

Product No.: 042885

Multi-Element Plasma Standard Solution 4

 Matrix: Diluted HNO₃

Lot No.: 1522058

Density: 1.08 g/mL @ 20°C

Date of Expiration:

Earlier of 28 October 2026 or 12 Months from Date opened

Intended Use: This solution is intended for use as a Certified Reference Material (CRM) for inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), or alternative techniques, such as flame or furnace atomic absorption spectroscopy (AA or GFAA).

Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty
Ag	1001 ± 5 µg/g	Cr	1000 ± 5 µg/g	Mn	1000 ± 5 µg/g
Al	1000 ± 5 µg/g	Cu	999.7 ± 5.0 µg/g	Na	1000 ± 5 µg/g
B	1000 ± 5 µg/g	Fe	1000 ± 5 µg/g	Ni	1000 ± 5 µg/g
Ba	1000 ± 5 µg/g	Ga	1000 ± 5 µg/g	Pb	1000 ± 5 µg/g
Bi	1000 ± 5 µg/g	In	1000 ± 5 µg/g	Sr	1000 ± 5 µg/g
Ca	1000 ± 5 µg/g	K	999.8 ± 5.0 µg/g	Tl	1000 ± 5 µg/g
Cd	999.7 ± 5.0 µg/g	Li	1000 ± 5 µg/g	Zn	1000 ± 5 µg/g
Co	999.8 ± 5.0 µg/g	Mg	1000 ± 5 µg/g		

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**, **ISO/IEC 17025**, and **ISO 17034** quality management system. This CRM was prepared to the certified concentrations shown above by gravimetric methods using single-element concentrates that were certified using the "High Performance ICP-OES" protocol developed by NIST and are directly traceable to the NIST SRMs listed below. This solution was stabilized using high purity nitric acid (HNO₃) and diluted with filtered (0.22µm), 18 M-ohm deionized water. 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 concentrations were determined based upon gravimetric procedures. Secondary verification of the certified concentrations was performed using ICP-OES that was calibrated and/or referenced against **NIST SRMs: 3151, 3101a, 3107, 3104a, 3106, 3109a, 3108, 3113, 3112a, 3114, 3126a, 3119a, 3124a, 3141a, 3129a, 3131a, 3132, 3152a, 3136, 3128, 3153a, 3158 and 3168a**. The uncertainty associated with each certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

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.

 7 November 2024
 Certification Date

Date Opened

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO 17034 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with QSP 6-13 Assessment of Homogeneity and Stability. To ensure homogeneity, users should not take a smaller sub-sample than specified in the Instructions for Use, as doing so will invalidate the certified values and uncertainties.

Quality Certifications: This CRM was prepared under a quality management system that is:

- Registered to ISO 9001:2015 – Quality Management Systems – Requirements (TÜV SÜD America Certificate Number 951 24 6017)
- Accredited to ISO 17034 – General Requirements for the Competence of Reference Material Producers (A2LA Cert. No. 2848.02)
 - ISO 17034 references additional requirements specified in ISO Guide 31 and ISO Guide 35
- Accredited ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories (A2LA Cert. No. 2848.01)