ThermoFisher SCIENTIFIC

Certificate of Analysis

Product No.: 047172
Yttrium Metallo-Organic Standard

Certified Concentration of Y: 1000 ± 10 µg/g **Lot No.:** 1534036

Matrix: Hydrocarbon Oil **Date of Expiration:**
Earlier of 25 July 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 the analysis of this element in petroleum products or other organic matrices using inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), rotating disc electrode atomic emission spectroscopy (RDE-AES), flame or furnace atomic absorption spectroscopy (AA or GFAA), 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**, **ISO/IEC 17025**, and **ISO 17034** quality management system. This CRM was prepared to the certified concentration shown above by gravimetric methods using a single-element concentrate that is traceable to the NIST SRM listed below. The balances used in the preparation of this CRM are calibrated regularly with traceability to NIST. The certified concentration was determined based upon gravimetric procedures. Secondary verification of the certified concentration was performed using ICP-OES and these data are traceable to **NIST SRM 3167a**. The uncertainty associated with the certified concentration represents the expanded uncertainty at the 95% confidence level using a coverage factor of k=2.

Uncertified Values: ICP-OES was used to determine trace metal concentrations in this product.

Trace Concentrations (µg/g)

Ag	<1	Cr	<1	Mo	<1	Sn	<1
Al	<1	Cu	<1	Na	<1	Sr	<1
As	<1	Fe	<1	Ni	<1	Ti	<1
B	<1	Hg	<1	P	<1	Tl	<1
Ba	<1	K	<1	Pb	<1	V	<1
Bi	<1	La	<1	Sb	<1	Y	Major
Ca	<1	Li	<1	Sc	<1	Zn	<1
Cd	<1	Mg	<1	Se	<1		
Co	<1	Mn	<1	Si	<1		

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 500mg, (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. Fresh solutions should be prepared daily. Do not freeze, heat, or expose to direct sunlight. Minimize exposure to moisture or high humidity. We suggest the addition of stabilizer (Stock No. 43871) to enhance the stability of metallo-organic standards that have been diluted using solvents.

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. Any dilutions to lower concentrations may have reduced storage life. 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.

31 January 2024
Certification Date

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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)