



Designation: **E2451–13** **E2451 – 21**

Standard Practice for Preserving Ignitable Liquids and Ignitable Liquid Residue Extracts from Fire Debris Samples¹

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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This practice describes standard covers procedures for preserving residues the preservation of ignitable liquids in and ignitable liquid residue extracts obtained from fire debris samples and questioned ignitable liquid samples. Extraction procedures are described in the Section 2, Referenced Documents.

1.2 This practice does not attempt to address all the issues regarding the short-term or long-term Specific evaluation of this practice is limited to the preservation of gasoline and diesel fuel storage(1-4),² 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. The components of which together span the range of chemical classes and volatility of ignitable liquid residues commonly encountered in fire debris samples.

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. The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

1.5 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:³

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

E1388 Practice for Static Headspace Sampling of 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 of Ignitable Liquid Residues from Fire Debris Samples by Dynamic Headspace Concentration onto an Adsorbent Tube

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 June 1, 2013; Sept. 1, 2021. Published July 2013; October 2021. Originally approved in 2008. Last previous edition approved in 2008 as E2451 – 08:13. DOI: 10.1520/E2451-13.10.1520/E2451-21.

² The boldface numbers in parentheses refer to a list of references at the end of this standard.

³ 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.

[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](#)

[E1732 Terminology Relating to Forensic Science](#)

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

[E3189 Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Static Headspace Concentration onto an Adsorbent Tube](#)

[E3197 Terminology Relating to Examination of Fire Debris](#)

3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, refer to Terminologies [E1732](#) and [E3197](#).

4. Summary of Practice

4.1 Extracts obtained from fire debris samples and questioned liquids analyzed for the presence of ignitable liquid residues are retained and preserved—liquid samples are preserved and stored as evidence, which also allows for potential reanalysis by using Test Method [E1618](#).

5. Significance and Use

5.1 The archiving—preservation and storage 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—the original evidence is altered due to factors such as the extraction process (Practices [E1386](#) and [E1413](#)), sample degradation, or failure of the fire debris—original evidence container occurs—during post-analysis storage of fire debris—evidence—storage.

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

5.2 Changes to Reanalysis of a preserved sample extract and the length of time stored sample extract could result in data that do not duplicate the data obtained during the initial analysis. Loss of the more volatile components of a stored sample can occur, and this possibility should be considered when interpreting data from a stored sample. Studies of gasoline and diesel show that results (that is, determination of presence and classification of an ignitable liquid, or determination of absence of an ignitable liquid) obtained from reanalysis data are in agreement with the initial analytical results. ~~it (1-4 remains) viable under storage conditions are unknown.~~

5.3 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. Preserved extracts are either returned to the submitter for storage or catalogued and stored by the laboratory or other designee.

6. Materials

6.1 *Airtight and Vapor-Tight, Volatile-Free Storage Containers—Preservation Container*—The following are suggested container types: Preservation containers are tightly sealed, volatile-free, and chemically inert to the sample. An example of a suitable preservation container is a crimp-top glass vial with intact polytetrafluoroethylene (PTFE) lined seal.

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).

6.2 *Adsorption Media—Media*—

5.2.1 Activated charcoal (coconut). Activated charcoal strips or loose activated carbon or equivalent.

~~5.2.2 Activated charcoal strips.~~

7. Procedure

~~7.1 *Passive Headspace Concentration with Activated Charcoal* 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.~~

~~7.1.1 *Two-Strip Adsorbent-Strip Adsorption*:~~

~~7.1.1.1 Activated charcoal strips are utilized either in their entirety, or they are divided before or after adsorption, but prior to elution.~~

~~7.1.1.2 If a single strip, or a single portion of a strip, is utilized, after analysis, preserve the extract by adsorbing it onto adsorption media (original or new) via solvent evaporation, and preserve the adsorption media in a preservation container. (Warning—Components of ignitable liquid residues that have similar volatility to the solvent can be lost during solvent evaporation.)~~

~~7.1.1.3 After adsorption, use one strip for analysis. Place the second strip in an appropriate container for preservation. If two strips, or two portions of a strip, are utilized, use one strip, or one portion of a strip, for elution and analysis, and preserve the second strip, or second portion of a strip, in a preservation container.~~

~~NOTE 1—This procedure requires that the two strips be both strips, or both portions of a strip, are adsorbed simultaneously.~~

~~7.1.2 *Adsorbent Package Adsorption*:~~

~~7.1.2.1 After elution and 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 preserve the extract by adsorbing it onto adsorption media (original or new) via solvent evaporation, and preserve the adsorption media in a preservation container. (Warning—Components of ignitable liquid residues that have similar volatility to the solvent can be lost during solvent evaporation.preservation.)~~

~~7.2 *Dynamic Headspace Concentration and Static Headspace Concentration* Dynamic Headspace (Practices E1413 (Practice and E1413E3189):~~

~~7.2.1 *Activated Carbon or Equivalent with Solvent Desorption*—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 preserve the extract by adsorbing it onto adsorption media (original or new) via solvent evaporation, and preserve the adsorption media in a preservation container. (Warning—Components of ignitable liquid residues that have similar volatility to the solvent can be lost during solvent evaporation.preservation.)~~

~~7.2.2 *Tenax⁴ TA or Equivalent with Thermal Desorption*—Extracts obtained using this process are consumed during analysis and are not amenable to preservation. Consider an alternative process if the preservation of extracts is required.~~

~~7.3 *Solvent Extraction* Solvent Extraction (Practice E1386):~~

~~7.3.1 After analysis, the analyzed extract may be retained for preservation. Adsorb the extract preserve the extract, or a portion~~

⁴ Tenax is a trademark of Buchem B.V. in Apeldoorn, Netherlands.