



Designation: D3223 – 17

Standard Test Method for Total Mercury in Water¹

This standard is issued under the fixed designation D3223; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This test method² covers the determination of total mercury in water in the range from 0.5 to 10.0 $\mu\text{g Hg/L}$ (1).³ The test method is applicable to fresh waters, saline waters, and some industrial and sewage effluents. It is the user's responsibility to ensure the validity of this test method for waters of untested matrices.

1.1.1 The analyst should recognize that the precision and bias of this standard may be affected by the other constituents in all waters, as tap, industrial, river, and wastewaters. The cold vapor atomic absorption measurement portion of this method is applicable to the analysis of materials other than water (sediments, biological materials, tissues, etc.) if, and only if, an initial procedure for digesting and oxidizing the sample is carried out, ensuring that the mercury in the sample is converted to the mercuric ion, and is dissolved in aqueous media (2, 3).

1.2 Both organic and inorganic mercury compounds may be analyzed by this procedure if they are first converted to mercuric ions. Using potassium persulfate and potassium permanganate as oxidants, and a digestion temperature of 95°C, approximately 100 % recovery of organomercury compounds can be obtained (2, 4).

1.3 The range of the test method may be changed by instrument or recorder expansion or both, and by using a larger volume of sample.

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

1.5 A method for the disposal of mercury-containing wastes is also presented (Appendix X1) (5).

¹ This test method is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.05 on Inorganic Constituents in Water.

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² Adapted from research investigations by the U. S. Environmental Protection Agency's Analytical Quality Control Laboratory, Cincinnati, OH, and Region IV Surveillance and Analysis Division, Chemical Services Branch, Athens, GA.

³ The boldface numbers in parentheses refer to the references at the end of this test method.

1.6 **Warning**—Mercury has been designated by many regulatory agencies as a hazardous material that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury containing products. See the applicable product Safety Data Sheet (SDS) for additional information. Users should be aware that selling mercury and/or mercury containing products into your state or country may be prohibited by law.

1.7 *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 1.6 and 7.8.

1.8 *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:⁴

D512 Test Methods for Chloride Ion in Water

D1129 Terminology Relating to Water

D1193 Specification for Reagent Water

D1245 Practice for Examination of Water-Formed Deposits by Chemical Microscopy

D1252 Test Methods for Chemical Oxygen Demand (Dichromate Oxygen Demand) of Water

D1426 Test Methods for Ammonia Nitrogen in 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

D4691 Practice for Measuring Elements in Water by Flame Atomic Absorption Spectrophotometry

⁴ 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.

*A Summary of Changes section appears at the end of this standard