Designation: E2451 – 13

Standard Practice for Preserving Ignitable Liquids and Ignitable Liquid Residue Extracts from Fire Debris Samples[1]

This standard is issued under the fixed designation E2451; 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 procedures for preserving residues of ignitable liquids in extracts obtained from fire debris samples and questioned ignitable liquid samples. Extraction procedures are described in the Referenced Documents.

1.2 This practice does not attempt to address all the issues regarding the short-term or long-term storage of ignitable liquid samples and ignitable liquid extracts from fire debris samples. The changes that may occur under various storage conditions have not been fully documented.

1.3 This practice cannot replace knowledge, skill, or ability acquired through appropriate education, training, and experience and should be used in conjunction with sound professional judgment.

1.4 *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:*[2]

E1386 Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Solvent Extraction

E1388 Practice for Sampling of Headspace Vapors from Fire Debris Samples

E1412 Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration With Activated Charcoal

E1413 Practice for Separation and Concentration of Ignitable Liquid Residues from Fire Debris Samples by Dynamic Headspace Concentration

E1459 Guide for Physical Evidence Labeling and Related Documentation

E1492 Practice for Receiving, Documenting, Storing, and Retrieving Evidence in a Forensic Science Laboratory

E1618 Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry

E2154 Practice for Separation and Concentration of Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration with Solid Phase Microextraction (SPME)

3. Summary of Practice

3.1 Extracts obtained from fire debris samples and questioned liquids analyzed for the presence of ignitable liquid residues are retained and preserved for potential reanalysis by Test Method E1618.

4. Significance and Use

4.1 The archiving of extracts recovered from fire debris or liquids submitted in a fire investigation provides a mechanism to preserve extracts and liquids for reanalysis in the event that sample loss, sample degradation, or failure of the fire debris container occurs during post-analysis storage of fire debris evidence.

4.2 The nature of some extraction procedures, which may preclude reanalysis, is considered.

4.3 Changes to a preserved sample extract and the length of time it remains viable under storage conditions are unknown.

4.4 The concentration and composition of the ignitable liquid residue or the use of an alternate extraction/concentration technique used to preserve a sample extract of the fire debris sample may result in different findings between the analysis of the preserved sample and the original analysis.

5. Materials

5.1 *Airtight and Vapor-Tight, Volatile-Free Storage Containers*—The following are suggested container types:

5.1.1 Septum crimp vials with PTFE-lined seals.

5.1.2 Screw cap glass vials with PTFE-lined seals.

5.1.3 Polymer evidence bags (this does not include polyethylene or polypropylene-type containers).

[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.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

5.2 *Adsorption Media:*

5.2.1 Activated charcoal (coconut).

5.2.2 Activated charcoal strips.

6. Procedure

6.1 Passive Headspace Concentration with Activated Charcoal (Practice E1412).

6.1.1 *Single-Strip Adsorption:*

6.1.1.1 After analysis, the eluted and analyzed extract may be retained for preservation. Readsorb the extract onto the charcoal strip by allowing the eluent to evaporate. Store the charcoal strip in an appropriate container for preservation.

6.1.1.2 Alternatively, after adsorption and before elution, divide the strip. Use one portion of the strip for analysis. Place the remaining portion in an appropriate container for preservation.

6.1.2 *Two-Strip Adsorption:*

6.1.2.1 After adsorption, use one strip for analysis. Place the second strip in an appropriate container for preservation.

NOTE 1—This procedure requires that the two strips be adsorbed simultaneously.

6.1.3 *Adsorbent Package Adsorption:*

6.1.3.1 After analysis, the eluted and analyzed extract may be retained for preservation. Readsorb the extract onto the adsorbent package by allowing the eluent to evaporate. Store the adsorbent in an appropriate container for preservation.

6.2 Dynamic Headspace (Practice E1413).

6.2.1 After analysis, the eluted and analyzed extract may be retained for preservation. Readsorb the extract onto the adsorbent by allowing the eluent to evaporate. Store the adsorbent in an appropriate container for preservation.

6.3 Solvent Extraction (Practice E1386).

6.3.1 After analysis, the analyzed extract may be retained for preservation. Adsorb the extract or a portion of the extract on an adsorption medium and store in an appropriate container for preservation.

6.3.2 Place any remaining extract in an appropriate container for preservation.

6.4 Liquid Samples.

6.4.1 Place the liquid, a portion of the liquid, extract, or recovered distillate in an appropriate container for preservation.

6.4.2 Alternatively, adsorb a portion of the liquid, extract, or recovered distillate on an adsorption medium and store in an appropriate container for preservation.

6.5 SPME and Headspace Sampling (Practices E2154 and E1388).

6.5.1 Extracts using these sampling techniques are consumed by the analysis and are not amenable to preservation.

6.5.2 Alternative separation and concentration practices may be used when the preservation of extracts is desired.

7. Storage of Liquid Samples and Extracts

7.1 Label all vials containing samples or extracts according to Guide E1459. Notations regarding any sample or extract preservation should be maintained in the case notes and in accordance with laboratory procedures.

7.1.1 Preserved samples and extracts may be released/returned with the evidence as an attachment or enclosure.

7.1.2 Alternatively, preserved samples and extracts may be cataloged and stored.

7.2 Preserved samples and extracts may be stored in containers as noted in 5.1. Chemical compatibility, vapor pressure, contamination, mechanical strength, and storage conditions are among the considerations in selection of storage containers.

7.3 Preserved samples and extracts may be stored at room temperature, under refrigeration, or frozen. Effects of temperature and freeze-thaw conditions on the stability and viability of samples, effectiveness of container sealing, and container integrity are factors to consider in selection of thermal storage conditions.

7.4 If not returned with the evidence, store preserved samples and extracts at the laboratory for a period of time as directed by laboratory policy and federal, state, or local laws. Follow the procedures set forth in Practice E1492 to ensure that the chain of custody is protected.

8. Keywords

8.1 analysis; archiving; extract preservation; fire debris; forensic science; ignitable liquid residue; sample extract; sample preservation; storage