



# National Institute of Standards & Technology

## Certificate of Analysis

### Standard Reference Material 3184

#### Anion Standard Solution

#### Bromide

#### Batch Code 490908

This Standard Reference Material (SRM) is intended for use in ion chromatography, or any other analytical technique that requires aqueous standard solutions for calibration or as control samples. SRM 3184 is a single component solution prepared gravimetrically to contain 1000 mg/kg of bromide in solution. The certified value (V) is based on gravimetric procedures, i.e., weight per weight composition of a high-purity salt dissolved in (0.22  $\mu$ m) 18 megohm water. The calculated concentration of bromide based on the weights of potassium bromide and the solution, and on the atomic weights of potassium and bromide (39.0983 and 79.904, respectively) is 1000.0 mg/kg. 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 for the certification period. To confirm the gravimetric value, samples were analyzed by ion chromatography. The density of the solution at 22 °C is 0.9988 g/mL.

Component	Concentration ( $\mu$ g/g)	Source Purity, %
Bromide	1000 $\pm$ 5	KBr (99.977%)

The uncertainty in the certified value is calculated as

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

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

The combined uncertainty consists of Type B components due to uncertainty in the balance reading and uncertainty in the material handling and dilution. Each component is derived from its corresponding uniform probability distribution by division by  $\sqrt{3}$ .

SRM 3184 was prepared by T.A. Butler and ion chromatographic measurements were made by J. Smeller 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.

Gaithersburg, MD 20899  
September 21, 1994

Thomas E. Gills, Chief  
Standard Reference Materials Program

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## Procedures for Use

**Stability:** This certification is valid for one year from the shipping date provided the solutions are kept tightly capped and stored under normal laboratory 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 will notify purchasers of any changes that invalidate this certification.

**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. A working standard solution can be prepared from the SRM solution by serial dilution. Dilutions 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 to calibrated volume with high-purity water. To achieve the highest accuracy, the analyst should prepare daily working solutions from 100 µg/mL dilutions of the original SRM solution.

## REFERENCE

- [1] *"Guide to the Expression of Uncertainty in Measurement"*, ISBN 92-67-10188-9, 1st Ed. ISO, Switzerland, 1993.