



National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 3150

Spectrometric Standard Solution

Silicon

Batch Code 592009

This Standard Reference Material (SRM) is intended for use in atomic absorption spectrometry, optical emission (plasma) spectrometry, spectrophotometry, or any other analytical technique that requires aqueous standard solutions for calibrating instruments. SRM 3150 is a single element solution prepared gravimetrically to contain 10 mg/mL of silicon in water. The certified value (Y) is based on a gravimetric assay of the prepared solution. The value has been adjusted upward by 0.1 % relative, based on estimated transpiration losses of solvent through the container walls of 0.2 % relative per year. The density of the solution at 22 °C is 1.044 g/mL.

Metal	Concentration (mg/mL)	Source Purity, %	Solvent
Si	10.17 ± 0.03	Na ₂ SiO ₃ ·9H ₂ O (99.99)*	Water

*This high-purity material was analyzed by optical emission spectrometry and atomic absorption spectrometry and found to contain less than 100 mg/kg total impurities.

The uncertainty in the certified value is calculated as

$$U = (2u_c + 0.001Y) \text{ mg/mL}$$

where u_c is the "combined uncertainty" calculated according to the ISO Guide [1]. The value u_c is intended to represent, at the level of one standard deviation, the combined effect of uncertainty components associated with volumetric, gravimetric, and instrumental factors relevant to the gravimetric assay of the prepared solution. The additional quantity, $0.001Y$, is an allowance for transpiration of the solution through the container walls, which is estimated to be ± 0.1 % of the certified value during the one-year period of validity of the certification.

The combined uncertainty consists of a Type A component associated with replicate weighings of the silica precipitate and Type B components due to uncertainty in the balance reading, material handling, and dilution.

SRM 3150 was prepared by T.A. Butler of the NIST Analytical Chemistry Division; gravimetric and emission spectrometric analyses were made by T.A. Butler, J.A. Norris, and T.W. Vetter of the NIST Analytical Chemistry Division.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by B.S. MacDonald.

Gaithersburg, MD 20899
October 19, 1995

Thomas E. Gills, Chief
Standard Reference Materials Program

Procedures for Use

Stability: This certification is valid for one year from the shipping date, provided the SRM solution is kept tightly capped and stored under normal laboratory conditions. NIST will monitor the stability of representative solutions from the SRM lot, and if any changes occur that invalidate this certification, NIST will notify purchasers.

Preparation of Working Standard Solutions: All solutions should be brought to $22\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ before use and all glass or plastic surfaces coming into contact with the standard must have been previously cleaned. A working standard solution can be prepared from the SRM solution by serial dilution. Dilutions should be made with certified volumetric class A flasks and 5 mL or 10 mL class A pipets. All volumetric transfers of solutions should be performed using a proven analytical technique.

NOTICE AND WARNING TO USERS

For some instrumental techniques, small differences in acid type and concentration between the SRM and sample may lead to erroneous results. Therefore, the same solvent as is listed on this SRM certificate should be used in making appropriate dilutions and working standards.

REFERENCE

- [1] "*Guide to the Expression of Uncertainty in Measurement*", ISBN 92-67-10188-9, 1st Ed. ISO, Geneva, Switzerland, (1993).