National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 986

Isotopic Standard for Nickel

This Standard Reference Material (SRM) is intended primarily for use as an isotopic standard. SRM 986 consists of 0.50 g of a commercial, high-purity nickel metal, 99.999+ % pure. The certified isotopic compositions are given below together with the atomic weight of nickel. The atomic weight is calculated from the isotopic composition given on this certificate.

Absolute Isotopic Abundance Ratios: $^{58}Ni/^{60}Ni$ 2.596061 ± 0.000728

$^{61}Ni/^{60}Ni$ 0.043469 ± 0.000015

$^{62}Ni/^{60}Ni$ 0.138600 ± 0.000045

$^{64}Ni/^{60}Ni$ 0.035295 ± 0.000024

Isotopic Composition:

^{58}Ni, Atom Percent	68.076886 ± 0.005919
^{60}Ni, Atom Percent	26.223146 ± 0.005144
^{61}Ni, Atom Percent	1.139894 ± 0.000433
^{62}Ni, Atom Percent	3.634528 ± 0.001142
^{64}Ni, Atom Percent	0.925546 ± 0.000599
Nickel Atomic Weight	58.6934 ± 0.0002

The indicated uncertainties are overall limits of error based on two standard deviations of the mean and allowances for the effects of known sources of possible systematic error.

The absolute abundance ratios of $^{58}Ni/^{60}Ni$, $^{61}Ni/^{60}Ni$, $^{62}Ni/^{60}Ni$ and $^{64}Ni/^{60}Ni$ were determined by thermal ionization mass spectrometry. Mixtures of synthetic isotopic standards were used to calibrate the mass spectrometers. These synthetic standards were gravimetrically prepared from chemically pure and nearly isotopically pure isotopes. The bias correction (calculated isotopic ratio/observed isotopic ratio), that these standards provide, allows absolute ratios to be calculated for the sample. Details of the preparation and measurements for this SRM are described by Gramlich, J.W., Machlan, L.A., Barnes, I.L., and Paulsen, P.J., "Absolute Isotopic Abundance Ratios and Atomic Weight of a Reference Sample of Nickel"[1].

The analytical measurements leading to the certification of this material were performed in the NIST Inorganic Analytical Research Division. Mass spectrometric measurements on the calibration mixes were made by J.W. Gramlich and I.L. Barnes. The calibration mixes were prepared by L.A. Machlan. The nickel metal used for SRM 986 was obtained from Atomergic Chemicals Corporation (Lot F-3625). Trace element impurities were determined by ICP-MS using isotope dilution and external standards.

Gaithersburg, MD 20899
May 1, 1990

William P. Reed, Acting Chief
Standard Reference Materials Program

Statistical analysis of the data was performed by K.R. Eberhardt and S.B. Schiller, NIST Statistical Engineering Division.

The overall direction and coordination of the technical measurements leading to certification were under the chairmanship of I.L. Barnes.

Issuance of this Standard Reference Material was coordinated through the Standard Reference Materials Program by J.C. Colbert.

REFERENCES

[1] Gramlich, J.W., Machlan, L.A., Barnes, I.L. and Paulsen P. J., J. Res. Natl. Inst. Stand. Technol. **94**, 347 (1989)