



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 135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials⁴

E 173 Practice for Conducting Interlaboratory Studies of Methods for Chemical Analysis of Metals⁵

E 877 Practice for Sampling and Sample Preparation of Iron Ores and Related Materials⁶

E 882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory⁶

E 1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method⁶

3. Terminology

3.1 *Definitions*—For definitions of terms used in this Test Method, refer to Terminology E 135.

4. Summary of Test Method

4.1 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.

5. Significance and Use

5.1 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 quality control procedures will be followed, such as those described in Guide E 882.

6. Interferences

6.1 Halogens interfere with this test method.

7. Apparatus

7.1 *Induction Heating Apparatus* for determination of sulfur by direct combustion.

7.1.1 The apparatus must be suitable for the combustion of the sample in oxygen to form sulfur dioxide (SO_2) and must provide an absorption vessel in which the SO_2 is titrated. A typical arrangement is shown in Fig. 1.

7.1.2 *Oxygen Purifiers*—The regular commercial tank oxygen is satisfactory. It must be passed through two pressure reduction valves (approximately 207 kPa (30 psig) and 14 to 28 kPa (2 to 4 psig), respectively) or a suitable two-stage reduction valve to provide an even and adequate flow of oxygen through a tower containing H_2SO_4 and through an absorption tower containing 20 to 30-mesh inert base impregnated with NaOH and anhydrous magnesium perchlorate ($\text{Mg}(\text{ClO}_4)_2$). A flowmeter and quick-acting shut-off valve for use during preheating periods must precede the resistance furnace assembly. A flowmeter must also precede the induction furnace assembly.

¹ This test method is under the jurisdiction of ASTM Committee E01 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 Discontinued; see 1997 *Annual Book of ASTM Standards*, Vol 03.05.

⁶ *Annual Book of ASTM Standards*, Vol 03.06.