



National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 3171a

Multielement Mix A-1 Standard Solution

This Standard Reference Material (SRM) is intended for use in atomic absorption spectrometry, optical emission (plasma) spectrometry, spectrophotometry, or any other analytical technique that requires aqueous standard solutions for calibrating instruments. SRM 3171a is a multielement solution prepared gravimetrically with a nitric acid concentration (V/V) of 5 percent. The certified values given below are based on gravimetric procedures, i.e., weight per volume composition of the high-purity metal or salt dissolved in NIST high-purity reagents.

Certified Concentrations of Constituent Elements

<u>Element</u>	<u>Source, % Purity</u> *	<u>Concentration, $\mu\text{g/mL}$</u> ^a
Aluminum	Metal, (99.99+)	100.0 \pm 0.5
Antimony	Metal, (99.99)	100.0 \pm 0.5
Beryllium	Metal, (99.9)	10.0 \pm 0.1
Cadmium	Metal, (99.99+)	100.0 \pm 0.5
Chromium	Metal, (99.99+)	100.0 \pm 0.5
Iron	Metal, (99.99+)	100.0 \pm 0.5
Magnesium	Metal, (99.999)	100.0 \pm 0.5
Manganese	Metal, (99.99)	100.0 \pm 0.5
Molybdenum	Metal, (99.99+)	100.0 \pm 0.5
Nickel	Metal, (99.999)	100.0 \pm 0.5
Potassium	KCl, (99.98)	500.0 \pm 2.5
Sodium	NaCl, (99.98)	100.0 \pm 0.5
Vanadium	NH ₄ VO ₃ , (99.99)	100.0 \pm 0.5

*The purity of these materials was determined at NIST.

^aThe uncertainty listed for an element is based on judgment and represents an estimate of the effects of any errors attributable to weighing, dilutions, interelement effects, and purity of the metal or compound. (No attempt was made to derive exact statistical results as the imprecisions of most analytical methods are much larger than the errors listed above.)

SRM 3171a was prepared by T.A. Butler of the NIST Inorganic Analytical Research Division. Atomic absorption spectrometry, emission spectrometry, and inductively coupled plasma atomic emission spectrometry analyses were made by T.A. Butler, J.A. Norris, and L.J. Wood.

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
May 14, 1993
(Revision of certificate dated 8-10-92)

Thomas E. Gills, Acting Chief
Standard Reference Materials Program

(over)

Procedures for Use

Stability: This certificate is valid for one year from the shipping date provided the solutions are kept tightly capped and stored under normal laboratory conditions. NIST will monitor the stability of these solutions: if any changes occur that invalidate this certification, NIST will notify purchasers.

Preparation of Working Standard Solutions: All solutions should be brought to 22 ± 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 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 acidified with an appropriate high-purity acid and diluted to calibrated volume using high-purity water. The stability of the working standard solution will depend on the final acid concentration; therefore, care should be exercised to ensure that the final acid concentration of the dilution closely approximates that of the SRM. To achieve the highest accuracy, the analyst should prepare daily working solutions from the original SRM solution.