



Designation: D8084 – 17

Standard Test Method for Photoelectrochemical Oxygen Demand of Freshwater Sources for Drinking Water Treatment Plants and Treated Drinking Water¹

This standard is issued under the fixed designation D8084; 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 a protocol for the determination of the photoelectrochemical oxygen demand of freshwater sources for drinking water treatment plants and treated drinking water in the range of 0.7 mg/L to 20 mg/L. Higher levels may be determined by sample dilution.

1.2 Photoelectrochemical oxygen demand is determined using the current generated from the photoelectrochemical oxidation of the sample using titanium dioxide (TiO_2) irradiated with ultraviolet (UV) light from a light-emitting diode (LED).

1.3 This test method does not require the use of the hazardous reagents, such as mercuric sulfate, potassium dichromate and silver sulfate, that are often associated with the determination of chemical oxygen demand (that is, Test Methods [D1252](#)). It can also provide a result rapidly, as samples do not require reflux.

1.4 Determination of photoelectrochemical oxygen demand in freshwater sources for drinking water treatment plants and treated drinking water matrices has important implications for assessing treatment efficacy. Photoelectrochemical oxygen demand can be used as a bulk surrogate measure of natural organic matter, a key target for drinking water treatment. In aerobic biological treatment processes, determination of photoelectrochemical oxygen demand can provide an estimation of the oxygen required by microorganisms to degrade organic matter. This test method is complementary to existing natural organic matter (NOM) monitoring techniques and will help scientists and engineers further the understanding of NOM in water with a rapid oxygen demand test.

1.5 This test method was used successfully with reagent grade water spiked with pure compounds, freshwater sources for drinking water treatment plants and treated drinking water.

It is the user's responsibility to ensure the validity of this test method for waters of untested matrices.

1.6 This test method is applicable to oxidizable matter, <50 μm that can be introduced into the sensor.

NOTE 1—This test method can be performed (1) immediately in the field or laboratory on an unpreserved sample, and (2) in the laboratory on a properly preserved sample following the stated hold times.

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

1.8 *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.* For specific hazard statements, see Section 9.

1.9 *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](#)
- [D1252 Test Methods for Chemical Oxygen Demand \(Dichromate Oxygen Demand\) of Water](#)
- [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](#)
- [D5847 Practice for Writing Quality Control Specifications for Standard Test Methods for Water Analysis](#)

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 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.