

**1.0 INORGANIC VENTURES** is an ISO Guide 34 "General Requirements for the Competence of Reference Material Producers" and ISO 9001:2000 registered manufacturer. Our manufacturing laboratory is accredited to ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories."



**2.0 DESCRIPTION OF CRM**      Stock Solution  
 Catalog No.:                      IV-ICPMS-71B  
 Lot Number:                        **C2-MEB296062**  
 Matrix:                                tr. HF,                                3% HNO<sub>3</sub>(v/v)

10.00 µg/mL ea:

Ge,    Hf,    Mo,    Nb,    Sb,    Si,    Sn,    Ta,    Te,    Ti,    W,    Zr

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ELEMENT	CERTIFIED VALUE	ELEMENT	CERTIFIED VALUE	ELEMENT	CERTIFIED VALUE
Antimony, Sb	9.98 ± 0.03 µg/mL	Germanium, Ge	9.99 ± 0.03 µg/mL	Hafnium, Hf	9.97 ± 0.03 µg/mL
Molybdenum, Mo	10.01 ± 0.04 µg/mL	Niobium, Nb	10.03 ± 0.09 µg/mL	Silicon, Si	10.00 ± 0.04 µg/mL
Tantalum, Ta	10.02 ± 0.02 µg/mL	Tellurium, Te	9.99 ± 0.03 µg/mL	Tin, Sn	9.99 ± 0.03 µg/mL
Titanium, Ti	9.98 ± 0.03 µg/mL	Tungsten, W	10.00 ± 0.07 µg/mL	Zirconium, Zr	10.03 ± 0.05 µg/mL

**Certified Density:**      1.012      g/mL (measured at 22° C)

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

$$\text{Certified Value } (\bar{x}) = \frac{\sum x_i}{n}$$

$$\text{Uncertainty } (\pm) = \frac{2[(\sum s_i)^2]^{1/2}}{(n)^{1/2}}$$

( $\bar{x}$ ) = mean

$x_i$  = individual results

n = number of measurements

$\sum s_i$  = The summation of all significant estimated errors (Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

### 4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

· "Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." (ISO VIM, 2nd ed., 1993, definition 6.10)

· This product is Traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRMs are available, the term 'in-house std.' is specified.

#### 4.1 ASSAY INFORMATION

ELEMENT	METHOD	NIST SRM#	SRM LOT#	ELEMENT	METHOD	NIST SRM#	SRM LOT#
Ge	ICP Assay	3120a	000411	Ge	Calculated		See Sec. 4.2
Hf	ICP Assay	3122	000406	Hf	Gravimetric		See Sec. 4.2
Mo	ICP Assay	3134	891307	Mo	Calculated		See Sec. 4.2
Nb	Gravimetric		See Sec. 4.2	Nb	ICP Assay	3137	991810
Sb	Gravimetric		See Sec. 4.2	Sb	ICP Assay	3102a	990707
Si	ICP Assay	3150	991108	Si	Calculated		See Sec. 4.2
Sn	Calculated		See Sec. 4.2	Sn	ICP Assay	3161a	993107
Ta	ICP Assay	3155	993108	Ta	Calculated		See Sec. 4.2
Te	ICP Assay	3156	892901	Te	Gravimetric		See Sec. 4.2
Ti	ICP Assay	3162a	060808	Ti	Calculated		See Sec. 4.2
W	Calculated		See Sec. 4.2	W	ICP Assay	3163	990209
Zr	ICP Assay	3169	990109	Zr	Calculated		See Sec. 4.2

**4.2 BALANCE CALIBRATION** - All analytical balances are calibrated yearly by an A2LA accredited calibration laboratory and are traceable to a class E 2 analytical weight set with NIST Traceability No. 822/269558-04. All balances are checked daily using an in-house procedure. The weights used for testing are annually compared to master weights and are traceable to the National Institute of Standards and Technology (NIST).

**4.3 THERMOMETER CALIBRATION** - All thermometers are NIST traceable through thermometers that are calibrated by an A2LA accredited calibration laboratory.

**4.4 GLASSWARE CALIBRATION** - An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM's.

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

#### 6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:

HPLC, IC, TLC, ISE, IR, NMR, UV/VIS, MS, Capillary Electrophoresis, Potentiometry, Wet Chemistry and Voltammetry

For the validation of analytical methods

For the preparation of "working reference samples"

For interference studies and the determination of correction coefficients

For detection limit and linearity studies

For additional intended uses, contact Technical Staff

This CRM was manufactured using 18 megohm doubly deionized water that has been filtered through a 0.2 micron filter.

#### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

**Storage & Handling** - Keep **Tightly** sealed when not in use. Store and use at 20 ± 4°C. **Do Not** pipette from the container. **Do Not** return portions removed from pipetting to container.

Element Specific Information - For specific information regarding any element: Contact technical staff.

**Uranium Note:** If uranium is present in this standard, it is natural abundance unless specified in Section 3.0.

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

#### 8.0 HAZARDOUS INFORMATION - Please refer to the enclosed Material Safety Data sheet for information regarding this CRM.

#### 9.0 HOMOGENEITY - This solution was mixed according to in-house procedure IV-MPM-004 and is guaranteed to be homogeneous.

**10.0 QUALITY STANDARD DOCUMENTATION**

- 10.1 ISO 9001:2000 Quality Management System Registration**  
- QMI Certificate Number 010105
  
- 10.2 ISO/IEC 17025:2005 "General Requirements for the Competence of Testing and Calibration"**  
- Chemical Testing - Accredited A2LA Certificate Number 883.01
  
- 10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"**  
- Reference Materials Production - Accredited A2LA Certificate Number 883.02
  
- 10.4 10CFR50 Appendix B - Nuclear Regulatory Commission**  
- Domestic Licensing of Production and Utilization Facilities
  
- 10.5 10CFR21 - Nuclear Regulatory Commission**  
- Reporting Defects and Non-Compliance

**11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY**

**11.1 Shelf Life** - The period of time during which the concentration of the analyte(s) in a properly packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf life is limited primarily by transpiration (loss of water from the solution) and infrequently, by chemical instability. Transpiration studies of chemically-stable solutions performed at the manufacturer's facility show a CRM shelf-life of twenty one months for solutions packaged in 125-mL low density polyethylene bottles. When stored under special conditions that minimize transpiration and instability, the shelf life can be extended past this limit.

**11.2 Expiration Date** - The date after which a CRM should not be used. Routine laboratory use of a CRM increases transpiration losses and the chance of contamination which affect the integrity of the CRM and limit its useful life. Manufacturer concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

**11.3 Chemical Stability** - Studies have been conducted on this or similar CRMs and it has been demonstrated that this CRM is chemically stable for a period of not less than two years provided the "Storage & Handling" conditions are followed that are described in section 7.0.

**Certification Date:** July 14, 2009

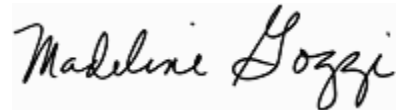
**Expiration Date:**

**12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS**

**Certificate Prepared By:** Danny Feeny, Product Documentation Technician



**Certificate Approved By:** Madeline Gozzi, Quality Control Supervisor



**Certifying Officer:** Paul Gaines, PhD., Senior Technical Director

