



## Standard Test Method for Determination of Silica in Manganese Ores, Iron Ores, and Related Materials by Gravimetry<sup>1</sup>

This standard is issued under the fixed designation E 247; 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 covers the determination of silica in iron ores, iron ore concentrates and agglomerates, and manganese ore in the concentration range from 0.5 to 15 %.

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 Water<sup>2</sup>

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method<sup>3</sup>

E 877 Practice for Sampling and Sample Preparation of Iron Ores<sup>4</sup>

E 882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory<sup>4</sup>

### 3. Summary of Test Method

3.1 The sample is fused with sodium peroxide in a zirconium crucible. The melt is leached with water and dissolved in hydrochloric acid. Silica is separated by double dehydration with perchloric acid. The two precipitates are combined, ignited, and weighed. The silica is volatilized by treatment with hydrofluoric and sulfuric acids and the residue weighed.

### 4. Significance and Use

4.1 This test method is intended to be used for compliance with compositional specifications for silica 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. Appropriate quality control practices must be followed such as those described in Guide E 882.

### 5. Interferences

5.1 This test method is written for iron and manganese ores containing less than 0.25 % of fluorine. None of the elements normally found in iron ores or in manganese ores interfere with this test method.

### 6. Apparatus

6.1 *Zirconium Crucible* (50-mL capacity).

6.2 *Platinum Filter Cone*.

### 7. Reagents

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society where such specification are available.<sup>5</sup> Other grades may be used, provided it is first ascertained that the reagent is of sufficient 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 as defined by Type I of Specification D 1193.

7.3 *Hydrochloric Acid* (sp gr 1.19)—Concentrated hydrochloric acid (HCl).

7.4 *Hydrochloric Acid* (1 + 49)—Mix 1 volume of concentrated HCl (sp gr 1.19) with 49 volumes of water.

7.5 *Hydrofluoric Acid* (48%)—Concentrated hydrofluoric acid (HF).

7.6 *Perchloric Acid* (70%) ( $\text{HClO}_4$ ).

7.7 *Sodium Peroxide Powder* ( $\text{Na}_2\text{O}_2$ ).

7.8 *Sulfuric Acid* (1 + 1)—Carefully pour 1 volume of

<sup>1</sup> 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, Concentrates, and Related Metallurgical Materials.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 11.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 14.02.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 03.06.

<sup>5</sup> *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 Pharmacopoeia and National Formulary*, U.S. Pharmacopoeial Convention, Inc. (USPC), Rockville, MD.