



Standard Test Method for Determination of Copper in Unalloyed Copper by Gravimetry¹

This standard is issued under the fixed designation E 53; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the chemical analysis of copper having minimum purity of 99.75 % to 99.95 %.

1.2 This test method covers the electrolytic determination of copper in chemical, electrolytic, and fire refined copper. In this method silver is deposited with the copper, and is reported as copper.

1.3 *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.* Specific precautionary statements are given in Section 9 and Note 1.

2. Referenced Documents

2.1 ASTM Standards:

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications²

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

E 121 Test Methods for Chemical Analysis of Copper-Tellurium Alloys³

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

E 173 Practice for Conducting Interlaboratory Studies of Methods for Chemical Analysis of Metals³

E 255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition³

E 1024 Guide for Chemical Analysis of Metals and Metal Bearing Ores by Flame Atomic Absorption Spectrophotometry⁴

E 1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method⁴

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 sample is dissolved in an acid mixture and the copper is electrolytically deposited and weighed on a tared platinum cathode. Copper remaining in the electrolyte is determined by atomic absorption spectroscopy.

5. Significance and Use

5.1 This test method for the chemical analysis of copper is primarily intended to test for compliance with compositional specifications. It is assumed that all who use this method 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.

6. Interferences

6.1 Elements normally present in refined copper with a minimum purity of 99.85 % do not interfere.

6.2 Approximately one-half of any selenium or tellurium present will codeposit. If interfering amounts are present, proceed in accordance with Test Methods E 121.

7. Apparatus

7.1 *Electrodes for Electroanalysis*—Apparatus No. 9, Practices E 50.

7.1.1 *Electrodes*—Platinum electrodes of the stationary type are recommended as described in 7.1.2 and 7.1.3, but strict adherence to the exact size and shape of the electrodes is not mandatory. When agitation of the electrolyte is permissible in order to decrease the time of deposition, one of the types of rotating forms of electrodes, generally available, may be employed. The surface of the platinum electrodes should be smooth, clean, and bright to promote uniform deposition and good adherence. Sandblasting is not recommended.

7.1.2 *Cathodes*—Platinum cathodes may be formed either from plain or perforated sheets or from wire gauze, and may be either open or closed cylinders. Gauze cathodes are recommended, and shall be made preferably from 50-mesh gauze

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 E01.07 on Cu and Cu Alloys.

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² *Annual Book of ASTM Standards*, Vol 14.02.

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

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