



National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 3122

Spectrometric Standard Solution

Hafnium

Batch Code 490402

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 3122 is a single element solution prepared gravimetrically to contain 10 mg/mL of hafnium in a nitric-hydrofluoric acid mixture. The certified value is based on a gravimetric procedure, i.e., weight per volume composition of the high-purity metal dissolved in high-purity reagents. The uncertainty listed is based on gravimetric and volumetric uncertainties of the preparation and the effect of solvent transpiration through the container walls for one year. The density of the solution at 22 °C is 1.065 g/mL.

| Metal | Concentration (mg/mL) | Source Purity, % | Acid Conc. (V/V) Approximate |
|-------|--------------------------|---------------------|----------------------------------|
| Hf | 10.00 ± 0.03 | Hf metal (99.95%)* | HNO ₃ , 10% HF, 2% |

*This high-purity material was analyzed by spark source mass spectrometry and was found to contain less than 200 mg/kg total impurities. The only elements detected were N and Zr at 5 and 129 mg/kg, respectively.

Procedures for Use

Stability: This certification is valid for one year from the shipping date, provided the solutions are kept tightly capped and stored under normal laboratory conditions. NIST will monitor the stability of representative solutions from this 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 ± 1 °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 or 10 mL class A pipets. All volumetric transfers of solutions should be performed using a proven analytical technique. Each dilution should be acidified with an appropriate high-purity acid and diluted to calibrated volume using high-purity water. The stability of the working standard solution will depend on the final acid concentration; therefore, care should be exercised to ensure that the final acid concentration of the dilution closely approximates that of the SRM. To achieve the highest accuracy, the analyst should prepare daily working solutions from 100 µg/mL dilutions of the original SRM solution.

Gaithersburg, MD 20899
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Thomas E. Gills, Acting Chief
Standard Reference Materials Program

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SRM 3122 was prepared by T.A. Butler of the NIST Inorganic Analytical Research Division; atomic absorption and spark source mass spectrometric analyses were performed by T.A. Butler and J.A. Norris.

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