



Standard Test Method for Determination of Silver in Copper Concentrates by Flame Absorption Spectrometry¹

This standard is issued under the fixed designation E 1898; 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 silver in the range of 50 µg/g to 1000 µg/g by acid dissolution of the silver and measurement by atomic absorption spectrophotometry. Copper concentrates are internationally traded within the following concentration ranges:

Element	Unit	Concentration Range	
Aluminum	%	0.05	to 2.50
Antimony	%	0.0001	to 4.50
Arsenic	%	0.01	to 0.50
Barium	%	0.003	to 0.10
Bismuth	%	0.001	to 0.16
Cadmium	%	0.0005	to 0.04
Calcium	%	0.05	to 4.00
Carbon	%	0.10	to 0.90
Chlorine	%	0.001	to 0.006
Chromium	%	0.0001	to 0.10
Cobalt	%	0.0005	to 0.20
Copper	%	10.0	to 44.0
Fluorine	%	0.001	to 0.10
Gold	µg/g	1.40	to 100.0
Iron	%	12.0	to 30.0
Lead	%	0.01	to 1.40
Magnesium	%	0.02	to 2.00
Manganese	%	0.009	to 0.10
Mercury	µg/g	0.05	to 50.0
Molybdenum	%	0.002	to 0.25
Nickel	%	0.0001	to 0.08
Silicon	%	0.40	to 20.0
Silver	µg/g	18.0	to 8000
Sulfur	%	10.0	to 36.0
Tin	%	0.004	to 0.012
Zinc	%	0.005	to 4.30

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 its use. Specific precautions are given in WARNING paragraphs.*

2. Referenced Documents

2.1 ASTM Standards:

E 29 Practice For Using Significant Digits in Test Data to

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 Metal Bearing Ores, Concentrates and Related Metallurgical Materials.

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Determine Conformance With Specifications²

E 50 Practices for Apparatus, Reagents and Safety Precautions for Chemical Analysis of Metals²

E 663 Practice for Flame Atomic Absorption Analysis³

E 882 Guide for Accountability and Quality Control in the Chemical Analysis of Metals³

E 1024 Guide for Chemical Analysis of Metals and Metal Bearing Ores by Flame Atomic Absorption Spectrophotometry³

E 1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method²

E 1763 Guide for Interpretation and Use of Results from Interlaboratory Testing of Chemical Analysis Methods²

3. Summary of Test Method

3.1 The analyst has the option of either digesting the sample in nitric and hydrochloric acids or nitric and perchloric acids, depending on their preference and equipment availability. The filtered solutions are aspirated into an air-acetylene flame of an atomic absorption spectrophotometer. Spectral energy at approximately 328.1 nm from a silver hollow cathode lamp is passed through the flame and the absorbance is measured. This absorbance is compared with the absorbance of a series of standard calibration solutions.

4. Significance and Use

4.1 In the primary metallurgical processes used by the mineral processing industry for copper bearing ores, copper and silver associated with sulfide mineralization are concentrated by the process of flotation for recovery of the metals.

4.2 This test method is intended to be a referee method for the determination of silver in copper concentrates. It is assumed that all who use this procedure 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 Elements normally found in copper concentrates do not

² Annual Book of ASTM Standards, Vol 03.05.

³ Annual Book of ASTM Standards, Vol 03.06.