

## 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: Multi Analyte Custom Grade Solution

Catalog Number: IV-STOCK-53

Lot Number: J2-MEB597102

Matrix: 10% (v/v) HNO<sub>3</sub>  
tr. HF

Value / Analyte(s): 10 µg/mL ea:  
Bi, Ge, In,  
Li6, Sc, Tb,  
Y

## 3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
6-Lithium, Li6	10.03 ± 0.05 µg/mL	Bismuth, Bi	10.03 ± 0.05 µg/mL
Germanium, Ge	10.04 ± 0.05 µg/mL	Indium, In	10.03 ± 0.05 µg/mL
Scandium, Sc	10.04 ± 0.07 µg/mL	Terbium, Tb	10.03 ± 0.05 µg/mL
Yttrium, Y	10.03 ± 0.05 µg/mL		

**Certified Density:** 1.051 g/mL (measured at 20 ± 1 °C)

### Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Bi	Calculated		See Sec. 4.2
Bi	ICP Assay	3106	991212
Ge	Calculated		See Sec. 4.2
Ge	ICP Assay	3120a	080429
In	ICP Assay	3124a	110516
In	EDTA	928	928
Li6	Gravimetric		See Sec. 4.2
Sc	ICP Assay	3148a	100701
Sc	EDTA	928	928
Tb	ICP Assay	3157a	100518
Tb	EDTA	928	928
Y	ICP Assay	3167a	120314
Y	EDTA	928	928

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.

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

( $\bar{x}$ ) = mean

$x_i$  = individual results

$n$  = number of measurements

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

2 = the coverage factor.

$\left[ \sum (s_i)^2 \right]^{1/2}$  = The square root of the sum of the squares of the most common errors (where 's' stands for the standard deviation) from instrumental measurement, density, NIST SRM uncertainty, weighing, dilution to volume, homogeneity, long term stability and short term stability.

#### Certified Abundance:

##### IV's Certified Abundance

<u>Isotope</u>	<u>Atom %</u>
Lithium Li6	95.6 ± 0.3
Lithium Li7	4.4 ± 0.1

#### 4.0 TRACEABILITY TO NIST

- 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/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

##### 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.

**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

**10.4 ISO/IEC Guide 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"**

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

**10.5 ISO/IEC Guide 34 "General Requirements for the Competence of Reference Material Producers"**

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

**11.0 CERTIFICATION, EXPIRATION AND PERIOD OF VALIDITY**

**11.1 Certification Issue Date**

September 14, 2015

**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.

**12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS**


**Certificate Prepared By:**

Brenda Francis  
Product Documentation Technician



**Certificate Approved By:**

Brian Alexander  
PhD., Technical Process Director



**Certifying Officer:**

Paul Gaines  
PhD., Senior Technical Director

