



Designation: E 395 – 95a

Standard Test Method for Determination of Total Sulfur in Iron Ores and Related Materials by Combustion-Iodate Titration¹

This standard is issued under the fixed designation E 395; 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 the determination of total sulfur in iron ores, concentrates, agglomerates, and related materials in the concentration range from 0.007 to 0.50 %.

1.2 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 1193 Specification for Reagent Water²

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications³

E 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals⁴

E 173 Practice for Conducting Interlaboratory Studies of Methods for Chemical Analysis of Metals⁴

E 877 Practice for Sampling and Sample Preparation of Iron Ores and Related Materials⁵

E 882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory⁵

E 1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method⁵

3. Summary of Test Method

3.1 The sulfur in the test sample is converted to sulfur dioxide by combustion in a stream of oxygen. The sulfur dioxide is absorbed in an acidified starch-iodide solution and titrated with potassium iodate solution. The potassium iodate solution is standardized against a similar type ore of known sulfur content since the percentage of sulfur evolved as sulfur dioxide varies with different materials.

4. Significance and Use

4.1 This test method is intended to be used for compliance with compositional specifications for sulfur content. It is assumed that all who use these procedures will be trained analysts capable of performing common laboratory procedures skillfully and safely. It is expected that work will be performed in a properly equipped laboratory and that proper waste disposal procedures will be followed, such as those described in Guide E 882.

5. Interferences

5.1 Halogens interfere with this test method.

6. Apparatus

6.1 *Induction Heating Apparatus* for determination of sulfur by direct combustion as described in Practices E 50, Apparatus No. 13.

7. Reagents and Materials

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.⁶ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

7.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean reagent water conforming to Specification D 1193.

7.3 *Copper (Low-Sulfur) Accelerator*, chips or rings.

7.4 *Hydrochloric Acid (3+97)*—Add 3 volumes of concentrated hydrochloric acid (HCl) (sp gr 1.19) with 97 volumes of water.

7.5 *Iron (Low-Sulfur) Accelerator*, chips or powder.

7.6 *Potassium Iodate, Standard Solution* (1 mL = 0.1 mg S)—Dissolve 0.2225 g of potassium iodate (KIO₃) in 900 mL of water and dilute to 1 L.

¹ This test method is under the jurisdiction of ASTM Committee E-1 on Analytical Chemistry for Metals, Ores, and Related Materials and is the direct responsibility of Subcommittee E01.02 on Ores, Concentrated, and Related Metallurgical Materials.

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ *Annual Book of ASTM Standards*, Vol 03.05.

⁵ *Annual Book of ASTM Standards*, Vol 03.06.

⁶ *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmaceutical Convention, Inc. (USPC), Rockville, MD.