



Standard Practice for Separation and Concentration of Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration with Solid Phase Microextraction (SPME)¹

This standard is issued under the fixed designation E 2154; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice describes the procedure for removing small quantities of ignitable liquid residues from samples of fire debris. An adsorbent material is used to extract the residue from the static headspace above the sample. Then, analytes are thermally desorbed in the injection port of the gas chromatograph (GC).

1.2 This practice is best suited for screening fire debris samples to assess relative ignitable liquid concentration and for extracting ignitable liquid from aqueous samples.

1.3 This practice is suitable for extracting ignitable liquid residues when a high level of sensitivity is required due to a very low concentration of ignitable liquid residues in the sample.

1.3.1 Unlike other methods of separation and concentration, this method recovers a minimal amount of the ignitable residues present in the evidence, leaving residues that are suitable for subsequent resampling.

1.4 Alternate separation and concentration procedures are listed in Section 2.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- E 1385 Practice for Separation and Concentration of Flammable or Combustible Liquid Residues from Fire Debris Samples by Steam Distillation²
- E 1386 Practice for Separation and Concentration of Flammable or Combustible Liquid Residues from Fire Debris Samples by Solvent Extraction²
- E 1387 Test Method for Flammable or Combustible Liquid Residues in Extracts from Samples of Fire Debris by Gas Chromatography²

E 1388 Practice for Sampling Headspace Vapors from Fire Debris Samples²

E 1412 Practice for Separation and Concentration of Flammable or Combustible Liquid Residues from Fire Debris Samples by Passive Headspace Concentration with Activated Charcoal²

E 1413 Practice for Separation and Concentration of Flammable or Combustible Liquid Residues from Fire Debris Samples by Dynamic Headspace Concentration²

E 1459 Guide for Physical Evidence Labeling and Related Documentation²

E 1492 Practice for Receiving, Documenting, Storing, and Retrieving Evidence in a Forensic Science Laboratory²

E 1618 Guide for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry²

3. Summary of Practice

3.1 A fiber coated with a polydimethylsiloxane stationary phase is exposed to the headspace of the fire debris sample container to extract ignitable liquid residues. The fiber, which is housed in a needle similar to a syringe needle, is introduced directly in the injection port of a gas chromatograph to thermally desorb the analytes.

4. Significance and Use

4.1 This practice is suited ideally for screening samples for the presence, relative concentration, and potential class of ignitable liquid residues in fire debris.

4.2 This is a very sensitive separation procedure, capable of isolating small quantities of ignitable liquid residues from a sample, that is, a 0.1 μL spike of gasoline on a cellulose wipe inside of a 1-gal can is detectable.

4.3 Actual recovery will vary, depending on several factors, including adsorption temperature, container size, competition from the sample matrix, ignitable liquid class and relative ignitable liquid concentration.

4.4 Because this separation takes place in a closed container, the sample remains in approximately the same condition in which it was submitted. Repeat and interlaboratory analyses, therefore, may be possible. Since the extraction is nonexhaustive, the technique permits reanalysis of samples.

¹ This practice is under the jurisdiction of ASTM Committee E30 on Forensic Sciences and is the direct responsibility of Subcommittee E30.01 on Criminalistics. Current edition approved Sept 10, 2001. Published December 2001.

² *Annual Book of ASTM Standards*, Vol 14.02.