



# National Institute of Standards & Technology

## Certificate of Analysis

### Standard Reference Material 3181

#### Anion Standard Solution Sulfate

Batch Code 391507

This Standard Reference Material (SRM) is intended for use in anion ion chromatography, or any other analytical technique that requires aqueous standard solutions for calibration or as control samples. SRM 3181 is a single component solution prepared gravimetrically to contain a nominal 1000 mg/kg sulfate. The preparation is based on gravimetric procedures, i.e., weight per weight composition of a high-purity salt dissolved in filtered (0.22  $\mu\text{m}$ ) 18 megohm water. The potassium sulfate used was from a lot of material reserved for ion chromatographic use, which had been previously intercompared with coulometrically standardized sulfuric acid and found to be at least 99.7% pure. The density of the solution was measured to be 0.999 g/mL at 22 °C. The certified value and its uncertainty are listed below.

Component	Concentration (mg/kg)	Source
Sulfate	1005 $\pm$ 3	K <sub>2</sub> SO <sub>4</sub>

The certified value (**V**) is based on weighings of replicate barium sulfate precipitates corrected for contaminants and losses. The value has been adjusted upward by 0.1% relative, based on estimated transpiration losses of solvent through the container walls of 0.2% relative per year after the bottle is removed from the plastic sleeve.

The uncertainty in the certified value is calculated as:

$$U = (2u_c + 0.001V) \text{ mg/kg}$$

where  $u_c$  is the "combined uncertainty" calculated according to the CIPM approach. [1] The value of  $u_c$  is intended to represent, at the level of one standard deviation, the combined effect of uncertainty components associated with gravimetric and instrumental correction factors. The additional quantity, 0.001V, is an allowance for transpiration of the solution through the container walls, which is estimated to be  $\pm$  0.1% of the certified value during the one-year period of validity of the certification.

#### Procedures for Use

**Stability:** The certification is valid for one year from the shipping date, provided the solutions are kept tightly capped and stored under normal conditions in an area known to be free of acid fumes and sulfur dioxide. NIST will monitor the stability of representative solutions from this SRM lot; and if any changes occur that invalidate this certification, NIST will notify purchasers.

Gaithersburg, MD 20899  
August 25, 1993

Thomas E. Gills, Acting Chief  
Standard Reference Materials Program

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Preparation of Working Standard Solutions: All solutions should be brought to  $22 \pm 1$  °C before use and all glass or plastic surfaces coming into contact with the standard must have been previously cleaned. Working standard solutions can be prepared from the SRM solution by serial dilution on either a weight or volume basis. If dilutions are prepared volumetrically, they should be made with certified volumetric class A flasks and 5 or 10 mL class A pipets. All volumetric transfers of solutions should be performed using a proven analytical technique. Each dilution should be made using high-purity water. To achieve the highest accuracy, the analyst should prepare daily working solutions from 100 mg/kg dilutions of the original SRM solution.

SRM 3181 was prepared by T.A. Butler and analyzed by T.W. Vetter under the technical supervision of R.L. Watters, Jr., all of the NIST Inorganic Analytical Research Division.

The technical and support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by J.S. Kane.

#### REFERENCE

- [1] B.N. Taylor and C.E. Kuyatt, "Guidelines for Evaluation and Expressing the Uncertainty of NIST Measurement Results", NIST Technical Note 1297, National Institute of Standards and Technology, Technology Administration, U.S. Department of Commerce, 1993.