



Designation: E248 – 20

# Standard Test Method for Determination of Manganese in Manganese Ores by Pyrophosphate Complexed Permanganate Potentiometric Titrimetry<sup>1</sup>

This standard is issued under the fixed designation E248; 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 manganese in manganese ore in the range from 15 % to 60 %.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.3 *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.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[D1193 Specification for Reagent Water](#)

[E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)

[E50 Practices for Apparatus, Reagents, and Safety Considerations for Chemical Analysis of Metals, Ores, and Related Materials](#)

[E135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials](#)

[E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

[E882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory](#)

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

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology [E135](#).

## 4. Summary of Test Method

4.1 The test sample is decomposed by treatment with HCl, HNO<sub>3</sub>, HF, and HClO<sub>4</sub>. After the addition of sodium pyrophosphate (Na<sub>4</sub>P<sub>2</sub>O<sub>7</sub>·10H<sub>2</sub>O) and adjustment of the acidity, the manganese is determined by oxidation to trivalent manganese with a standard solution of potassium permanganate (KMnO<sub>4</sub>). The end point is determined potentiometrically.

## 5. Significance and Use

5.1 This test method is intended to be used as a referee method for compliance with compositional specifications for manganese 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 [E882](#).

## 6. Interferences

6.1 Provision has been made for removal of chromium, which, under some conditions, is an interfering element.

## 7. Apparatus

7.1 *pH Meter* equipped with calomel and glass electrodes.

7.2 *Potentiometric Titration Apparatus* equipped with calomel and platinum electrodes. A suitable pH meter may be used for this purpose.

7.3 *Magnetic Stirrer*—Use of a TFE-fluorocarbon covered stirring bar is recommended.

## 8. Reagents

8.1 *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,