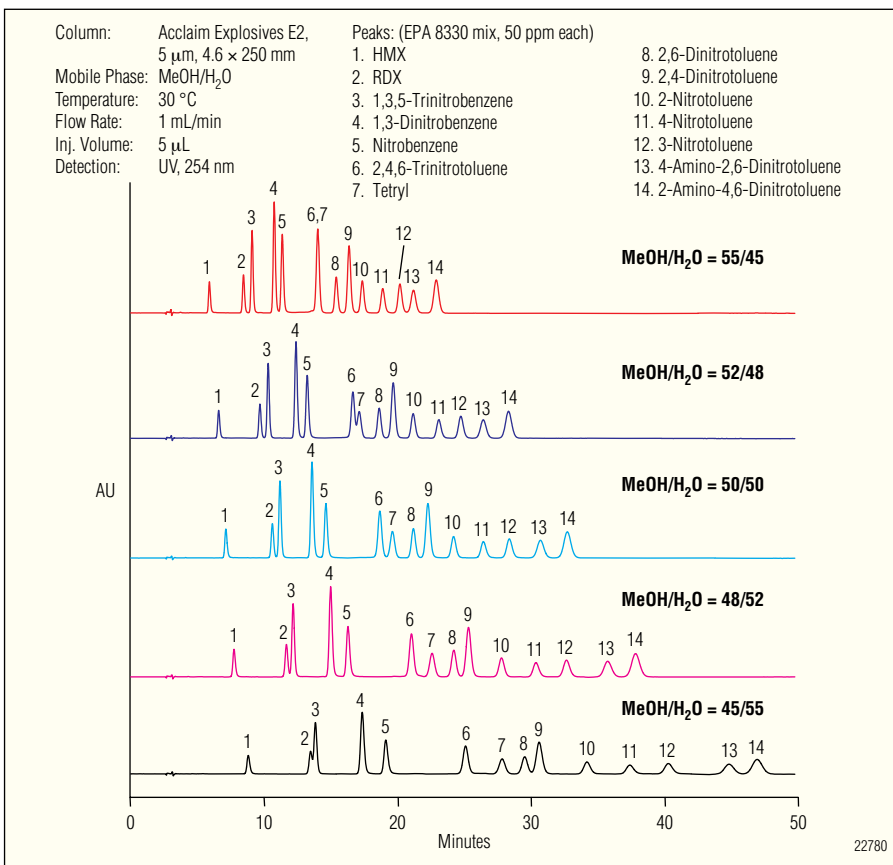


Figure 5. Effect of mobile phase composition on the selectivity of the Acclaim Explosives E2 column.

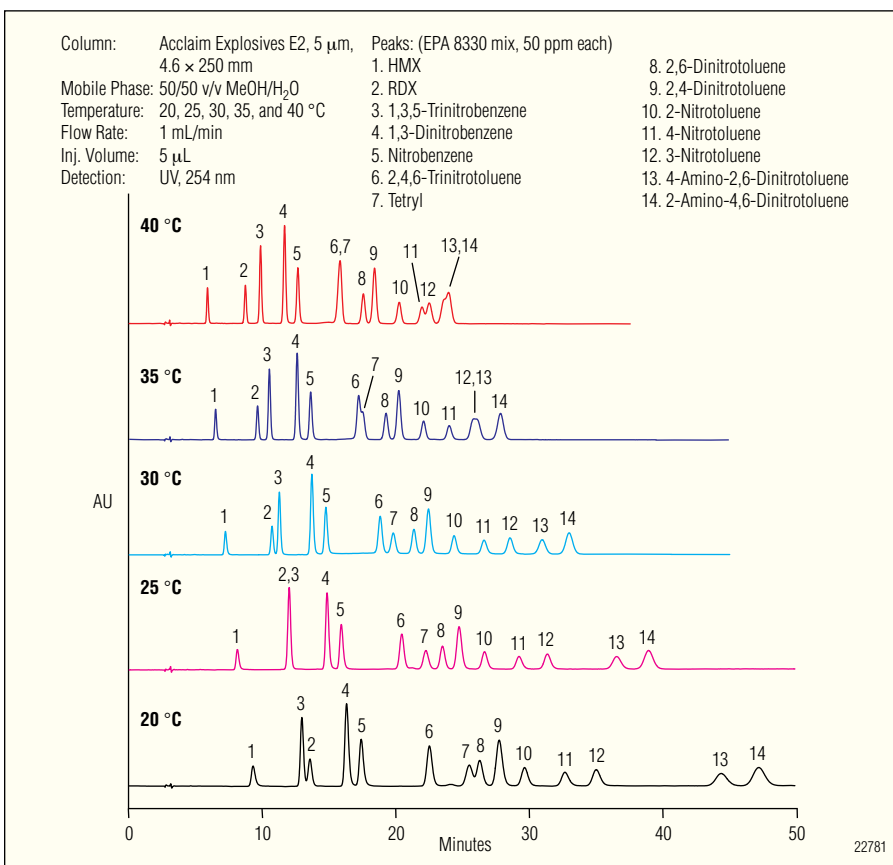


Figure 6. Effect of temperature on the selectivity of the Acclaim Explosives E2 column.

Rapid Separation

As shown in Figures 7 and 8, separations of 14 explosives compounds can be accelerated while maintaining resolution on Acclaim Explosives columns packed with smaller (2.0 and 3.0 -um) particles.

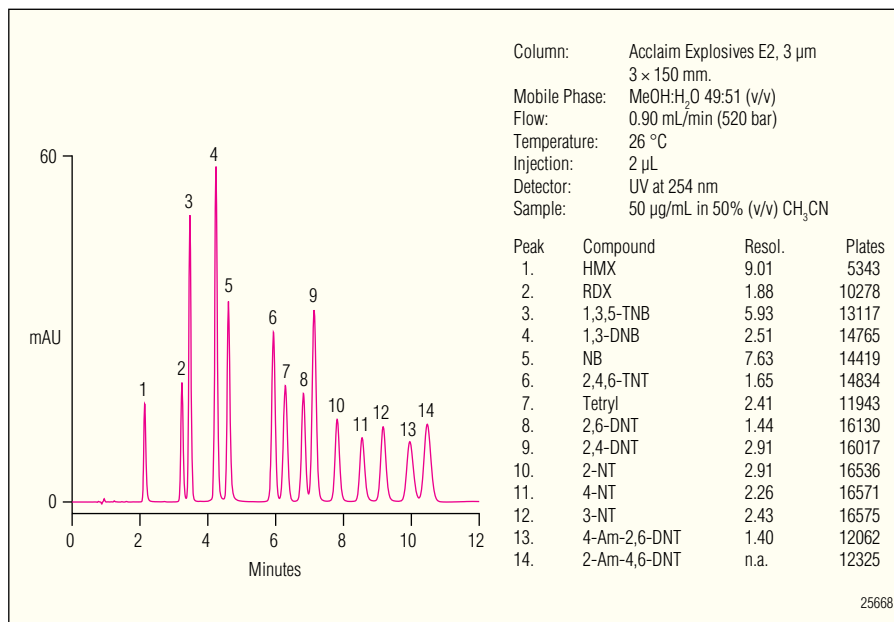


Figure 7. Acceleration of EPA method 8330 with Acclaim Explosives E2 column.

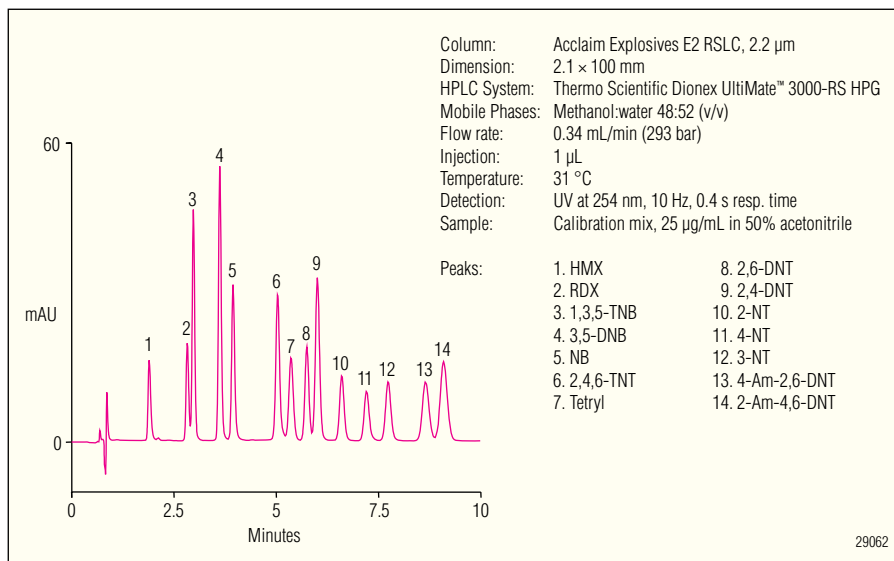


Figure 8. Rapid EPA 8330 separation using Acclaim Explosives E2 RSLC column.

Reproducible Manufacturing

Each Acclaim Explosives column is manufactured to stringent specifications to ensure column-to-column reproducibility. Each column is shipped with a lot validation sheet showing the test results and specifications for the lot of bonded silica packed into the column. In addition, the columns are individually tested and shipped with an individual test chromatogram that validates column performance.

SPECIFICATIONS

Starting Material

Ultrapure silica

Particle Size

5 µm, 3 µm, 2.2 µm

Particle Shape

Spherical

Particle Size Distribution (40/90)

1.2

Metal Impurity (Na, Fe, Al)

<3.0 ppm

Pore Volume

0.9 mL/g

Average Pore Diameter

120 Å

Surface Area

300 m²/g

ORDERING INFORMATION

To order in the U.S., call 1-800-346-6390, or contact the Dionex Regional Office nearest you. Outside the U.S., order through your local Dionex office or distributor. Refer to the following part numbers.

Acclaim Explosives Columns	Part Number
Acclaim Explosives E1 Analytical Column (4.6 × 250 mm)	064305
Acclaim Explosives E2 Analytical Column (4.6 × 250 mm)	064309
Acclaim Explosives E2, 3 µm, Analytical Column (3.0 × 250 mm)	070081
Acclaim Explosives E2, 3 µm, Analytical Column (3.0 × 150 mm)	070082
Acclaim Explosives E2, 3 µm, Analytical Column (2.1 × 150 mm)	070083
Acclaim Explosives E2 RSLC, 2.2 µm, Analytical Column (2.1 × 150 mm)	076226
Acclaim Explosives E2 RSLC, 2.2 µm, Analytical Column (2.1 × 100 mm)	076225
Acclaim Explosives E2 RSLC, 2.2 µm, Analytical Column (3.0 × 100 mm)	076227
Acclaim Explosives E1, 5 µm, Guard Column (4.6 × 10 mm)	069702
Acclaim Explosives E2, 5 µm, Guard Column (4.6 × 10 mm)	069703
Acclaim Explosives E2, 5 µm, Guard Column (3.0 × 10 mm)	071989
Acclaim Explosives E1 Guard Cartridges (4.3 × 10 mm), 2 ea.....	064303
Acclaim Explosives E2 Guard Cartridges (4.3 × 10 mm), 2 ea.....	064307
Acclaim Explosives Kit (Acclaim Explosives E1 and E2 Columns, with 2 ea Acclaim Explosives E1 and E2 Guard Cartridges)	064312
Acclaim Guard Kit (holder and coupler)	059526
Acclaim SST Guard Cartridge Holder	059456
Guard to Analytical Column Coupler	059457

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