



Standard Test Method for Comparison of Waterborne Petroleum Oils By Fluorescence Analysis¹

This standard is issued under the fixed designation D3650; 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 comparison of waterborne petroleum oils with oils from possible sources by means of fluorescence spectroscopy (1).² Useful references for this test method include: (2) and (3) for fluorescence analysis in general and (4), (5), and (6) for oil spill identification including fluorescence.

1.2 This test method is applicable to crude or refined petroleum products, for any sample of neat oil, waterborne oil, or sample of oil-soaked material. Unless the samples are collected soon after the spill occurs, it is not recommended that volatile fuels such as gasoline, kerosine, and No. 1 fuel oils be analyzed by this test method, because their fluorescence signatures change rapidly with weathering. Some No. 2 fuel oils and light crude oils may only be identifiable up to 2 days weathering, or less, depending on the severity of weathering. In general, samples weathered up to 1 week may be identified, although longer periods of weathering may be tolerated for heavy residual oils, oil weathered under Arctic conditions, or oil that has been protected from weathering by collecting in a thick layer.

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

1.4 *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.*

¹ 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 The boldface numbers in parentheses refer to the references at the end of this test method.

2. Referenced Documents

2.1 ASTM Standards:³

- D1129 Terminology Relating to Water
- D1193 Specification for Reagent Water
- D3325 Practice for Preservation of Waterborne Oil Samples
- D3326 Practice for Preparation of Samples for Identification of Waterborne Oils
- D3415 Practice for Identification of Waterborne Oils
- D4489 Practices for Sampling of Waterborne Oils
- E131 Terminology Relating to Molecular Spectroscopy
- E275 Practice for Describing and Measuring Performance of Ultraviolet and Visible Spectrophotometers
- E520 Practice for Describing Photomultiplier Detectors in Emission and Absorption Spectrometry

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method refer to Terminology D1129, Practice D3415, and Terminology E131.

4. Summary of Test Method

4.1 This test method consists of fluorescence analyses of dilute solutions of oil in spectroquality cyclohexane. In most cases the emission spectra, with excitation at 254 nm, over the spectral range from 280 to 500 nm, are adequate for matching.

4.2 Identification of the sample is made by direct visual comparison of the sample's spectrum with the spectra from possible source samples.

NOTE 1—When weathering has occurred, it may be necessary to consider known weathering trends when matching spectra (Fig. 1 and Fig. 2).

5. Significance and Use

5.1 This test method is useful for rapid identification of waterborne petroleum oil samples as well as oil samples

³ 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.