

Preserving Ignitable Liquids and Ignitable Liquid Residue Extracts from Fire Debris Samples



WHAT IS AN AAFS STANDARD FACTSHEET?

The AAFS produces clear, concise, and easy-to-understand factsheets to summarize the contents of technical and professional forensic science standards on the OSAC Registry. They are not intended to provide an interpretation for any portion of a published standard.

WHAT IS THE PURPOSE OF THIS STANDARD?

Fire debris may contain residues from an ignitable liquid used as a fuel for a fire. Ignitable liquids can include petroleum-based products such as gasoline, paint thinner, and kerosene, as well as non-petroleum-based products, such as alcohols and vegetable oil-based products. Ignitable liquid residues are often present in very small quantities after a fire, if present during the fire. During the investigation of events involving a fire, materials containing ignitable liquid residues can be recovered for analysis.

This standard provides guidance for the preservation and storage of extracts that may contain small quantities of ignitable liquid residues from fire debris evidence. The preserved extracts are suitable for analysis or reanalysis by a technique such as Gas Chromatography-Mass Spectrometry (GC-MS) per ANSI/ASTM E1618-19.

WHY IS THIS STANDARD IMPORTANT? WHAT ARE ITS BENEFITS?

This standard provides instructions for the preservation of extracts from multiple extraction procedures, including ANSI/ASTM E1386-15, ANSI/ASTM E1412-19, ANSI/ASTM E1413-19, and ANSI/ASTM E3189-19. It describes the materials and procedures involved in the preservation process and subsequent storage. Preservation allows for later analysis of the extract from a fire debris item by either the same or a second forensic science service provider.

Studies show that while loss of volatile components is possible, there is no change in results (i.e., the final determination of the presence or absence of an ignitable liquid) following analysis of a properly preserved extract.

HOW IS THIS STANDARD USED, AND WHAT ARE ITS KEY ELEMENTS?



This standard provides instructions for the preservation and storage of extracts from fire debris evidence and liquid samples submitted to forensic science service providers.

Passive Headspace Concentration with Activated Charcoal (ANSI/ASTM E1412-19) allows for an activated charcoal strip to be divided. One portion of the strip is not eluted but is preserved. Alternately, with a charcoal strip or adsorption package where the entirety is eluted, a portion of the extract is adsorbed onto adsorption media after analysis. Dynamic Headspace Concentration and Static Headspace Concentration (ANSI/ASTM E1413-19 and ANSI/ASTM E3189-19) using adsorption media with solvent desorption and Solvent Extraction (ANSI/ASTM E1386-15) require a portion of the extract to be re-adsorbed onto adsorption media after analysis. A portion of liquid samples can be preserved as a liquid or adsorbed onto adsorption media.

Samples from Dynamic Headspace Concentration and Static Headspace Concentration (ANSI/ASTM E1413-19 and ANSI/ASTM E3189-19) using adsorption media with thermal desorption, Static Headspace (ANSI/ASTM E1388-17), and Solid Phase Microextraction (SPME, ANSI/ASTM E2154-15a) techniques are consumed during analysis and, therefore, cannot be preserved.

Literature references to detailed studies supporting this standard practice are included. These studies are limited to the preservation of gasoline and diesel fuel. The combination of gasoline and diesel fuel span the chemical classes and volatility of ignitable liquids commonly encountered in fire debris samples.

