ThermoFisher SCIENTIFIC

Certificate of Analysis

Product No.: 042242
Germanium Plasma Standard

Certified Concentration of Ge: 1000 ± 5 µg/mL (1000 ± 5 µg/g) **Lot No.:** 1545121

Matrix: H_2O/tr. F^- **Date of Expiration:**

Earlier of 30 June 2026 or 12 Months from Date opened

Intended Use: This solution is intended for use as a Certified Reference Material (CRM) or calibration standard for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), flame or furnace atomic absorption spectroscopy (AA or GFAA), x-ray fluorescence spectroscopy (XRF), and other techniques for elemental analysis.

Certification & Traceability: Thermo Fisher Scientific is ISO 9001:2015 certified. This CRM was manufactured and certified by a Thermo Fisher Scientific supplier under an **ISO 9001** and **ISO/IEC 17025** quality management system. This CRM was prepared to a nominal concentration of 1000 µg/mL by gravimetric methods using high purity ammonium hexafluorogerminate [$(NH_4)_2GeF_6$] dissolved and diluted with filtered (0.22µm), 18 M-ohm deionized water with trace fluoride (F^-). The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentration is based upon the gravimetric preparation of the solution. Secondary verification of the certified concentration was done using ICP-OES and is traceable to **NIST SRM 3120a**. The uncertainty associated with the certified concentration is the sum of the estimated errors due to purity of the raw material, gravimetric measurements and transpiration through the container wall.

Trace Impurities (µg/mL)

Ag	<0.001	Co	<0.001	Ge	Major	Mg	<0.001	Pd	<0.001	Si	<0.2	V	<0.001
Al	0.008	Cr	<0.001	Hf	<0.001	Mn	0.001	Pr	<0.001	Sm	<0.001	W	<0.001
As	<0.02	Cs	<0.001	Hg	<0.001	Mo	<0.001	Pt	<0.001	Sn	<0.001	Y	0.02
Au	<0.001	Cu	<0.001	Ho	<0.001	Na	0.02	Rb	<0.001	Sr	0.003	Yb	<0.001
B	<0.002	Dy	<0.001	In	<0.001	Nb	0.006	Re	<0.001	Ta	<0.001	Zn	<0.006
Ba	<0.001	Er	<0.001	Ir	<0.001	Nd	<0.001	Rh	<0.001	Tb	<0.001		
Bi	<0.001	Eu	<0.001	K	<0.08	Ni	<0.001	Ru	<0.001	Te	<0.001		
Ca	0.02	Fe	<0.002	La	<0.001	Os	NA	Sb	0.002	Ti	<0.001		
Cd	<0.001	Ga	<0.001	Li	<0.001	P	<0.2	Sc	<0.001	Tl	<0.001		
Ce	<0.001	Gd	<0.001	Lu	<0.001	Pb	<0.001	Se	<0.003	Tm	<0.001		

N.A. - Not Analyzed

Instructions for Use: We recommend that the solution be thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. To achieve the highest accuracy the analyst should: (1) use only pre-cleaned containers and transferware, (2) not pipette directly from the CRM's original container, (3) use a minimum sub-sample size of 500µL, (4) make dilutions using calibrated balances or certified volumetric class A flasks and pipettes, (5) dilute with the same matrix as the original CRM, and (6) never pour used product back into the original container. The solution should be kept tightly capped and stored under normal laboratory conditions. Do not freeze, heat, or expose to direct sunlight. Minimize exposure to moisture or high humidity.

Period of Validity: Thermo Fisher Scientific guarantees the accuracy of this Specpure® solution until the expiry date shown above, provided the instructions for use are followed. During the period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution.

23 December 2024
Certification Date

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Date Opened