National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 987

Strontium Carbonate
(Isotopic Standard)

This Standard Reference Material (SRM) is certified for use as an isotopic reference material for the calibration of mass spectrometers. The material consists of highly purified strontium carbonate of high homogeneity. A unit of SRM 987 consists of 1 g of powder.

Certified Values: The certified values for the absolute strontium isotopic abundance ratios and the atom fractions of ^{88}Sr, ^{87}Sr, ^{86}Sr and ^{84}Sr are listed in Table 1. A NIST-certified value is a value for which NIST has the highest confidence in its accuracy, in that all known or suspected sources of bias have been investigated or accounted for by NIST. A certified value is the present best estimate of the true value based on the results of analyses performed at NIST and cooperating laboratories. Value assignment categories are based on the definition of terms and modes used at NIST for chemical reference materials [1]. The uncertainties listed with the values are expanded uncertainties (95 % confidence interval) and are calculated according to the methods in the ISO and NIST Guides [2].

Table 1. Certified Values for SRM 987 Strontium Carbonate

Absolute Abundance Ratios	$^{88}Sr/^{86}Sr = 8.378\ 61 \pm 0.003\ 25$
	$^{87}Sr/^{86}Sr = 0.710\ 34 \pm 0.000\ 26$
	$^{84}Sr/^{86}Sr = 0.056\ 55 \pm 0.000\ 14$
that yield atom percents of:	$^{88}Sr = 82.584\ 5 \pm 0.006\ 6$
	$^{87}Sr = 7.001\ 5 \pm 0.002\ 6$
	$^{86}Sr = 9.856\ 6 \pm 0.003\ 4$
	$^{84}Sr = 0.557\ 4 \pm 0.001\ 5$

This material was used as the reference sample in a determination of the absolute abundance ratios and atomic weight of strontium [3]. The atomic weight of strontium calculated from the absolute abundance ratios is 87.616 81 ± 0.000 12.

Expiration of Certification: The certification of this SRM is deemed to be indefinite within the stated uncertainties. However, certification is nullified if the SRM is contaminated or otherwise altered.

Maintenance of Certified Values: NIST will monitor this SRM and, if substantive changes occur in the certified values, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Stephen A. Wise, Chief
Analytical Chemistry Division

Gaithersburg, MD 20899
Certificate Issue Date: 19 June 2007
See Certificate Revision History on Last Page

Robert L. Watters, Jr., Chief
Measurement Services Division

The overall direction and coordination of the technical measurements leading to the certification of this SRM were performed under the chairmanship of I.L. Barnes and W.R. Shields of the NIST Analytical Chemistry Division.

The characterization of this SRM was performed by G. Marinenko, E.E. Etz, D.G. Friend, I.L. Barnes, L.J. Moore, T.C. Rains, T.A. Rush, L.A. Machlan, T.J. Murphy, and P.J. Paulsen, all of the NIST Analytical Chemistry Division.

The support aspects involved in the preparation of this SRM were coordinated through the NIST Measurement Services Division. The current revised certificate was coordinated by Robert D. Vocke, Jr. of the Analytical Chemistry Division.

Storage and Handling: There are no special storage or handling instructions. While strontium carbonate is slightly hygroscopic (absorbing approximately 0.02 % moisture at 90 % humidity), this has no effect on the isotopic abundances.

The strontium carbonate used for this SRM was obtained from Spex Industries, Inc[1]. of Metuchen, NJ. The material, when received, was of high purity in relation to cationic impurities but assayed only 99.0 % due to moisture and other volatile impurities. The impurities reported in the strontium carbonate material are lithium, 4 mg/kg; sodium, 6 mg/kg; potassium, < 1 mg/kg; magnesium, < 2 mg/kg; calcium, 5 mg/kg; barium, < 15 mg/kg; copper, < 3 mg/kg; iron, < 3 mg/kg; aluminum, < 1 mg/kg; and silicon, < 1 mg/kg.

REFERENCES

[1] May, W.E.; Parris, R.M.; Beck II, C.M.; Fassett, J.D.; Greenberg, R.R.; Guenther, F.R.; Kramer; G.W.; Wise; S.A.; Gills, T.E.; Colbert, J.C.; Gettings, R.J.; MacDonald, B.S.; *Definitions of Terms and Modes Used at NIST for Value-Assignment of Reference Materials for Chemical Measurements*; NIST Spec. Pub. 260-136, U.S. Government Printing Office: Washington, DC (2000).

[2] ISO; *Guide to the Expression of Uncertainty in Measurement*; ISBN 92-67-10188-9, 1st ed., International Organization for Standardization: Geneva, Switzerland (1993); see also Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994); available at http://physics.nist.gov/Pubs/.

[3] Moore, L.J.; Murphy, T.J.; Barnes, I.L.; Paulsen, P.J.; *Absolute Isotopic Abundance Ratios and Atomic Weight of a Reference Sample of Strontium*, J. of Res. (NBS) Vol. 87, No. 1, pp. 1–8 (1982).

Certificate Revision History: 19 June 2007 (Editorial change); 14 June 2007 (Editorial changes and revised as isotopic standard only); 01 May 2000 (Editorial changes); 01 October 1982 (Revision of certified values); 06 March 1972 (Editorial changes); 08 November 1971 (Original certificate date).

Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-6776; fax (301) 926-4751; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

[1]Certain commercial equipment, instrumentation, or materials are identified in this certificate to specify adequately the experimental procedure. Such identification does not imply recommendation or endorsement by the NIST, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.