



# Standard Test Method for Mercury in Liquid Chlorine<sup>1</sup>

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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This test method<sup>2</sup> covers the determination of mercury in liquid chlorine with a lower limit of detection of 0.1  $\mu\text{g/L}$ .

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

1.3 *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.

1.4 Review the current material safety data sheet (MSDS) for detailed information concerning toxicity, first-aid procedures, and safety precautions.

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>3</sup>

D1193 Specification for Reagent Water

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Practice for Determining the Precision of ASTM Methods for Analysis and Testing of Industrial and Specialty Chemicals (Withdrawn 2009)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

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

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee E15 on Industrial and Specialty Chemicals and is the direct responsibility of Subcommittee E15.02 on Product Standards.

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

<sup>3</sup> "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.

<sup>4</sup> "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.

<sup>5</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>6</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

## 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.<sup>5</sup>

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

5.3 *Absorption Cell*, 10-cm path length with quartz windows.<sup>5,6</sup>

5.4 *Gas Washing Bottle*, 125 mL, with extra-coarse fritted bubbler.<sup>5,7</sup> The bottle has a calibration line drawn at the 60-mL mark.

5.5 *Stopcock*, 3-way, with plug of TFE-fluorocarbon.<sup>5,8</sup>

<sup>5</sup> The sole source of supply of the Beckman 10-in. recorder Model No. 100502 known to the committee at this time is Beckman Instruments Inc., 2500 Harbor Blvd., Fullerton, CA 92634. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee<sup>1</sup>, which you may attend.

<sup>6</sup> The sole source of supply of the Beckman 75144 known to the committee at this time is Beckman Instruments Inc., 2500 Harbor Blvd., Fullerton, CA 92634.

<sup>7</sup> The sole source of supply of the Corning 31770 (125 EC) known to the committee at this time is Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219-4785. I

<sup>8</sup> The sole source of supply of the Corning 7382 known to the committee at this time is Fisher Scientific, 711 Forbes Ave., Pittsburgh, PA 15219-4785.

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