

Qualitative Analysis

There were 5 peaks in the sample chromatogram beyond the solvent front and with heights over 10 mAU. These should be investigated further.

The peaks at retention times of 3.1 and 3.3 min do not match the retention times nor the spectra of any of the early-eluting organic explosives (compared to the standards chromatogram).

The peak at retention time of 3.8 min matches RDX well. The retention time of RDX in the standard was 3.7 min and the spectra from 200 - 280 nm are nearly identical.

The very large peak at retention time of 5.9 min appears to be due to Tetryl. The retention time of Tetryl in the standard was 5.8 min and the spectra from 200 - 280 nm are quite similar. However, since this same peak appears in the chromatogram of the blank, it is impossible to say that Tetryl was present in the sample.

The peak at retention time of 6.8 min matches TNT well. The retention time of TNT in the standard was 6.8 min and the spectra from 200 - 280 nm are nearly identical.

Semi-Quantitative Analysis

The volume of the reconstituted sample extract was about 0.75 mL.

Since the chromatogram monitored at 240 nm was much cleaner and all the important peaks were resolved at baseline, the peak areas from the 240 nm chromatogram are used to calculate the semi-quantitative results.

The peak area of RDX in the standard was 370, in the sample was 540. The concentration of RDX in the standard was 2.0 µg/mL, so the amount collected from the surface was approximately $(2.0 \text{ µg/mL})(540/370)(0.75 \text{ mL}) = 2.2 \text{ µg}$. About 2 µg were applied to the surface of the milk bottle originally, so the overall recovery was very good.

The peak area of TNT in the standard was 550, in the sample was 120. The concentration of TNT in the standard was 2.0 µg/mL, so the amount collected from the surface was approximately $(2.0 \text{ µg/mL})(120/550)(0.75 \text{ mL}) = 0.33 \text{ µg}$. About 0.5 µg were applied to the surface of the milk bottle originally, so the overall recovery was fair.

Conclusions

The original explosive appears to have contained RDX and TNT in roughly 7:1 mass ratio and, therefore, was likely Cyclotol.