U. S. Department of Commerce
Malcolm Baldrige
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 994

Isotopic Standard for Gallium

This Standard Reference Material (SRM) is intended for use as an isotopic standard. SRM 994 consists of 0.25 g of a commercial, high-purity gallium metal. The certified isotopic compositions are given below together with the atomic weight of gallium. The atomic weight of this gallium SRM was calculated from the isotopic composition and nuclidic masses, 68.025580 and 70.9247005 reported by Wapstra and Audi [1].

Absolute Isotopic Abundance Ratio, $^{69}Ga/^{71}Ga$:	1.50676 ± 0.00039
Isotopic Composition:	
^{69}Ga, Atomic Percent	60.1079 ± 0.0062
^{71}Ga, Atomic Percent	39.8921 ± 0.0062
Atomic Weight:	(69.72307 ± 0.00013)

The indicated uncertainties are overall limits of error based on the sum of 95 percent confidence limits for the means and upper bounds for the effects of known sources of possible systematic error. Details of the statistical analysis and deviation of the uncertainty limits are given by Eberhardt, K.R., "Statistical Evaluation of Uncertainties for the Absolute Isotopic Abundance and Atomic Weight of a Reference Sample of Gallium" [2].

The absolute abundance ratio of $^{69}Ga/^{71}Ga$ was determined by thermal ionization mass spectrometry. Mixtures of known $^{69}Ga/^{71}Ga$ prepared from nearly pure separated gallium isotopes were used to calibrate the mass spectrometers. Details of the preparation and measurements of this SRM are described by Machlan, L.A., Gramlich, J.W., Powell, L.J., and Lambert, G.M., "Absolute Isotopic Abundance and Atomic Weight of a Reference Sample of Gallium" [3].

The analytical measurements leading to the certification of this material were performed in the NBS Inorganic Analytical Research Division. Mass spectrometric measurements were made by J.W. Gramlich and L.J. Powell on calibration mixes prepared by L.A. Machlan. The purity of the separated isotopes was determined by G.M. Lambert using spark source mass spectrometry.

Statistical analysis of the data was performed by K.R. Eberhardt, NBS Statistical Engineering Division.

The overall direction and coordination of the technical measurements leading to the certification were under the chairmanship of J.R. DeVoe of the NBS Inorganic Analytical Research Division.

Issuance of this Standard Reference Material was coordinated through the Office of Standard Reference Materials by R.W. Seward.

Gaithersburg, MD 20899
February 3, 1986

Stanley D. Rasberry, Chief
Office of Standard Reference Materials

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The gallium metal used for Standard Reference Material 994 was obtained from Material Research Corporation, Orangeburg, N.Y.

References

[1] Wapstra, A.H. and Audi, G., Nuclear Physics A432(1), 1-55 (1985).

[2] Eberhardt, K.R., J. Res. Nat. Bur. Stand. (U.S.), (In Press).

[3] Machlan, L.A., Gramlich, J.W., Powell, L.J. and Lambert, G.M., J. Res. Nat. Bur. Stand. (U.S.), (In Press).