

Separation of Ignitable Liquid Residues from Fire Debris Samples by Static Headspace Concentration onto an Adsorbent Tube



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?

This sample preparation standard aims to provide information about one of several possible procedures for preparing extracts from fire debris samples. For alternative sample extraction procedures, refer to ANSI/ASTM E1386-15, ANSI/ASTM E1388-17, ANSI/ASTM E1412-19, ANSI/ASTM E1413-19, ANSI/ASTM E2154-15a, and ANSI/ASTM E2881-18. For guidance related to considerations involved in the selection of an extraction procedure, refer to ANSI/ASTM E3245-20e1.

This standard describes the procedure for the separation of ignitable liquid residues from fire debris samples using the technique of static headspace concentration onto an adsorbent tube. It also provides information about the quality assurance and quality control practices to be used in association with this technique.

Fire debris extracts obtained using this technique are suitable for subsequent analysis by gas chromatography-mass spectrometry (GC-MS) in accordance with ANSI/ASTM E1618-19.



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

Headspace is the empty space above a fire debris sample in an evidence container. In the static headspace concentration onto an adsorbent tube technique, a portion of the headspace vapors from inside a closed container of fire debris are drawn from the container onto an adsorbent tube using a syringe or pump connected to the outlet of the tube. If any ignitable liquid residues are present in the container, this procedure collects and concentrates them onto the adsorbent tube. The resulting concentrated headspace sample is removed from the adsorbent tube (either by rinsing with solvent or heating) to facilitate subsequent qualitative analysis by gas chromatography-mass spectrometry (GC-MS) in accordance with ANSI/ASTM E1618-19.

A figure that illustrates the procedure, including descriptions of the materials and apparatus required for proper implementation of the technique, is included in the standard for enhanced clarity.

The static headspace concentration technique can be more sensitive than the static headspace technique (ANSI/ASTM E1388-17) and less sensitive than the dynamic headspace concentration technique (ANSI/ASTM E1413-19). However, the static concentration technique leaves the sample in a condition suitable for resampling as only a portion, typically less than 10%, of the headspace is withdrawn from the sample container.

This is a standard practice. Additional procedural steps beyond those required in the standard may be necessary.

WHY IS THIS STANDARD IMPORTANT? WHAT ARE ITS BENEFITS?

Adherence to the standard ensures that the sample preparation procedure results in a fire debris extract that is fit for purpose within a systematic analytical scheme for identifying ignitable liquid residues.

Forensic science service providers that prepare extracts from fire debris samples using the technique of static headspace concentration onto an adsorbent tube are encouraged to meet or exceed the requirements set forth in this standard.