



Standard Test Methods for Determination of Manganese (IV) in Manganese Ores by Redox Titration¹

This standard is issued under the fixed designation E 465; 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 determination of manganese dioxide in amounts commonly found in manganese ore. The determination measures the amount of manganese (IV) present in the sample. The result may be expressed as available oxygen or as manganese dioxide. The following test methods are included and may be used interchangeably:

Sections

Test Method A (Ferrous Ammonium Sulfate)	9-13
Test Method B (Periodate (Sodium Oxalate)	14-18

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 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals³

E 135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials³

E 882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory⁴

3. Terminology

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

4. Significance and Use

4.1 This test method is intended to be used for compliance with compositional specifications for manganese dioxide content in manganese ores. 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 shall be followed, such as those described in Guide E 882.

5. Interferences

5.1 The elements ordinarily present in manganese ores do not interfere in either test method.

6. Reagents and Materials

6.1 *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 specifications are available.⁵ 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.

6.2 *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. Hazards

7.1 For precautions to be observed in these methods, refer to Practice E 50.

8. Sampling and Sample Preparation

8.1 The sample shall pass a No. 100 (150-μm) sieve.

TEST METHOD A—FERROUS AMMONIUM SULFATE METHOD

9. Summary of Test Method

9.1 The test sample is dissolved in an excess of ferrous ammonium sulfate solution. The manganese dioxide reacts with an equivalent amount of ferrous iron. The excess ferrous iron is titrated with standard potassium dichromate solution using sodium diphenylamine sulfonate as an indicator.

¹ These test methods are under the jurisdiction of ASTM Committee E01 on Analytical Chemistry for Metals, Ores, and Related Materials and are the direct responsibility of Subcommittee E01.02 on Ores, Concentrates, and Related Metallurgical Materials.

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

³ *Annual Book of ASTM Standards*, Vol 03.05.

⁴ *Annual Book of ASTM Standards*, Vol 03.06.

⁵ *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 “Reagent Chemicals and Standards,” by Joseph Rosin, D. Nostrand Co., Inc., New York, NY, and the “United States Pharmacopeia.”