Designation: E 841 – 99

Standard Test Method for Determination of Copper in Iron Ores and Related Materials by Atomic Absorption Spectrometry[1]

This standard is issued under the fixed designation E 841; 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 copper in iron ores, concentrates, agglomerates, and related materials in the concentration range from 0.003 to 1 %.

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:*

E 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals[2]

E 173 Practice for Conducting Interlaboratory Studies of Methods for Chemical Analysis of Metals[2]

E 276 Test Method for Particle Size or Screen Analysis at No. 4 (4.75-mm) Sieve and Finer for Metal-Bearing Ores and Related Materials[2]

E 663 Practice for Flame Atomic Absorption Analysis[3]

E 877 Practice for Sampling and Sample Preparation of Iron Ores and Related Materials[3]

E 882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory[3]

3. Summary of Test Method

3.1 The sample is dissolved in hydrochloric acid with the addition of a small amount of nitric and hydrofluoric acids. After evaporation to fumes with perchloric acid, the solution is diluted with water and filtered. A portion of the solution is examined by atomic absorption spectroscopy using standards containing approximately the same amount of iron as the test sample.

4. Significance and Use

4.1 In the making of iron and steel during the reduction of iron ores, copper forms alloy with iron and steel hence the necessity of determining the copper concentration for metallurgical consideration.

4.2 This test method is intended to be used for compliance with compositional specifications for copper 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 None of the elements normally found in iron ores interfere with this test method.

6. Apparatus

6.1 *Atomic Absorption Spectrometer*, meeting the following criteria:

6.1.1 *Minimum Sensitivity*—The absorbance of the highest calibration solution (see 7.5) must be at least 0.3.

6.1.2 *Curve—Linearity*—The difference between the readings of the two highest calibration solutions must be more than 1.4 times the difference between the readings for the zero solution and the lowest calibration solution (see 7.5).

6.1.3 *Minimum Stability*—The coefficient of variation of a number of measurements of the highest calibration solution and of the zero calibration solution must be less than 1.5 and 0.5 % respectively, relative to the measurement of the highest calibration solution.

NOTE 1—A strip chart recorder or digital readout device, or both is advisable to measure the criteria in 6.1 and for all subsequent measurements.

NOTE 2—A background corrector equipped with a hydrogen or a deuterium hollow cathode lamp is advisable for the concentration range from 0.003 to 0.010 % Cu.

[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, Concentrates and Related Metallurgical Materials.

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[2] *Annual Book of ASTM Standards*, Vol 03.05.

[3] *Annual Book of ASTM Standards*, Vol 03.06.