



Designation: E538 – 17a

Standard Test Methods for Mercury in Caustic Soda (Sodium Hydroxide) and Caustic Potash (Potassium Hydroxide)¹

This standard is issued under the fixed designation E538; 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 These test methods cover the routine determination of mercury in caustic soda and caustic potash liquors and anhydrous caustic soda in the solid, flake, ground, and bead form by the flameless atomic absorption method.

1.2 Two test methods are described as follows: Test Method A employs a direct analysis of the sample using an alkaline reducing agent with a lower limit of detection of 0.1 ppb (ng/g). Test Method A was developed using caustic soda and caustic potash. Test Method B requires a preliminary neutralization of the sample followed by a permanganate oxidation before it can be analyzed by an acidic reducing agent with a lower limit of detection of this test method of 0.01 ppm ($\mu\text{g/g}$). Test Method B was developed using caustic soda.

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

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 *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 hazards statements are given in Sections 7 and 18.

1.6 *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.*

¹ These test methods are under the jurisdiction of ASTM Committee D16 on Aromatic, Industrial, Specialty and Related Chemicals and are the direct responsibility of Subcommittee D16.15 on Industrial and Specialty General Standards.

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2. Referenced Documents

2.1 ASTM Standards:²

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)³

TEST METHOD A—ALKALINE REDUCING AGENT

3. Summary of Test Method

3.1 All forms of mercury are reduced to metallic mercury which is aerated from the solution and determined by cold vapor atomic absorption analysis.

4. Significance and Use

4.1 Mercury is a toxic material and is also deleterious if present in caustic soda and caustic potash used in certain manufacturing processes. It must therefore be controlled as a possible pollutant. These test methods provide a procedure for measuring mercury in liquid and solid caustic soda and caustic potash.

5. Apparatus

5.1 *Atomic Absorption Spectrophotometer*, equipped with mounting to hold an 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.

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.

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