National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Materials 1641c

Mercury in Water

(Acidified with 2% HNO_3)

This Standard Reference Material (SRM) is intended for use in the primary calibration of instruments and techniques used for the determination of mercury in natural waters. It is designed for the preparation of calibration solutions and for use as a "spike" sample in a "method-of-additions" type analytical procedure. A unit of SRM 1641c consists of six ampoules, each ampoule containing 20 mL of solution containing a trace amount of mercury in 2% (v/v) HNO_3, initially stabilized with 1 mg/L gold.

The mercury content in this SRM was certified using flow injection analysis cold vapor atomic absorption (FIA-CVAA) and inductively coupled plasma mass spectrometry (ICP-MS). The certified mercury content and its estimated uncertainty is given below.

Mercury concentration: 1.47 ± 0.04 mg/L

The certified value, minus and plus the uncertainty, gives a 95% confidence interval for the true concentration of mercury in this material, with an allowance for differences between the analytical methods used.

Notice to users: The certification of this SRM is considered valid for one year from the date of shipment from NIST. At or below the mg/mL level, mercury solutions are not adequately stabilized with mineral acid alone. The addition of trace quantities of gold to the nitric acid solution of mercury provides greater stability. However, the gold which stabilizes the mercury content may plate out on the ampoule wall during the period for which the certification is valid. Experience with the three previous issues of this SRM indicates that this has no affect on the mercury concentration. The stability of this SRM will continue to be monitored and any substantive change in the certified value will be reported to customers. Please return the enclosed registration card to facilitate the notification.

This SRM was prepared by J.R. Moody, and certification analyses were performed by M.S. Epstein, R. Saraswati, R.A. Tores, and G.C. Turk of the NIST Inorganic Analytical Research Division.

The overall direction and coordination of technical measurements leading to certification were performed by J.D. Fassett of the NIST Inorganic Analytical Research Division.

The statistical evaluation of certification data was performed by S.B. Schiller of the NIST Statistical Engineering 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
June 14, 1993
(Revision of certificate dated 4-6-93)

Thomas E. Gills, Acting Chief
Standard Reference Materials Program

(over)

CAUTION: Traces of mercury vapor are present in most laboratory environments. Therefore, contamination of reagents, equipment, and common laboratory materials may cause a severe blank or background problem. Apparatus for analyses at and below the mg/L level must be scrupulously cleaned immediately before use, and only the purest reagents with respect to mercury should be used.

Preparation of the SRM Solution: The polyethylene drum in which the SRM solution was mixed was first cleaned by filling for several weeks with a 10% nitric acid solution containing nominally the same mercury and gold concentration as the SRM solution. The drum was then flushed with distilled water before SRM 1641c was prepared in it by filling with approximately 200 L of distilled water, and acidifying to 2% (v/v) HNO_3 with high-purity acid. Then spikes of high-purity gold dissolved in aqua regia and high-purity mercury dissolved in concentrated HNO_3 were added sequentially, with mixing for one week after each addition. Finally, the bulk solution was ampouled.

Instructions for Use: Ampoules are to be opened immediately before use by breaking the glass at the score line in the narrowest segment of the neck of the ampoule. Ampoules should not be resealed, or the unused portion stored in some other manner, for subsequent use. Once ampoules are opened, dilutions should be prepared and used without delay, since stability of the dilutions cannot be guaranteed.

Dilutions may be made by the addition of accurately measured aliquots, withdrawn from the just opened ampoule, to known volumes of pure or natural water (spiking mode) using conventional techniques. The volumetric apparatus used should be scrupulously cleaned. The reliability of the dilution process will depend on the care exercised, and on the reliability of the calibration of the volumetric apparatus used. Blank determinations should be made of the water and other reagents used.