



Standard Test Method for Polynuclear Aromatic Hydrocarbons in Water¹

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1. Scope

1.1 This test method covers the determination of certain polynuclear aromatic hydrocarbons (PAHs) in water and wastewater. The following compounds may be determined by this test method: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenzo(ah)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene. Additional PAHs may also be determined; however, the analyst should demonstrate that the test method is in fact applicable to the specific PAH(s) of interest before applying it to sample analysis. This test method has high sensitivity for the compounds of interest. It is limited to use by analysts familiar with high-performance liquid chromatography (HPLC) or working under close supervision of such persons.

1.2 This test method is applicable to the determination of the compounds in 1.1 in water and wastewater. This test method has been successfully used with distilled water, tap water, surface water, and the following wastewaters: effluent from an oil refinery, blast furnace, and combined coke oven and blast furnace. It is the user's responsibility to ensure the validity of this test method for waters of untested matrices. It presupposes a high expectation of finding the specific compounds of interest. If the user is attempting to screen samples for any or all of the compounds above, component identities should be verified by using two different types of reverse phase HPLC columns, both ultraviolet and fluorescence detection, or gas chromatography/mass spectrometry-spectroscopy screening procedures, or both.

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 and health practices and determine the applicability of regulatory limitations prior to use. Specific hazards statements are given in Section 9.*

¹ This test method is under the jurisdiction of ASTM Committee D-19 on Water and is the direct responsibility of Subcommittee D19.06 on Methods for Analysis for Organic Substances in Water.

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2. Referenced Documents

2.1 ASTM Standards:

- D 1129 Terminology Relating to Water²
- D 1192 Specification for Equipment for Sampling Water and Steam in Closed Conduits²
- D 1193 Specification for Reagent Water²
- D 1253 Test Method for Residual Chlorine in Water²
- D 3370 Practices for Sampling Water from Closed Conduits²
- D 3856 Guide for Good Laboratory Practices in Laboratories Engaged in Sampling and Analysis of Water²
- D 4210 Practice for Intralaboratory Quality Control Procedures and a Discussion on Reporting Low-Level Data²

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D 1129.

4. Summary of Test Method

4.1 This test method consists of the extraction of 1 L of water with methylene chloride. This extract is then reduced in volume using Kuderna-Danish (K-D) evaporation followed by column chromatography on silica gel. The appropriate fraction from the silica gel chromatography containing the PAHs is again reduced in volume using K-D evaporation and is solvent exchanged with acetonitrile to an exact volume of 1 mL. This concentrated extract is then analyzed for PAH using high-performance liquid chromatography (HPLC).

4.2 The HPLC analysis utilizes reverse phase chromatography using a combination of isocratic and gradient elution. Acetonitrile and water are used as the mobile phase on a Perkin Elmer PAH/10 reverse phase column.³ Other C-18 reverse phase columns may be used, provided that they yield adequate resolution of the PAHs of interest. Fluorescence or ultraviolet detection depending on the needs is used to monitor the PAH of interest; quantitation is by peak area integration or peak height measurement. Results are reported in micrograms per litre.

² *Annual Book of ASTM Standards*, Vol 11.01.

³ Perkin-Elmer PAH/10 reverse phase column is available from Perkin-Elmer Corporation, 761 Main Ave., Norwalk, CT 06859.

