Designation: D5830 – 22

Standard Test Method for Solvents Analysis in Hazardous Waste Using Gas Chromatography[1]

This standard is issued under the fixed designation D5830; 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 test method is used to determine qualitatively and quantitatively the presence of the following compounds in waste samples using gas chromatography. This test method is intended for use as a screening method with a typical reporting level of 0.1 %.

Dichodifluoromethane	Tetrahydrofuran
Trichlorofluoromethane	Acetone
1,1,2-Trichloro-1,2,2-trifluoroethane	Methyl Ethyl Ketone
	MIBK
Methanol	Cyclohexanone
Ethanol	Ethyl Acetate
Isopropanol	Propyl Acetate
n-Propanol	Butyl Acetate
Isobutanol	Benzene
n-Butanol	Toluene
tert-Butanol	Ethylbenzene
Methylene Chloride	Xylenes
Chloroform	Styrene
Carbon Tetrachloride	Chlorobenzene
1,1-Dichloroethane	Dichlorobenzenes
1,2-Dichloroethane	Nitrobenzene
1,2-Dichloropropane	Fluorobenzene
1,1-Dichloroethylene	*n*-Propyl Benzene
1,2-Dichloroethene	Isopropyl Benzene
1,1,1-Trichloroethane	Isobutyl Benzene
Tetrachloroethylene	*n*-Butyl Benzene
Trichloroethylene	2-Ethoxyethanol
Tetrachloroethane	2-Butoxyethanol
Cyclopentane	2-Ethoxyethanol Acetate
Pentane	2-Methoxyethanol
Hexane	Bromoform
Heptane	Carbitol
Cyclohexane	Ethyl Ether
*Iso*octane	1,4-Dioxane
Nitropropane	Diacetone Alcohol
Ethanolamine	Acetonitrile
Nitromethane	Pyridine
Ethylene Chloride	Toluidine
Benzyl Chloride	Ethylene Glycol
	Propylene Glycol

1.1.1 This compound list is a compilation of hazardous solvents and other constituents that are commonly seen in hazardous waste samples.

1.2 The scope of this test method may be expanded to include other volatile and semivolatile organic constituents such as but not limited to those described below, provided the intended use data quality objectives including sampling, recovery, and analytic data quality are demonstrated as satisfied by the user.

1.2.1 Hydrocarbon mixtures such as kerosene and mineral spirits.

1.2.2 High-boiling organics, defined here as compounds which boil above *n*-Hexadecane.

1.2.3 Other organics that the analyst is able to identify, either through retention time data or gas chromatography/mass spectrometric (GC/MS) analysis.

1.3 *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.*

1.4 *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:*[2]

D1193 Specification for Reagent Water

D4547 Guide for Sampling Waste and Soils for Volatile Organic Compounds

D4687 Guide for General Planning of Waste Sampling

D5013 Practices for Sampling Wastes from Pipes and Other Point Discharges

D5681 Terminology for Waste and Waste Management

D5743 Practice for Sampling Single or Multilayered Liquids, with or Without Solids, in Drums or Similar Containers

[1] This test method is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.01.06 on Analytical Methods.

Current edition approved March 1, 2022. Published March 2022. Originally approved in 1995. Last previous edition approved in 2014 as D5830 – 14. DOI: 10.1520/D5830-22.

[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.

2.2 *EPA Documents:*[3]

Test Method 8000D Determinative Chromatographic Separations, SW-846, Revision 5, 2018

Test Method 8015D Nonhalogenated Organics Using GC/FID, SW-846, Revision 4, 2003

Test Method 8021B Aromatic and Halogenated Volatiles By Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors, SW-846, Revision 3, 2014

Test Method 8260D Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), SW-846, Revision 4, 2018

3. Terminology

3.1 *Definitions*—For definitions of terms used in this standard, refer to Terminology D5681.

4. Summary of Test Method

4.1 Waste samples are analyzed by direct injection, or by carbon disulfide, *M*-Pyrol, or other suitable solvent extraction and injection of the extract into a gas chromatograph. Detection is achieved using a detector which is specific for the needed application, for example, flame ionization detector (FID), electron capture detector (ECD), thermal conductivity detector (TCD), photoionization detector (PID), or mass selective detector (MSD). This test method may be expanded to utilize other detector types not previously mentioned.

5. Significance and Use

5.1 This test method is useful in identifying the common solvent constituents in hazardous waste samples. This test method is designed to support field or site assessments, recycling operations, plant operations, or pollution control programs.

6. Interferences

6.1 Interferences may be encountered from any number of organic compounds to which a specific detector responds. Also, closely eluting components may complicate identification based solely on retention time. When these types of interferences are encountered, the analyst must rely on other sources of information for positive identification, such as:

6.1.1 GC/MS confirmation; see EPA Method 8260D, direct injection technique.

6.1.2 Gas chromatography with an analyte class selective detector such as PID or electrolytic conductivity (ELCD) detectors or both; see EPA Method 8021B.

6.1.3 Use of confirmation column, or confirmatory detector.

6.1.3.1 This method identifies one column (DB-1701) and one detector (FID) and utilizes three solvent standards and one QC daily check. Use of confirmatory columns or detectors, or both, will also require the use of the three solvent standards (see Note 2, 9.1) and QC daily check, one for each confirmatory column or detector, or both. EPA Method 8000D provides useful guidance on calibration and QC requirements applicable to this activity.

6.1.4 Use of varying temperature programs or standard comparison, or both.

6.1.4.1 Use of varying analytical programs will also require the use of three solvent standards and QC daily check for each variation.

6.1.5 Sample history, for example, any information available from the waste generator.

6.1.6 Physical characteristics, for example, flammability, specific gravity, or miscibility with water.

6.2 Interferences may also be encountered from syringe carryover. Immediately following each injection, the syringe is thoroughly rinsed with carbon disulfide or *M*-Pyrol. Other solvents such as methanol may be used as rinse solvents if sample types necessitate their use, but carryover and possible interferences may occur if rinse solvent is still present in the syringe at reuse. Before each injection the syringe is rinsed with the sample to be injected, where the first two pumps are flushed into a waste receptacle.

6.3 When carbon disulfide (CS_2) is used to extract solids or sludges that contain significant amounts of water, low recovery of the water-miscible solvents may result.

6.4 Some grades of CS_2 may contain trace amounts of benzene.

6.5 *M*-Pyrol degrades with time. The degradation products interfere with some late eluting compounds on some columns (approximately five small peaks).

6.6 Interference from the CS_2 solvent peak may occur if using a TCD.

6.7 When using a TCD, water as well as oxygenated compounds such as MEK, MIBK, or both, may suppress detector response.

6.8 If an ELCD or ECD is used, CS_2, *M*-Pyrol (required for an ELCD), and high concentrations of halogenated compounds may overload and damage these detectors. It is recommended that these detectors be used only when very low detection levels of halogenated compounds are expected and direct injection of the sample is possible.

7. Apparatus

7.1 *Gas Chromatograph System*—Equipped with capillary or packed column injection ports, or both, detector, and data system.

7.2 *Suggested Chromatographic Columns:*

7.2.1 *Capillary,* microbore or megabore.

7.2.1.1 DB-1701, 30M by 0.25 mm inside diameter, 0.25 µm film thickness.

7.2.1.2 DB-624, 30M by 0.3 mm inside diameter, 1.8 µm film thickness.

7.2.2 *Packed: Stainless Steel or Glass.*

7.2.2.1 1 % SP-1000, 60/80 Carbopak B, 8 ft by ⅛ in. inside diameter.

7.2.2.2 10 % SP-2100, 100/120 Chromosorb WHP, 2M by 2 mm ID.

[3] Available from United States Environmental Protection Agency (EPA), William Jefferson Clinton Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460, http://www.epa.gov.