

## Ion Chromatography CRM

**Sulfate ( $\text{SO}_4^{2-}$ ) – 1000  $\mu\text{g/mL}$**

Matrix:  $\text{H}_2\text{O}$

Product #: VHG-ISO41K-500

Lot #: 994440-6

| Ion                | Certified Concentration & Uncertainty |
|--------------------|---------------------------------------|
| $\text{SO}_4^{2-}$ | 1000 $\pm$ 5 $\mu\text{g/mL}$         |

**Intended Use:** This solution is intended for use as a certified reference material or calibration standard, for ion chromatography (IC) or techniques using other modes of aqueous ion detection.

**Certification & Traceability:** VHG CRMs are manufactured and certified under a quality management system that is accredited to **ISO 9001**, **ISO Guide 34** and **ISO/IEC 17025**. This CRM was prepared to a nominal concentration of 1000 $\mu\text{g/mL}$  by gravimetric methods using 99% pure potassium sulfate ( $\text{K}_2\text{SO}_4$ ) dissolved and diluted with filtered (0.22 $\mu\text{m}$ ), 18 M-ohm deionized water. The balances used in the preparation of VHG CRMs are calibrated regularly with traceability to NIST. All volumetric dilutions are performed in Class A calibrated glassware. The certified concentration was determined by VHG Labs based upon gravimetric procedures. Secondary verification of the certified concentration was performed by VHG Labs using ion chromatography (IC) or inductively coupled plasma optical emission spectroscopy (ICP-OES), which was calibrated and/or referenced against **NIST SRM 3181**. The uncertainty associated with the 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 500 $\mu\text{L}$ , (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:** VHG ensures the accuracy of this solution for **12 Months** from the Certification date shown below, 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.

VHG Labs, Inc.



**Chuck Goudreau, Certifying Officer**

See Exp. date on container  
**Certification Date**

LGC 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](http://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 <sub>4</sub> <sup>2-</sup> | 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 <sup>-</sup> | 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 <sub>3</sub> <sup>-</sup>  | 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 <sub>4</sub> <sup>3-</sup> | 3186    | —      |  | Y                             | 3167a   | 3167a  |
| F <sup>-</sup>  | 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   |  |                               |         |        |