



Designation: E 1413 – 06

Standard Practice for Separation and Concentration of Ignitable Liquid Residues from Fire Debris Samples by Dynamic Headspace Concentration¹

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1. Scope

1.1 This practice describes the procedure for separation of small quantities of ignitable liquid residues from fire debris samples using the absorption/elution method of headspace concentration.

1.2 Both positive and negative pressure systems are described.

1.3 While this practice is suitable for successfully extracting ignitable liquid residues over the entire range of concentration, the headspace concentration methods are best used when a high level of sensitivity is required due to a very low concentration of ignitable liquid residues in the sample.

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:*²

D 1193 Specification for Reagent Water

E 752 Practice for Safety and Health Regulations Relating to Occupational Exposure to Carbon Disulfide³

E 1387 Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography

E 1412 Practice for Separation of Ignitable Liquid Residues from Fire Debris Samples by Passive Headspace Concentration With Activated Charcoal

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.

³ Withdrawn.

3. Summary of Practice

3.1 The sample, preferably in its original container, is heated, forcing volatile compounds to vaporize. At the same time, the headspace in the sample is drawn or pushed through a tube containing activated charcoal which adsorbs the vaporized compounds.

4. Significance and Use

4.1 This practice is useful for preparing extracts from fire debris for later analysis by gas chromatography, GC/MS, or GC/IR.

4.2 This is a very sensitive separation procedure, capable of isolating quantities smaller than 0.1 μL of ignitable liquid residue from a sample.

4.2.1 Actual recovery will vary, depending on several factors, including adsorption temperature, container size, and competition from the sample matrix.

4.3 "This is a potentially destructive technique." Portions of the sample subjected to this procedure may not be suitable for re-sampling. Therefore, a portion of the sample extract should be saved for potential future analysis. Consider using passive headspace concentration as described in Practice E 1412.

5. Apparatus

5.1 *Positive Pressure Apparatus:*

5.1.1 *Sample Pressurization Device*—A system capable of delivering pressurized dry nitrogen (or other inert gas) at up to 40 psi (276 kPa) to an orifice to be inserted into the bottom of the sample container.

5.1.1.1 A needle valve capable of fine control of the flow rate of the dry nitrogen, at up to 1500 cc/min.

5.1.1.2 A flow meter capable of measuring the flow of dry nitrogen through the end of the charcoal adsorption tube at the rate of 0 to 1500 cc/min.

5.1.1.3 *Container Closure*—A device suitable for sealing the container and directing the effluent nitrogen and vapors to the charcoal tube.

5.2 *Negative Pressure Apparatus:*

5.2.1 *Inlet and outlet system*—A tube containing 1 cm of charcoal is fitted into the lid of the original container with a