



Standard Test Method for Extraction and Derivatization of Vegetable Oils and Fats from Fire Debris and Liquid Samples with Analysis by Gas Chromatography-Mass Spectrometry¹

This standard is issued under the fixed designation E2881; 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.

ε¹ NOTE—Editorial corrections were made throughout in January 2015.

1. Scope

1.1 This test method covers the extraction, derivatization, and identification of fatty acids indicative of vegetable oils and fats in fire debris and liquid samples. This procedure will also extract animal oils and fats, as these are similar in chemical composition to vegetable oils and fats. Herein, the phrase “oils and fats” will be used to refer to both animal and vegetable derived oils and fats.

1.2 This test method is suitable for successfully extracting oil and fat residues having 8 to 24 carbon atoms.

1.3 The identification of a specific type of oil (for example, olive, corn, linseed) requires a quantitative analysis of the fatty acid esters and is beyond the scope of this test method.

1.4 This test method cannot replace the requisite knowledge, skills, or abilities acquired through appropriate education, training, and experience and should be used in conjunction with sound professional judgment.

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

1.6 *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

E620 Practice for Reporting Opinions of Scientific or Technical Experts

¹ This test method 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. Published October 2013. DOI: 10.1520/E2881-13E01.

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.

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 of Ignitable Liquid Residues from Fire Debris Samples by Dynamic Headspace Concentration

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)

E2451 Practice for Preserving Ignitable Liquids and Ignitable Liquid Residue Extracts from Fire Debris Samples

3. Summary of Test Method

3.1 If ignitable liquid analysis is required, it shall be performed prior to analysis for oils and fats as this test method is a destructive technique. A fire debris sample (or sub-sample) or an aliquot of a liquid is initially analyzed for ignitable liquid residues using standards listed in referenced documents.

3.2 The same sample of fire debris (or different sub-sample) or an additional aliquot of a liquid is then extracted with an organic solvent, and a derivatizing agent is added to convert either the free fatty acids and some triglycerides (for acid-catalyzed derivatization) or just the triglycerides (for base-catalyzed derivatization) to fatty acid methyl esters (FAMES).

3.3 The organic layer of solvent is removed, filtered, and concentrated if necessary, using dry nitrogen, filtered air, or inert gas.

3.4 The derivatized extract is analyzed by gas chromatography-mass spectrometry (GC-MS).