



### **A152 Investigation and Separation of Interferences From Fire Debris Analysis by Solid Phase Extraction**

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After attending this presentation, attendees will understand a novel approach to clean up fire debris analysis by removing polar interferences by the use of solid phase extraction after performing a passive headspace extraction

This presentation will impact the forensic science community by making identification of accelerant use in suspected arson fire by eliminating interferences that occur during the process of a fire. This method can be done easily and quickly after passive headspace extraction when analysts are confronted with complex chromatograms that are overwhelmed by interferences.

Arson investigation is one of the most difficult challenges that forensic scientists can encounter due to the destruction of forensic evidence. Interferences are often seen in analysis of such evidence due to substrate background, pyrolysis, and combustion products. These interferences result in rather noisy chromatograms when analyzed by gas chromatography (GC) or gas chromatography mass spectrometry (GC/MS) and if the interferences overwhelm the chromatogram, a proper identification of an ignitable liquid, if any is present, cannot be done. A new method has been developed to separate out these interferences by use of solid phase extraction (SPE). Through the implementation of SPE, an extracted arson sample could easily and quickly be run through a SPE cartridge, which will retain any polar interference compounds in the sorbent and elute any accelerant compounds present, resulting in a cleaner chromatogram.

This new method has been applied to sets of compounds representative of matrix interferences, pyrolysis products of man-made polymers, and petroleum distillates. Several Waters Sep-Pak® SPE cartridges were tested, specifically Silica, Alumina N, Aminopropyl, Cyanopropyl, and Florisil®. The Silica and Aminopropyl cartridges worked the best to separate out the representative interference compounds, as seen in analysis by gas chromatography flame ionization detection (GC-FID). Both cartridges successfully removed eight out of the nine representative interference compounds. Twenty ignitable liquids, representing a broad spectrum of petroleum based acceleratants and both locally obtained and selected from the National Center for Forensic Science, were also extracted and spiked on to the SPE cartridges. No significant difference was seen between the extracted accelerants before and after SPE. A Column Resolution Check Mix, as described in ASTM E1387, was also spiked onto the SPE cartridges. Subsequent analysis and comparison of the analytical data obtained from the neat check mix and the SPE treated check mix disclosed little variation. This method was also applied to ten common household items that were burned with and without an ignitable liquid. Based on the analytical results obtained thus far, it is believed that this method is desirable and could easily be employed routinely by fire debris analysts.

#### **Fire Debris Analysis, Solid Phase Extraction, Interferences**