



B11 The Persistence of Ignitable Liquids on Laundered T-Shirts

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The goal of this presentation is to illustrate the patterns of ignitable liquids on clothing (a commonly collected item in suspected arson cases) that has been washed and dried.

This presentation will impact the forensic science community by presenting samples to demonstrate the importance of noting whether or not clothing has been washed and dried prior to analysis.

When attempting to set fire to a material that is relatively difficult to ignite, a perpetrator may turn to an ignitable liquid to accelerate the growth of the fire. These ignitable liquids may potentially be spilled onto the clothes of the person who is pouring it. It has been questioned whether or not these ignitable liquid residues could be washed off in the course of laundering, as would be the case if someone was trying to eliminate evidence of having committed arson. This study sought to determine if ignitable liquids could be detected on cotton, polyester, and nylon T-shirts after they have been cleaned in a conventional residential washing machine.

Different volumes ranging from 10mL to 100mL of a 1:1 mixture of gasoline and diesel fuel, a Heavy Petroleum Distillate (HPD), were added to one-half of a T-shirt. This T-shirt fragment was inserted into the washing machine with another T-shirt fragment without ignitable liquids to test how efficiently ignitable liquids would transfer from one shirt to another. One detergent was investigated to determine if detergent has an effect on the retention of ignitable liquids on the T-shirts, relative to simple water immersion and agitation. A subsection of the test shirts was dried in a dryer to evaluate the extent to which any ignitable liquids remaining after washing with detergent would evaporate during the drying process. The presence of ignitable liquids was determined using passive headspace extraction with activated charcoal strips and Gas Chromatography/Mass Spectrometry (GC/MS).

Gasoline and/or an HPD could be identified on all of the samples spiked with 10 mL of the Standard Accelerant Mixture (SAM) for all washing conditions (water only, detergent added, and detergent with subsequent drying). At the 1mL spike level, at least one of the ignitable liquids in the SAM was potentially identifiable for the different washing conditions, but the fabric type had an observable effect on which ignitable liquid was identified. At 100 μ L, there were some indications of ignitable liquids on the cotton and nylon fabrics; however, for the polyester samples, ignitable liquids could not be identified once detergent was used and were detected at an even lower abundance once drying was incorporated.

The different fabric types, use of detergent, and volume of ignitable liquid each had an observable impact on the final appearance and identifiability of the ignitable liquids. These variables also affected the extent to which the components of the ignitable liquids transferred to secondary pieces of fabric. The transfer to secondary pieces of fabric and the surprising retention of ignitable liquids through laundering has potentially important implications.

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