Certificate of Analysis

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1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "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 (Amtivo Certificate Number 274357).

2.0 PRODUCT DESCRIPTION

Product Code:	Single Analyte Atomic Absorption Solution
Catalog Number:	AAGE1
Lot Number:	X2-GE762192AA
Matrix:	tr. HNO3 tr. HF
Value / Analyte(s):	1 000 µg/mL ea: Germanium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value:	1000 ± 10 µg/mL
Density:	1.004 g/mL (measured at 20 ± 5 ºC)

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 Traceable to 3120a.

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

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale, https://www.inorganicventures.com/terms-and-conditions-sale. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 25° C to minimize the effects of transpiration. Use at 20° ± 5° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit **www.inorganicventures.com/TCT**

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 72.59 +4 6 Ge(OH)x(F)y2-

Chemical Compatibility -Stable in HCl, HF, H3PO4 H2SO4 and HNO3 as the Ge(OH)x(F)y2-. Avoid 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 with a tendency to hydrolyze .

Stability - 2-100 ppb levels - stability unknown alone or mixed with all other metals as the Ge(OH)x(F)y2-. 1-10,000 ppm single element solutions as the Ge(OH)x(F)y2- chemically stable for years in 2-5% HNO3 / trace HF in a LDPE container.

Ge Containing Samples (Preparation and Solution) - Metal (Soluble in 1:1:1 H2O / HF / HNO3); Oxide - GeO (Readily soluble in HCl or NaOH), GeO2 (fuse in Pt0with Na2CO3 followed by HCl solution of the fuseate); Geological Samples (fuse in Pt0with Na2CO3 followed by HCl solution of the fuseate); Organic Matrices (Dry ash at 450EC in Pt0 and dissolve by gently warming with 1:1:1 H2O / HF / H2SO4 or fuse ash with Na2CO3 and dissolve fuseate with HCl / 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 72 amu	20	n/a	36Ar2,37Cl17O18O, 37Cl35Cl,36S18O2, 36S2,36Ar36S,56Fe 16O,40Ar16O2,40C a16O2,40Ar32S,144 Nd2+,44Sm2+
ICP-OES 164.919 nm	0.01 / 0.001 µg/mL	1	Co, Fe, Cu
ICP-OES 219.871 nm	0.06 / 0.009 micro;g/mL	1	W, Ir, Re, Co
ICP-OES 265.117 nm	0.05 / 0.009 micro;g/mL	1	Ta, Pt, Mn, Rh, Ce, Nb, Hf

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 ISO 9001 Quality Management System Registration

- Amtivo Certificate Number 274357

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

May 19, 2026

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **May 19, 2031**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Justin Dirico
Stock Processing Supervisor

Certificate Approved By:

Shalin Presgraves
SVS Coordinator

Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director