

U. S. Department of Commerce
Frederick B. Dent
Secretary

National Bureau of Standards
Richard W. Roberts, Director

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 478

Microprobe Standard - Cartridge Brass

This Standard Reference Material consists of one specimen each of chill cast material (SRM C1102) and wrought material (SRM 1102). The cast material is supplied as a cube 6 mm on an edge; the chill cast face is polished. The wrought material is supplied as a right circular cylinder 6 mm diameter by 6 mm high. Some sixteen elements are certified for their chemical composition in SRM's C1102 and 1102. However, at the micrometer level of spatial resolution these brasses comprising SRM 478, are certified to be homogeneous with respect to copper and zinc only.

CERTIFIED CHEMICAL CHARACTERIZATION

<u>SRM</u>	<u>COPPER</u>	<u>ZINC</u>
478 (both specimens)	72.8 ₅	27.1 ₀

The material for each component of the standard was melted and cast at the Naval Research Laboratory, Washington, D. C. High-purity metals were used either directly or in the preparation of master alloys. Approximately 325-kg heats were melted under a charcoal cover in a high-frequency induction furnace and the molten metal cast on a massive water-cooled plate to provide rapid unidirectional solidification. The casting for each standard was about 68.5 cm (27 in) in diameter and 8.9 cm (3 1/2 in) thick.

The material for the chill-cast samples was obtained from the area of the casting nearest the chill-cast face. Samples were originally finished to a size 31 mm (1 1/4 in) square, 19 mm (3/4 in) thick.

The material for the wrought samples was obtained after removal of the chill-cast material and discard of about 19 mm (3/4 in) thickness from the slab top. Strips of this material were forged, fully annealed, and finished to samples 31 mm (1 1/4 in) in diameter, 19 mm (3/4 in) thick.

The microprobe specimens were cut by electrical-discharge machining into the form provided as SRM 478. The chill-cast face was metallographically polished by mechanical means prior to the electrical-discharge machining.

Samples for chemical analysis were prepared in the form of millings taken from the cross section of the finished samples of both the chill-cast and wrought material.

Washington, D. C. 20234
February 28, 1974

J. Paul Cali, Chief
Office of Standard Reference Materials
(over)

Chemical analyses were performed in the NBS Analytical Chemistry Division by R. Alvarez, R. K. Bell, R. W. Burke, A. R. Landgrebe, E. E. Maczkowske, E. J. Maienthal, G. W. Smith, and R. K. Wolford. (See NBS Miscellaneous Publ. 260-7 99PP (1965) for details.)

Cooperative analyses for certification were performed in the analytical laboratories of Anaconda American Brass Co., Waterbury, Conn., O. P. Case and K. M. O'Brien; Department of Mines and Technical Surveys, Mines Branch, Ottawa, Ontario, Canada, A. E. LaRoche, E. M. Penner, C. H. McMaster, and W. R. Inman; Mueller Brass Co., Port Huron, Mich., S. C. Richards, R. Stevens, and A. Stuever.

Technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R. E. Michaelis.

CERTIFIED HOMOGENEITY CHARACTERIZATION

The homogeneity of Cu and Zn in SRM 478 was investigated by means of the electron probe microanalyzer. Two separate channels with LiF analyzing crystals and sealed proportional detectors were employed. The instrument was operated at 30 keV with probe currents of 100 na. The probe diameter was approximately one micrometer. The count rate for Cu was on the order of 13,500 c/s, whereas the count rate for Zn was on the order of 4,000 c/s. Signal-to-background ratios for Zn were greater than 100 to 1. Results of homogeneity testing follow:

Element	Coefficient of variation for counting	Standard deviation (%) computed from experiment	Analytical range (two standard deviation limits of composition at the three micrometer level of spatial resolution)
Zn ^a	0.0036	0.79	26.7 to 27.5
Cu ^a	.0027	.72	71.8 to 73.8
Zn ^b	.0036	2.2	25.9 to 28.3
Cu ^b	.0019	1.0	71.1 to 74.6

^aCast

^bWrought