

Sulfur- Free Single Element Metallo-Organic Standard

Nickel (Ni)

Product #: VHG-OSF-NI-1000-A-50G

Matrix: 20 cSt Hydrocarbon Oil

Lot #: 710973803C

Element	Concentration and Uncertainty		
Ni	Certified W/W	1000 µg/g	+/- 2% relative

This solution is intended for use as a calibration or reference standard for the analysis of this analyte in petroleum products or other organic matrices using x-ray fluorescence (XRF) spectrometry.

Certification: This standard was prepared using sulfur-free raw materials to a nominal concentration of 1000 µg/g by utilizing gravimetric methods. The certified concentration shown above is based upon the assayed concentration of the raw material and all gravimetric procedures used in the preparation of this certified standard. The uncertainty associated with the certified concentration is +/- 2% relative, which is the sum of the estimated errors due to the assay and purity of the raw material, the gravimetric preparation of the solution and transpiration through the container wall. Secondary verification of the certified concentration was done using ICP-AES or XRF and these data are traceable to NIST Standard Reference Materials when available. Plasma emission spectrometry (ICP-AES) was used to determine trace metal concentrations in this product.

Tools: The balance used to weigh materials used in the preparation of this standard is accurate to ± 0.0001g and is calibrated regularly using mass standards, which are traceable to NIST.

Trace Concentrations (µg/g)

Calcium 2.1

Recommendations: VHG guarantees the accuracy of this solution for **12 Months** from the certification date below, provided it is kept tightly capped in its original container and stored under normal laboratory conditions. Do not freeze, heat, or expose to direct sunlight. Minimize exposure to moisture or high humidity. We recommend that the solution is thoroughly mixed by repeated shaking or swirling of the bottle immediately prior to use. When diluting this standard, we recommend the addition of stabilizer (Product no. SF-STAB-4) to enhance the stability of the new diluted standard. To achieve the highest accuracy the analyst should (1) use only pre-cleaned containers and transfer-ware, (2) make dilutions using calibrated balances or certified volumetric class A flasks and pipettes, and, (3) dilute with the same matrix as the original standard, (4) never pour used product back into the original container.

VHG Labs, Inc.



Susan Evans Norris, Certifying Officer

See Exp. date on container
Certification Date



VHG Labs, Inc. waives all responsibility for any damages resulting from the usage and/or implementation of the products/data described herein.

Hazardous Information: Refer to the Material Safety Data Sheet (MSDS), which can be obtained at www.vhqlabs.com.

Homogeneity: This solution was determined to be homogeneous by procedures consistent with the requirements of ISO Guide 34 and ISO Guide 35. Replicate samples of the finished solution were analyzed to confirm its homogeneity, in accordance with VHG 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.

Further Information: Please contact VHG Labs for further information about this CRM.

Quality Certifications: This CRM was prepared under a quality management system that is accredited to the following:

- ISO 9001 – Quality Management Systems – Requirements (Registrar: United Registrar Services, LLC)
- ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories
- ISO Guide 34 – General Requirements for the Competence of Reference Material Producers
 - ISO Guide 34 references additional requirements specified in ISO Guide 31 and ISO Guide 35.

VHG Custom Standards are Traceable to the Following NIST SRMs:

Analyte	Aq. SRM	MO SRM	Analyte	Aq. SRM	MO SRM	Analyte	Aq. SRM	MO SRM
Ag	3151	1077a	Hf	3122	—	S	3154	2770
Al	3101a	1075a	Hg	3133	3133	Sb	3102a	3102a
As	3103a	3103a	Ho	3123a	—	Sc	3148a	3148a
Au	3121	—	In	3124a	3124a	Se	3149	3149
B	3107	3107	K	3141a	3141a	Si	3150	1066a
Ba	3104a	1051b	La	3127a	3127a	Sm	3147a	—
Be	3105a	3105a	Li	3129a	3129a	Sn	3161a	1057b
Bi	3106	3106	Lu	3130a	—	SO ₄ ²⁻	3181	—
Br	3184	—	Mg	3131a	3131a	Sr	3153a	3153a
Ca	3109a	3109a	Mn	3132	3132	Ta	3155	—
Cd	3108	1053a	Mo	3134	3134	Tb	3157a	—
Ce	3110	3110	Na	3152a	1069b	Te	3156	—
Cl	3182	1818a	Nb	3137	—	Th	3159	—
Co	3113	3113	Nd	3135a	—	Ti	3162a	3162a
Cr	3112a	1078b	Ni	3136	1065b	Tl	3158	3158
Cs	3111a	—	NO ₃ ⁻	3185	—	Tm	3160a	—
Cu	3114	1080a	P	3139a	3139a	U	3164	—
Dy	3115a	—	Pb	3128	1059c	V	3165	1052b
Er	3116a	—	Pd	3138	—	W	3163	3163
Eu	3117a	—	PO ₄ ³⁻	3186	—	Y	3167a	3167a
F	3183	—	Pr	3142a	—	Yb	3166a	—
Fe	3126a	1079b	Pt	3140	3140	Zn	3168a	3168a
Ga	3119a	—	Rb	3145a	—	Zr	3169	3169
Gd	3118a	—	Re	3143	—			
Ge	3120a	—	Rh	3144	3144			