

**Designation: E 1771 – 95**

## **Standard Test Method for Determination of Copper in Anode and Blister Copper<sup>1</sup>**

This standard is issued under the fixed designation E 1771; 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 describes the electrolytic determination of copper in commercial anode (99.0 to 99.8%) and blister copper (92.0 to 98.0 %).

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.* Specific hazards statements are given in Section 8.

### **2. Referenced Documents**

#### *2.1 ASTM Standards:*

- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specific Limiting Values<sup>2</sup>
- E 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals<sup>3</sup>
- E 53 Test Methods for Chemical Analysis of Copper<sup>3</sup>
- E 173 Practice for Conducting Interlaboratory Studies of Methods for Chemical Analysis of Metals<sup>3</sup>
- E 255 Practice for Sampling Copper and Copper Alloys for Determination of Chemical Composition<sup>3</sup>
- E 478 Methods for Chemical Analysis of Copper Alloys<sup>4</sup>
- E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method<sup>2</sup>

### **3. Summary of Test Method**

3.1 After dissolution of the sample, the solution is evaporated to dryness and fumes expelled by heat. The salt is dissolved in nitric acid, the solution is filtered, the acidity is adjusted, and the copper is electrolytically plated and weighed as the metal.

### **4. Significance and Use**

4.1 This test method for the determination of copper in anode (99.0 to 99.8 %) and blister copper (92.0 to 98.0 %) is primarily intended as a referee method, to test such materials for compliance with compositional specifications. It is assumed

that users of this test 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.

4.2 This test method is intended to determine the copper content of commercial anode and blister copper. Those elements that interfere are removed by precipitation or volatilization, or both. Copper is electrodeposited as the metal and weighed.

4.3 This method will also be found useful for the electrolytic determination of copper in some copper alloys and scrap.

### **5. Interferences**

5.1 Commonly present elements, which co-deposit or partially co-deposit with copper are precipitated, (for example, silver as the chloride), or volatilized, (for example, antimony, arsenic, selenium), as metal bromides. Molybdenum also will co-deposit with copper to produce a dark plate. When less than 6 mg is present, the addition of 1 mg of sodium chloride will prevent deposition.

5.2 This test method does not address interferences caused by tungsten and bismuth.

### **6. Apparatus**

6.1 *Electrodes for Electrolysis*—Apparatus No. 9 in Practices E 50.

### **7. Reagents**

- 7.1 *Acetone*, ( $\text{CH}_3\text{COCH}_3$ ).
- 7.2 *Ammonium Sulfate*,  $[(\text{NH}_4)_2\text{SO}_4]$ .
- 7.3 *Bromine*, ( $\text{Br}_2$ ).
- 7.4 *Ethanol*, ( $\text{C}_2\text{H}_5\text{OH}$ ).
- 7.5 *Hydrobromic Acid*, (HBr), 48%.

### **8. Hazards**

8.1 *Bromine* ( $\text{Br}_2$ )—Liquid bromine vaporizes at room temperature. Fumes attack organic material and are highly irritating to eyes and lungs. The liquid will cause serious burns and blisters if allowed to contact skin or other soft tissues. Inhalation of vapors may cause pulmonary edema and death. Ingestion may cause severe gastroenteritis and death.

**NOTE 1—Warning:** Work only in an efficient exhaust hood with proper protective equipment. Familiarity with proper first-aid procedure is essential before beginning work.

<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 E01.07 on Cu and Cu Alloys.

Current edition approved Nov. 10, 1995. Published January 1996.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 14.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 03.05.

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