U. S. Department of Commerce
C. R. Smith
Secretary

National Bureau of Standards
A. V. Astin, Director

Certificate of Analysis

Standard Reference Material 683
Zinc Metal[1]

This standard of zinc metal is issued as a special research material to further both chemical and physical methods of characterization. Two other zinc metal standards are also available: SRM 682, High-Purity Zinc, and SRM 782, Intermediate-Purity Zinc. All three standards were prepared from the same starting material.

Element[2]	Recommended Value (ppm by wt.)	Range of Values Reported[3] (ppm by wt.)	Method of Analysis[4]
Lead	11.1	(9.6 – 11.3)	SSMS – ID, POL
Copper	5.9	(5.3 – 6.1)	SSMS – ID, POL
Iron	2.2	(1.7 – 3.1)	POL, SPPH
Silver	1.3	(1.0 – 1.4)	SSMS – ID, NAA
Cadmium	1.1	(1.0 – 1.2)	SSMS – ID, POL
Thallium	(0.2)[5]	(0.17 – 0.18)	SSMS – ID
Tin	(0.02)	(0.013 – 0.023)	SSMS – ID

1. The zinc is in the form of semicircular bar segments about 2 1/4 inches in diameter, 1 inch deep at mid-diameter, and 3/4 inch long.

2. In the course of analysis by neutron activation, additional elements were sought. The following elements were not detected and are reported with an estimated upper limit of concentration in parts per million by weight:

As <(0.002)	Mn <(0.2)	Sc <(0.003)
Ga <(0.002)	Mo <(0.02)	V <(0.005)
In <(0.02)	Rh <(0.3)	W <(0.0001)

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 to a greater concentration than 3 ppm. Gold appears to be < 0.02 ppm.

3. 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.

4. SSMS–ID – Spark-Source Mass Spectrometry – Isotopic Dilution (R. Alvarez and P. Paulsen)
   POL – Polarography (E. J. Maienthal)
   SPPH – Spectrophotometry (E. R. Deardorff)
   NAA – Neutron Activation Analysis (B. A. Thompson and D. A. Becker)

5. Values in parentheses are not certified since only one method of analysis was used, but are provided for additional information on the composition.

Washington, D. C. 20234
July 9, 1968

W. Wayne Meinke, Chief
Office of Standard Reference Materials

(over)

This standard 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 the physicist and materials engineer 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 which 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 by NBS Washington and Boulder and the material was found to be satisfactory for the elements certified. The samples 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 samples 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 sample in dilute high-purity nitric acid for about one minute, followed by rinsing in distilled water.