



Designation: E506 – 17a

Standard Test Method for Mercury in Liquid Chlorine¹

This standard is issued under the fixed designation E506; 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 method² covers the determination of mercury in liquid chlorine with a lower limit of detection of 0.1 $\mu\text{g/L}$.

1.2 Review the current Safety Data Sheet (SDS) for detailed information concerning toxicity, first-aid procedures, and safety precautions.

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.* Specific precautionary statements are given in Sections 7, 6.3, 6.4, 6.5, and Note 2.

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:³

D1193 Specification for Reagent Water

D6809 Guide for Quality Control and Quality Assurance Procedures for Aromatic Hydrocarbons and Related Materials

E180 Practice for Determining the Precision of ASTM Methods for Analysis and Testing of Industrial and Specialty Chemicals (Withdrawn 2009)⁴

E200 Practice for Preparation, Standardization, and Storage of Standard and Reagent Solutions for Chemical Analysis

3. Summary of Test Method

3.1 Liquid chlorine samples are taken in chilled glass flasks, then allowed to evaporate slowly to dryness. The mercury is left in the residue. The residue is dissolved in dilute nitric acid and diluted to volume. The addition of nitric acid prevents any loss of mercury from the aqueous solution on standing. For analysis, an aliquot of the acidic aqueous solution is boiled with excess permanganate to remove interfering materials. The mercuric ions are then reduced to metallic mercury with stannous chloride. The solution is aerated and the mercury, now in the air stream, is determined using an atomic absorption spectrophotometer.

4. Significance and Use

4.1 This test method was developed primarily for the determination of traces of mercury in chlorine produced by the mercury-cell process.

5. Apparatus

5.1 *Atomic Absorption Spectrophotometer*, equipped with mounting to hold absorption cell and a fast response (0.5 s) recorder.

5.2 *Mercury Hollow Cathode Lamp*, primary line 253.7 nm.

5.3 *Absorption Cell*, 10-cm path length with quartz windows.

5.4 *Gas Washing Bottle*, 125 mL, with extra-coarse fritted bubbler. The bottle has a calibration line drawn at the 60-mL mark.

5.5 *Stopcock*, 3-way, with plug of TFE-fluorocarbon.

5.6 *Gas Washing Bottle*, 125-mL without frit.

¹ This test method is under the jurisdiction of ASTM Committee D16 on Aromatic, Industrial, Specialty and Related Chemicals and is the direct responsibility of Subcommittee D16.16 on Industrial and Specialty Product Standards.

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² *Analytical Methods for Atomic Absorption Spectrophotometry*, Perkin-Elmer Ltd., September 1968.

"Determination of Mercury in Effluents and Process Streams from a Mercury-Cell Chlorine Plant (Atomic Absorption Flameless Method)" CAS-AM-70.13, June 23, 1970, Analytical Laboratory, Dow Chemical of Canada, Ltd., Sarnia, Ontario, Canada.

"Determination of Mercury in Liquid Chlorine," CSAL-M72.4, Feb. 25, 1972, Analytical Laboratory, Dow Chemical of Canada, Ltd., Sarnia, Ontario, Canada.

Chlorine Institute Reference No. MIR-104.

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.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

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