National Bureau of Standards

Certificate of Analysis

Standard Reference Material 683

Zinc Metal

This Standard Reference Material (SRM) is intended for the calibration of instruments and the evaluation of chemical methods used in the analysis of zinc materials. SRM 683 is in the form of a semicircular bar segment, 57 mm diameter (2 1/4 inch), 25.4 mm (1 inch) deep at mid-diameter and 19 mm long (3/4 inch).

Element[1]	Recommended Value (ppm by wt.)	Range of Values Reported[2] (ppm by wt.)	Method of Analysis[3]
Lead	11.1	[9.6 - 11.3]	a,b
Copper	5.9	[5.3 - 6.1]	a,b
Iron	2.2	[1.7 - 3.1]	b,c
Silver	1.3	[1.0 - 1.4]	a,d
Cadmium	1.1	[1.0 - 1.2]	a,b
Thallium	(0.2)[4]	[0.17 - 0.18]	a
Tin	(0.02)	[0.013 - 0.023]	a

[1] Additional elements were sought by neutron activation. The following elements were not detected and are reported with an estimated upper limit of detection in parts per million by weight:

As (<0.002)	Mn (<0.2)	Sc (<0.003)
Ga (<.0002)	Mo (<.02)	V (<.005)
In (<.02)	Rh (<.3)	W (<.0001)

Potassium was not detected by either flame emission spectroscopy or by neutron activation at the 0.2 ppm level.

Aluminum, antimony, and sodium were detected by several techniques. The results were variable, but in no case are these elements present in concentrations greater than 3 ppm. Gold appears to be 0.02 ppm.

[2] The range of values reported is the extreme variation of the individual results reported by the methods of analysis used. The recommended value is based on considerations of the estimated systematic bias of each of the methods employed. From 7 to 13 individual determinations were made for each element certified.

[3] a. Spark-Source Mass Spectrometry - Isotope Dilution (R. Alvarez and P. Paulsen)
b. Polarography (E.J. Maienthal)
c. Spectrophotometry (E.R. Deardorff)
d. Neutron Activation Analysis (B.A. Thompson and D.A. Becker)

[4] Values in parentheses are not certified as only one method of analysis was used. They are provided for information only.

Gaithersburg, MD 20899
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Stanley D. Rasberry, Chief
Office of Standard Reference Materials

(over)

This reference material has been established to provide a homogeneous reference material for the analysis of pure zinc and analogous metals. It should also serve a useful function for physicists and materials engineers involved in the preparation and characterization of phosphors and other solid-state compounds, where a knowledge of the purity of the starting material is important. The material was prepared by Cominco American, Inc., from a special lot of high-grade electrolytic zinc that was homogenized and cast in the form of semicircular bars. Each bar was etched, dried, and sealed in a polyethylene pouch to minimize contamination.

Extensive homogeneity testing was performed at the NBS Gaithersburg and Boulder laboratories, and the material was found to be satisfactory for the elements certified. The specimens selected for testing were carefully chosen to represent the extreme variations that might be expected as a result of the preparation procedures. However, practical limitations precluded the testing of the number of specimens from each bar that would have been required to guarantee absolute limits of homogeneity. Therefore, some inhomogeneity in the untested material is possible but not probable. The testing was performed using combinations of the following methods: optical emission and spark-source mass spectrographic analysis, polarographic analysis, flame emission and atomic absorption analysis, neutron activation analysis, and electrical measurements for residual resistivity ratios.

Although the spark-source mass spectrographic measurements indicated homogeneity with respect to microsamples, it is recommended that samples as large as possible be utilized, preferably representative of the full cross-section.

The 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.

CAUTION

Before use, it is recommended that possible surface contamination be removed by placing the specimens in dilute high-purity nitric acid for about one minute, followed by rinsing in distilled water.