B142 Absorbent Household Materials for the Collection of Ignitable Liquid Residues (ILRs) From Surfaces of Varying Porosity

Jessica Carlotti, BS, Rineyville, KY 40162; Cynthia J. Kaeser Tran, PhD, Eastern Kentucky University, Richmond, KY 40475*

Learning Overview: After attending this presentation, attendees will better understand the collection practices of ILR evidence from an arson scene, the possible use of household items as lifting materials to recover Ignitable Liquids (ILs) from surfaces of varying porosity, and the ability to simplify and improve the collection and recovery process of a suspected IL.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by introducing a new practice through the use of common household absorbent materials in the collection of an IL present at an arson scene.

ILs are petroleum-based hydrocarbon mixtures such as gasoline, diesel, kerosene, paint thinners, and other fuel sources. These are used as accelerants to burn items at a quickened rate. The presence of ILs at the scene of a fire may indicate to investigators that arson has occurred. The residues from these ILs may remain on surfaces after the fire has been extinguished. Of particular interest are semi-porous surfaces such as concrete or wood that contain small pockets of pores which entrap unburned residues of ILs. The substrate containing the IL is collected from the scene and placed into a tightly sealed container for transport. Analysts identify the composition of the ILR through instrumentation such as Gas Chromatography/Mass Spectrometry (GC/MS).

Currently, surfaces suspected to contain ILR are taken back to the lab after removing a small portion from the scene of a fire. This method takes time, man power, often involves heavy machinery and tools, and can lead to contamination or destruction of the evidence. Being able to collect an ILR directly from a surface using an absorbent material will allow for easier transportation of evidence. Ideally, the absorbent material should be low cost, reproducibly manufactured, easy to use, and provide high collection and recovery efficiencies. The material utilized for this removal should not alter the chemical composition of the IL or contain any interferences once the IL is collected from a surface. These criteria will allow for a chemical classification to be made based on the hydrocarbon composition of the recovered IL.

Determining an appropriate material to use for the lifting of ILs from a surface requires several aspects to be optimized, including the texture of each surface, diameter and depth of any pores present, and the size and texture of each lifting material. The IL that resides within pores will likely not be reached by large materials that penetrate the pores themselves. Smaller materials, especially granular ones, may not easily be removed from the pores once they make contact with the IL. Materials consisting of textured surfaces such as cotton matting and polypropylene cloths have exhibited better success for the collection of ILs.

This research examines readily available household absorbent materials such as microfiber and paper-based products that can be used to effectively collect ILRs. The microfiber and paper fibers of the absorbent materials penetrate the pores of the substrate allowing contact with the ILR. The attachment of fibers to a solid backing ensures the fibers will be easily removable from the pores, which may lead to an improved collection efficiency of an IL from a semi-porous surface. Overall, 12 materials of various chemical compositions were selected and taken through a series of analyses to determine the absorption and collection capabilities. While cellulose-based and synthetic fiber materials are most promising, this presentation will outline the results of a series of validations for each material and recommend which materials provide sufficient recovery of an IL from common surface types (non-porous, semi-porous, and/or porous).

Ignitable Liquid Residue, Arson Collection Materials, Absorbent Materials