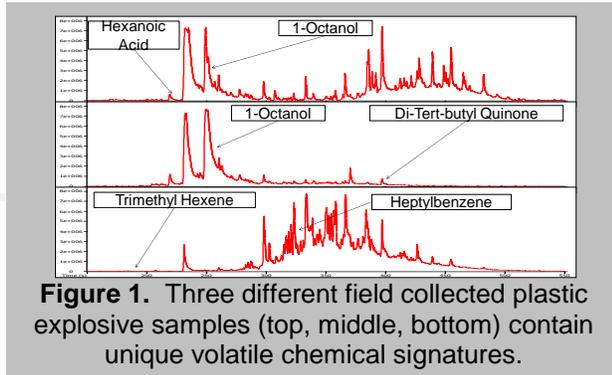


Volatile Chemical Signatures from Plastic Explosives for Forensic Attribution by Solid Phase Microextraction (SPME)-GC/MS

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As IEDs are collected in theater, they can be analyzed to provide valuable information about the types of explosives used as well as possibly providing information about the source of the explosives or provide clues as to which IEDs are produced by the same bombmaker. These explosives are typically characterized by analyzing their bulk explosive components (e.g. RDX, TNT). While this indicates the primary explosive signature, the sample is typically dissolved in solvent and analyzed by liquid injection which allows the solvent to mask many volatile signatures and the dilution reduces sensitivity to trace level components, so the trace level chemicals that make up the unique fingerprint of the explosive or explosive mix is hidden. Solid Phase Microextraction (SPME) is a solventless method that collects and concentrates volatile/semi-volatile components directly from the sample and injects them into the GC/MS for identification of the components.



This study uses SPME-GC/MS to characterize the volatile chemical fingerprint of plastic explosive samples manufactured and collected from Holston Army Ammunition Plant (HAAP), as well as plastic explosive samples collected from unexploded ordinance collected in theater. A fingerprint of volatile chemicals was determined for HAAP manufactured C4. Analysis of field collected plastic explosives (that were characterized as RDX containing) has yielded unique volatile chemical fingerprints. These fingerprints are being analyzed with chemometrics to batch together explosives that have similar fingerprints. These similarities coupled with the location of where the explosive was found may provide a useful tool for the intelligence community to detect trends in explosive source material or confirm that a specific explosive originated from an explosive cache.

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