Certificate of Analysis

Certificate of Analysis

Product No.: S55603

iCAP Q/Qnova Calibration Solution, Specpure®

re HNO_3

Lot No.: 1430699

Expiry Date: 31 March 2026

Intended Use: This solution is intended for use as a Reference Material (RM) or quality control check standard for inductively coupled plasma mass spectrometry (ICP-MS).

Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty	Element	Certified Concentration & Uncertainty
Ag	6.00 ± 0.30 µg/L	Ga	10.00 ± 0.50 µg/L	Sr	5.00 ± 0.25 µg/L
Al	10.00 ± 0.50 µg/L	Ho	3.00 ± 0.15 µg/L	Ta	3.00 ± 0.15 µg/L
Ba	4.00 ± 0.20 µg/L	In	3.00 ± 0.15 µg/L	Tb	3.00 ± 0.15 µg/L
Be	34.90 ± 1.75 µg/L	Li	8.00 ± 0.40 µg/L	Tl	4.00 ± 0.20 µg/L
Bi	3.00 ± 0.15 µg/L	Mg	10.00 ± 0.50 µg/L	U	3.00 ± 0.15 µg/L
Ce	3.00 ± 0.15 µg/L	Mn	6.00 ± 0.30 µg/L	Y	3.00 ± 0.15 µg/L
Co	8.00 ± 0.40 µg/L	Ni	14.90 ± 0.75 µg/L	Zn	19.90 ± 1.00 µg/L
Cs	3.00 ± 0.15 µg/L	Rh	3.00 ± 0.15 µg/L		
Cu	14.90 ± 0.75 µg/L	Sc	8.00 ± 0.40 µg/L		

Starting primary compounds and their purities (%): Ag 99.999%, $Al(NO_3)_3$ 99.999%, $Ba(NO_3)_2$ 99.999%, $Be_4O(O_2CCH_3)_6$ 99.995%, Bi 99.999%, $Ce(NO_3)_3$ 99.999%, Co 99.999%, Cs_2CO_3 99.994%, Cu 99.9995%, Ga 99.9999%, Ho_2O_3 99.999%, In 99.9998%, Li_2CO_3 99.999%, $Mg(NO_3)_2$ 99.999%, Mn 99.999%, Ni 99.996%, $RhCl_3$ 99.997%, Sc_2O_3 99.99%, $Sr(NO_3)_2$ 99.9965%, $TaCl_5$ 99.99%, Tb_4O_7 99.998%, Tl 99.999%, $UO_2(NO_3)_2$ 99.99%, YO_3 99.999%, Zn 99.999%.

Certification & Traceability: Thermo Fisher Scientific is ISO 9001:2015 certified. This RM was manufactured, processed, and certified by a Thermo Fisher Scientific supplier under an ISO 9001, ISO/IEC 17025, and ISO 17034 quality management system. This RM 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 the National Institute of Standards and Technology (NIST) and are directly traceable to the NIST SRMs listed below. This solution was stabilized using ultra-pure nitric acid (HNO_3) and diluted with filtered (0.22µm), 18 M-ohm deionized water. The balances used in the preparation of this RM 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, 3104a, 3105a, 3106, 3110, 3113, 3111a, 3114, 3119a, 3123a, 3124a, 3129a, 3131a, 3132, 3136, 3144, 3148a, 3153a, 3155, 3157a, 3158, 3164, 3167a, 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. The uncertainties are based on scientific judgement and represent an estimate of the combined effects of any error, attributed to gravimetric and volumetric procedures, purity of the source material, and possible contamination throughout the production steps.

Packaging Material: 250 mL HDPE bottle decontaminated by leaching with acids.

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 RM'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 RM, 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, immerse the bottle or its contents, 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.

02/15/2024
Production Date

05/16/2024
Certification Date

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This is to certify that units of the lot number above were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Thermo Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Products are for research use or further manufacturing. Not for direct administration to humans or animals. It is the responsibility of the purchaser, formulator or those performing further manufacturing to determine suitability based upon the intended use of the end product. Products are tested to meet the analytical requirements of the noted grade. The above information is the actual analytical results obtained.

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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 RM was prepared under a quality management system that is:

- Registered to ISO 9001 – Quality Management Systems – Requirements (TUV USA Cert. No. 12-1280)
- 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)