

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO Guide 34, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (SAI Global File Number 010105).

2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Atomic Absorption Solution
Catalog Number: AAZR1
Lot Number: H2-ZR01082R
Matrix: tr. HNO₃ / tr. HF
Value/Analyte(s): 1 000 µg/mL Zirconium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 1000 ± 10 µg/mL
Certified Density: 1.001 g/mL (measured at 20 ± 1 °C)

4.0 TRACEABILITY TO NIST

The concentration of this solution standard has been verified by Inductively Coupled Plasma Spectroscopy (ICP) and is traceable to NIST SRM 3169

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL**7.1 Storage and Handling Recommendations**

- Keep cap tightly sealed when not in use. Store and use at 20 ± 4° C. Do not pipette from the container. Do not return removed aliquots to container.

Chemical Compatibility -Soluble in concentrated HCl, HF, H₂SO₄ (very hot) and HNO₃. Avoid H₃PO₄ and neutral to basic media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions but precipitation with phosphate, oxalate, and tartrate with a tendency to hydrolyze forming the hydrated oxide in all dilute acids except HF.

Stability - 2-100 ppb levels stable (alone or mixed with all other metals that are at comparable levels) as the Zr(F)6-2 + Zr(OH)4F2-2 for months in 1% HNO₃ / LDPE container. 1-10,000 ppm single element solutions as the Zr(F)6-2 chemically stable for years in 2-5% HNO₃ / trace HF in a LDPE container.

Zr Containing Samples (Preparation and Solution) -Metal (Soluble in H₂O / HF / HNO₃); Oxide unlike TiO₂ the ZrO₂ is best fused in one of the following ways (Na₂O₂ in NiO, Na₂CO₃ in PtO or Borax in PtO); Organic Matrices (dry ash at 450 0C in PtO and dissolve by fusing with Na₂CO₃ and dissolving in HF / HNO₃ / H₂O).

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 90 amu	2 ppt	N/A	74Ge16O, 74Se16O, [180X+2 (where X = Hf, Ta, W)]
ICP-OES 272.261 nm	0.018/0.001 µg/mL	1	Cr, V, Th, W
ICP-OES 339.198 nm	0.008/0.0007 µg/mL	1	Th, Mo
ICP-OES 343.823 nm	0.007/0.0004 µg/mL	1	Hf, Nb

HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

10.2 10CFR21 - Nuclear Regulatory Commission

- Reporting defects and Non-Compliance

10.3 ISO 9001 Quality Management System Registration

- SAI Global File Number 010105

11.0 CERTIFICATION, EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

November 13, 2014

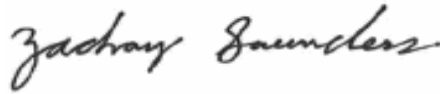
11.2 Expiration Date

11.3 Period of Validity

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is handled and stored in accordance with instructions given in Sec 7.0 and used prior to the date given in Sec 11.2. This certification is nullified if the CRM/RM is damaged, contaminated, or otherwise modified.

Certificate Prepared By:

Zach Saunders
Product Documentation Technician

A handwritten signature in black ink that reads "Zachary Saunders". The signature is written in a cursive style with a large 'Z' and a long, sweeping 'S'.**Certificate Approved By:**

Brian Alexander
PhD., Technical Process Director

A handwritten signature in black ink that reads "Brian Alexander". The signature is written in a cursive style with a large 'B' and a long, sweeping 'A'.**Certifying Officer:**

Paul Gaines
PhD., Senior Technical Director

A handwritten signature in black ink that reads "Paul R. Gaines". The signature is written in a cursive style with a large 'P' and a long, sweeping 'G'.