National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 913a

Uric Acid

This Standard Reference Material (SRM) is certified as a chemical of known purity. It is intended primarily for use in the calibration and standardization of procedures for uric acid determinations employed in clinical analysis and for routine critical evaluation of the daily working standards used in these procedures. A unit of SRM 913a consists of one bottle containing 10 g of crystalline uric acid.

Certified Value and Uncertainty: The certified value is based upon the results from several analytical techniques designed to measure impurities and on scientific judgement of these results. The certified chemical purity presented in Table 1 was determined by measuring the mass fractions of impurities, including water and residue from ashing, summing the impurities, adding an allowance for undetected impurities, and subtracting this sum from 100 %. A NIST certified value is a value for which NIST has the highest confidence in its accuracy in that all known or suspected sources of bias have been investigated or accounted for by NIST.

Table 1. Certified Chemical Purity and Uncertainty for Uric Acid (Mass Fraction)

Purity: 99.6 % ± 0.1 %

The results are expressed as the certified value ± the expanded uncertainty. The uncertainty in the certified value is equal to $U = ku_c$, where, u_c, is the combined standard uncertainty calculated according to the ISO Guide [1] and, $k = 1.97$, is the coverage factor. The expanded uncertainty is intended to represent a 95 % confidence interval and reflects the combined effects of measurement imprecision, variability in concentrations between vials, and any systematic differences between techniques when more than one method has been used [1].

Reference Values: Reference values are noncertified values that are the best estimates of the true values; however, the values do not meet NIST criteria for certification. Such values are provided with associated uncertainties that may reflect only measurement precision, may not include all sources of uncertainty, or may reflect a lack of sufficient statistical agreement among multiple analytical methods. Reference values for mass loss upon drying, residue after ashing, and molar extinction coefficients are provided in Table 2.

Expiration of Certification: The certification of **SRM 913a** is valid, within the measurement uncertainties specified, until **01 January 2020**, provided the SRM is handled and stored in accordance with instructions given in this certificate (see "Notice and Warning to Use" and "Instructions for Use"). This certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification before the expiration of this certificate, NIST will notify the purchaser. Registration (see attached sheet) will facilitate this notification.

Analytical measurements at NIST were performed by S.S-C. Tai, L.T. Sniegoski, and M.J. Welch of the NIST Analytical Chemistry Division.

The overall direction and coordination of the technical activities were under the chairmanship of M.J. Welch of the NIST Analytical Chemistry Division.

Stephen A. Wise, Chief
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Gaithersburg, MD 20899
Certificate Issue Date: 27 January 2010
See Certificate Revision History on Last Page

Robert L. Watters, Jr., Chief
Measurement Services Division

Statistical analysis of data was provided by N-F. Zhang of the NIST Statistical Engineering Division.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Measurement Services Division.

NOTICE AND WARNING TO USER

Storage: SRM 913a should be stored in its original bottle at temperatures between 20 °C and 25 °C. It must be tightly re-capped after use and protected from excessive moisture and light.

INSTRUCTIONS FOR USE

SRM 913a is not hygroscopic under ordinary conditions of storage as described above, and can be used without preliminary drying.

SOURCE AND ANALYSIS

Source of Material: The SRM material was obtained from a commercial supplier.

Analytical Approach: All analyses for the certified and information values were performed at NIST. Because uric acid does not melt, differential scanning calorimetry could not be used as an overall measure of the purity. Instead, impurities were tested for using a variety of techniques that included: liquid chromatography (LC), direct probe mass spectrometry (DP-MS), mass loss upon drying, ashing at 800 °C, and ultraviolet (UV) spectroscopy. No significant impurities were found by the techniques LC, DP-MS, or UV spectroscopy. The results for the drying and ashing analyses are shown in Table 2. Other low level impurities may be present but were not detected by the techniques used here. The certified purity is determined by subtracting from 100 %, the sum of the mass loss upon drying, the residue after ashing, and an allowance of 0.1 % for undetected impurities.

Molar extinction coefficients were measured for solutions of SRM 913a in a glycine-NaOH aqueous buffer (pH 9.6) and 0.0017 mol/L ammonia (pH 10.1) at 234 nm and 292 nm. The results for the molar extinction coefficients are also shown in Table 2.

Table 2. Reference Values for Selected Properties of SRM 913a

Components of Impurity	Mass Fraction (in %)
Mass loss upon drying	0.17 ± 0.02
Residue after ashing	0.09 ± 0.01

UV Absorbance of Uric Acid	Molar Extinction Coefficients	
	234 nm	292 nm
In glycine-NaOH buffer, pH 9.6	9 789 ± 149	12 612 ± 80
In ammonia solution, pH 10.1	9 847 ± 105	12 756 ± 93

REFERENCE

[1] JCGM 100:2008; Evaluation of Measurement Data — Guide to the Expression of Uncertainty in Measurement (ISO GUM 1995 with Minor Corrections); Joint Committee for Guides in Metrology (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf; see also Taylor, B.N.; Kuyatt, C.E.; Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results; NIST Technical Note 1297; U.S. Government Printing Office: Washington, DC (1994); available at http://physics.nist.gov/Pubs/.

Certificate Revision History: 27 January 2010 (Extension of certification period and editoral changes); 28 December 2000 (Original certificate date).

Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-2200; fax (301) 926-4751; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.