



Designation: D8431 – 22

Standard Test Method for Detection of Water-soluble Petroleum Oils by A-TEEM Optical Spectroscopy and Multivariate Analysis¹

This standard is issued under the fixed designation D8431; 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 (1) detection of trace level ($\mu\text{g/L}$ range) of oil and petroleum (water-soluble fraction) pollutants in surface and ground drinking water sources, (2) identification of the compounds, and (3) alerting analysts with a contaminant concentration prediction. This test method facilitates identification and quantification from 20 to 1000 $\mu\text{g/L}$ of target contaminants, including: water-soluble fraction of aromatic compounds from the BTEX family (benzene, toluene, ethylbenzene, and xylenes) and naphthalene from the polycyclic aromatic hydrocarbon (PAH) group, referred to as *BTEXN* in this test method, in water samples with up to 15 mg/L of dissolved organic carbon (DOC). The main approach involves analyzing and characterizing key water intake locations before the treatment and developing the contaminant library. The water-soluble (*BTEXN*) contaminants are associated with, but not limited to petroleum oils and fuels including commercial diesel fuel, gasoline, kerosene, heavy oil, fuel oil and lubricate oil, etc.

1.2 The data sets are analyzed using multivariate methods to test contaminant identification and quantification. The multivariate methods include classification and regression algorithms to analyze fluorescence EEM data acquired in the laboratory. The common goal of these algorithms is to reduce multidimensionality and eliminate noise of fluorescence and background signals. Automated identification-quantification methods linked directly to the instrument acquisition-analysis software are commercially available.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

1.5 *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

- D1129 Terminology Relating to Water
- D1193 Specification for Reagent Water
- D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water
- D3650 Test Method for Comparison of Waterborne Petroleum Oils By Fluorescence Analysis (Withdrawn 2018)³
- D3694 Practices for Preparation of Sample Containers and for Preservation of Organic Constituents
- D4841 Practice for Estimation of Holding Time for Water Samples Containing Organic and Inorganic Constituents
- D6046 Classification of Hydraulic Fluids for Environmental Impact
- D6161 Terminology Used for Microfiltration, Ultrafiltration, Nanofiltration, and Reverse Osmosis Membrane Processes
- E169 Practices for General Techniques of Ultraviolet-Visible Quantitative Analysis
- E2617 Practice for Validation of Empirically Derived Multivariate Calibrations
- E2719 Guide for Fluorescence—Instrument Calibration and Qualification
- E2891 Guide for Multivariate Data Analysis in Pharmaceutical Development and Manufacturing Applications

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.

Current edition approved May 1, 2022. Published July 2022. DOI: 10.1520/D8431-22.

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.

³ The last approved version of this historical standard is referenced on www.astm.org.