



B164 Investigation of Body Products on Worn Clothing Found at a Fire Scene Conflicting With Ignitable Liquid Residue Identification by Gas Chromatography/ Mass Spectrometry (GC/MS)

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After attending this presentation, attendees will be aware of the chemical interferences caused by body products on worn clothing and the associated difficulties with classifying Ignitable Liquid Residues (ILRs) using GC/MS.

This presentation will impact the forensic science community by informing fire debris analysts about the extent of the interference to the identification of ILRs that is caused by body products on worn clothing and how it can cause misinterpretations and misclassifications.

The question of whether cosmetic and medicinal body product deposits on clothing as well as the composition of clothing are being mistaken for ignitable liquids is of considerable importance for criminalists in forensic science laboratories. This research investigated the magnitude of the impact that body products (such as body oil, moisturizers, and perfume) on worn clothing have on ILR identification in fire debris. Body products can have similar chemical profiles to ignitable liquids as a result of comparable chemical compounds that are found in both sources. Consequently, body products on worn clothing could potentially cause difficulties for practitioners when classifying ILRs present in fire debris according to the American Society for Testing and Materials (ASTM) method E1618 (“Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography/Mass Spectrometry”).

Worn clothing samples of varying fiber content (cotton, polyester, lycra-spandex, and a blend) were collected from three individuals who had applied a body product provided for them before wearing the clothing item. The clothing was worn over a period of 12 hours, prior to collection. Passive headspace concentration by Activated Charcoal Strips (ACS) was performed according to ASTM method E1412 (“Standard Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration With Activated Charcoal”), heating the cans at 80°C for 16 hours followed by desorption of the ACS with carbon disulfide (CS₂). The samples were then analyzed by GC/MS with a quadrupole mass analyzer and the chromatograms were evaluated as to whether the residues could be misidentified as belonging to a class of ignitable liquids.

A preliminary study was performed prior to conducting the experiment with human subjects. It consisted of subjecting various body products to the ASTM E1412 and E1618 analytical methods. Results from the analysis of the neat samples showed that several body products could be mistaken for ILRs. Some products had chromatograms that showed similar visual patterns to ignitable liquids but showed differences in the mass spectral peak identifications. The results of this preliminary study were used to select the body products used in the human trials. In addition, unworn clothing samples were analyzed and the resulting chromatograms revealed compounds that could also cause difficulties with ILR classification. Additionally, it was found that materials used to preserve the clothing should not be ignored. These results highlight the complexities involved with identifying ILRs by demonstrating both the possible misclassifications and masking of ILRs that can occur due to the interference of body products and clothing.

This research has important implications for criminal justice because the identification of an ILR on clothing could result in an innocent person being charged with an arson crime or, in contradiction, present misleading data that would allow the guilty to walk free. Thus, it is critical to be able to differentiate interfering substances on substrates from ILRs when analyzing fire debris.

Fire Debris, Ignitable Liquids, Substrate Contribution