



# Standard Test Method for Total Petroleum Hydrocarbons (TPH) in Water and Wastewater with Solvent Extraction using Mid-IR Laser Spectroscopy<sup>1</sup>

This standard is issued under the fixed designation D7678; 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 covers the determination of total petroleum hydrocarbons (TPH) in water, and waste water, that are extractable from an acidified sample with a cyclic aliphatic hydrocarbon (for example cyclohexane), and measured by IR absorption in the region of 1370 -1380 cm<sup>-1</sup> (7.25 -7.30 microns). Polar substances are removed by clean-up with Florisil.

1.2 The method also considers the volatile fraction of petroleum hydrocarbons which is lost by gravimetric methods that require solvent evaporation prior to weighing, as well as by solventless IR methods that require drying of the employed solid phase material prior to measurement. Similarly, a more complete fraction of extracted petroleum hydrocarbon is accessible by this method as compared to GC methods that use a time window for quantification, as petroleum hydrocarbons eluting outside these windows are also quantified.

1.3 This method defines oil and grease in water and wastewater as that which is extractable in the test method and measured by IR absorption in the region of 1370-1380 cm<sup>-1</sup> (7.25 – 7.30 microns).

1.4 This method covers the range of 0.5 to 1000 mg/L and may be extended to a lower or higher level by extraction of a larger or smaller sample volume collected separately.

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.*

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D19 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:<sup>2</sup>

- D1129 Terminology Relating to Water
- D1141 Practice for the Preparation of Substitute Ocean Water
- D1193 Specification for Reagent Water
- D1192 Guide for Equipment for Sampling Water and Steam in Closed Conduits (Withdrawn 2003)<sup>3</sup>
- D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water
- D3370 Practices for Sampling Water from Closed Conduits
- D3921 Test Method For Oil and Grease and Petroleum Hydrocarbons in Water (Withdrawn 2013)<sup>3</sup>
- D5847 Practice for Writing Quality Control Specifications for Standard Test Methods for Water Analysis
- D7575 Test Method for Solvent-Free Membrane Recoverable Oil and Grease by Infrared Determination
- E168 Practices for General Techniques of Infrared Quantitative Analysis

### 2.2 ISO Standards:<sup>4</sup>

- ISO 9377-2 Determination of Hydrocarbon Oil Index

## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D1129 and Practices E168.

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *Total petroleum hydrocarbons (TPH), n*—the extracted material which remains in the solvent after treatment with Na<sub>2</sub>SO<sub>4</sub> and Florisil.

## 4. Summary of Test Method

4.1 An acidified 900 mL sample of water or wastewater is extracted with 50 mL of cyclohexane. The extract is treated

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>4</sup> Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, <http://www.iso.ch>.