National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 885

Refined Copper

(pin form)

This Standard Reference Material (SRM) is intended primarily for use in calibration and validation of instrumental methods of analysis used in determinations of sulfur and oxygen in copper and its alloys. The material is in the form of pins approximately 13 mm long, each weighing slightly less than 1 g. A unit of SRM 885 consists of one bottle containing 200 g of pins.

Certified Values: Certified values for constituents of SRM 885 are listed in Table 1 [1] as mass fractions of the elements in a copper matrix. A NIST certified value is a value for which NIST has the highest confidence in its accuracy, in that all known or suspected sources of bias have been taken into account [2]. A certified value is the present best estimate of the true value. The certified values are metrologically traceable to the SI derived unit of mass fraction expressed as percent (%). The combined standard uncertainties are expressed at a confidence level of approximately 68 %.

Table 1. Certified Values for SRM 885 Refined Copper

Constituent	Mass Fraction (%)	Combined Standard Uncertainty (%)
Oxygen (O)	0.031	0.002
Sulfur (S)	0.0018	0.0003
Silver (Ag)	0.0005	0.0002
Lead (Pb)	0.0002	0.0001

Expiration of Certification: The certification of **SRM 885** is valid indefinitely, within the uncertainty specified, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Instructions for Storage, Handling, and Use"). Periodic recertification of this SRM is not required. The certification is nullified if the SRM is damaged, contaminated or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet or register online) will facilitate notification.

Coordination of the technical measurements leading to certification was performed by J.I. Shultz, formerly of NIST.

Support aspects involved in the issuance of this Standard Reference Material were coordinated through the NIST Office of Reference Materials.

Carlos A. Gonzalez, Chief
Chemical Sciences Division

Gaithersburg, MD 20899
Certificate Issue Date: 07 June 2018
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Steven J. Choquette, Director
Office of Reference Materials

INSTRUCTIONS FOR STORAGE, HANDLING, AND USE

To relate analytical determinations to the values on this Certificate of Analysis, a minimum sample quantity of one pin (approximately 1 g) is recommended. The pins have a natural oxide surface coating that must be removed prior to measurements for determination of the bulk oxygen content. Test methods may specify the process for removal of the surface coating. The material should be stored in its original container in a cool, dry location.

ADDITIONAL CONSTITUENTS: Noncertified values are provided for the following additional constituents in SRM 885.

Information Mass Fraction Values: Information values for SRM 885 are reported as mass fractions in Table 2. An information value is a value that may be of interest to the SRM user, but insufficient information is available to assess the uncertainty associated with the value [2]. Information values cannot be used to establish metrological traceability.

Table 2. Information Mass Fraction Values in SRM 885 Refined Copper

Element	Mass Fraction (%)
Antimony (Sb)	<0.0002
Arsenic (As)	<0.0002
Bismuth (Bi)	<0.0001
Iron (Fe)	<0.0005
Nickel (Ni)	<0.0001
Selenium (Se)	<0.0001
Tellurium (Te)	<0.0001
Tin (Sn)	<0.0001
Zinc (Zn)	<0.0001

PREPARATION AND ANALYSIS[(1)]

The material for SRM 885 was prepared by A. Cardinal, Phelps Dodge Refining Corp. (El Paso, TX).

Cooperative analyses for certification were performed in the following laboratories: J. Anselmo, Accredited Laboratories, Inc. (Carteret, NJ); D. Neill, Asarco Inc. (Amarillo, TX); G.W. Self, Asarco Inc. (Hayden, AZ); L.E. Creasy, Axel Johnson Metals, Inc. (Exton, PA); R. Hertz, J.A. Horner and J. Beard, Brush Wellman Engineered Materials (Elmore, OH); J. Schuster, Cerro Copper Products Co. (St. Louis, MO); T.A. Appelman, Magma Copper Co. (San Manuel, AZ); E. Ackall, A. Cardinal and E.C. Thompson, Phelps Dodge Refining Corp. (El Paso, TX); and J.F. Brewton, D. Lanier and J. Maxwell, Southwire Co. (Carrollton, GA).

The estimated uncertainty listed for a constituent is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability. No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.

[(1)] Certain commercial equipment, instrumentation, or materials are identified in this certificate to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institutes of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

REFERENCES

[1] Thompson, A.; Taylor, B.N.; Guide for the Use of the International System of Units (SI); NIST Special Publication 811; U.S. Government Printing Office: Washington, DC (2008); available at https://www.nist.gov/physical-measurement-laboratory/special-publication-811 (accessed Jun 2018).

[2] May, W.; Parris, R.; Beck, C.; Fassett, J.; Greenberg, R.; Guenther, F.; Kramer, G.; Wise, S.; Gills, T.; Colbert, J.; Gettings, R.; MacDonald, B.; Definitions of Terms and Modes Used at NIST for Value Assignment of Reference Materials for Chemical Measurements; NIST Special Publication 260-136; U.S. Government Printing Office: Washington, DC (2000); available at https://www.nist.gov/sites/default/files/documents/srm/SP260-136.PDF (accessed Jun 2018).

Certificate Revision History: 07 June 2018 (Unit size change; editorial changes); 23 January 2018 (Updated title; instructions for storage, handling, and use added; editorial changes); 25 March 1991 (Original certificate date).

Users of this SRM should ensure that the Certificate of Analysis in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-2200; fax (301) 948-3730, email srminfo@nist.gov; or via the Internet at https://www.nist.gov/srm.