National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 937

Iron Metal

(Clinical Standard)

This Standard Reference Material (SRM) is a material of known purity intended for use as an assay standard for iron. SRM 937 consists of electrolytic grade iron to be used primarily for the calibration of instrumentation and standardization of procedures employed in clinical analysis and for the routine evaluation of daily working standards used in these procedures. SRM 937 is provided in a unit consisting of 50 g of iron metal in the form of chips sized between 0.5 mm and 1.8 mm mesh.

Iron, Mass Fraction (expressed as %) [1]	99.90 % ± 0.02 %

The certified value shown is based on dissolution of representative samples in hydrochloric acid followed by reduction of the iron with stannous chloride and oxidation of the excess stannous chloride with mercuric chloride. Most of the iron was oxidized with a known mass of potassium dichromate and the remaining iron was titrated with potassium dichromate solution. The estimated uncertainty shown is based on judgement and includes allowances for known sources of possible error.

Chemical analyses made on representative samples showed the presence of the following elements at the indicated mass fraction (expressed as %): nickel, 0.041 %; silicon, 0.008 %; carbon, chromium, and cobalt, each 0.007 %; copper, manganese, oxygen, and sulfur, each 0.006 %; molybdenum, 0.005 %; phosphorus, 0.003 %; germanium and nitrogen, each 0.001 %; total of all other elements, < 0.003 %.

The iron mass fraction (expressed as %), by difference, is 99.89+ %. This is in agreement with the certified value.

The chemical assay was performed by B.I. Diamondstone; the elemental determinations by R. Alvarez, J.R. Baldwin, E. Belkas, B.S. Carpenter, M.M. Darr, E.R. Deardorff, T.E. Gills, L.A. Machlan, E.J. Maienthal, L.J. Moore, C.W. Mueller, T.J. Murphy, P.J. Paulsen, K.M. Sappenfield, B.A. Thompson, and S.A. Wicks, all of NIST.

The overall direction and coordination of the technical measurements leading to certification was under the direction of I.L. Barnes, formerly of the NIST Inorganic Analytical Research Division.

This Certificate of Analysis has undergone editorial revision to reflect program and organizational changes at NIST and at the Department of Commerce. No attempt was made to reevaluate the certificate values or any technical data presented on this certificate.

The technical and support aspects involved in the original preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by R. Alvarez. Revision of this certificate was coordinated through the Standard Reference Materials Program by J.C. Colbert.

Gaithersburg, MD 20899
September 28, 1995
(Revision of certificate dated 6-9-78)

Thomas E. Gills, Chief
Standard Reference Materials Program

NOTICE AND WARNINGS TO USERS

This SRM is intended for "in vitro" diagnostic use only.

Precautions: All volumetric glassware used should conform to the specification for Class A glassware and should be individually calibrated and used at the calibration temperature [2]. All glassware should be cleaned in hot dilute hydrochloric acid and rinsed in distilled water.

Storage: This SRM should be stored in the tightly closed original bottle under normal laboratory conditions.

Expiration of Certification: When the SRM is stored properly, this certification is valid, within the specified uncertainty limits, for ten years from the date of shipment from NIST.

Preparation of Stock Iron Standard Solution (0.02 mol/L): Weigh approximately 1 g of SRM 937 to the nearest 0.1 mg and transfer to a 1 L volumetric flask. Dissolve the metal in 100 mL of hydrochloric acid solution having an amount-of-substance concentration of 6 mol/L. Dilute to 1 L with distilled deionized water.

The amount-of-substance concentration (c_B) [1] of this stock solution, in mol/L, is expressed by:

$$c(\mathrm{Fe}) = \frac{\text{g (SRM 937) x } 0.9990}{55.847} \text{ mol/L}$$

Preparation of Working Stock Iron Standard Solution (0.2 mmol/L): Transfer 10 mL of the stock iron standard solution to a 1 L volumetric flask and dilute to volume with hydrochloric acid solution having an amount-of-substance concentration of 0.2 mol/L.

Preparation of Working Iron Standard Solutions: Prepare more dilute solutions by pipetting known volumes of the working stock iron standard solution into volumetric flasks and diluting to volume with 0.2 mol/L hydrochloric acid. These solutions should be prepared daily. [Note: In the preparation of very dilute solutions, the 0.2 mol/L hydrochloric acid may contain sufficient iron, as an impurity, to affect the calculated iron concentrations of these dilute solutions.]

REFERENCES

[1] Taylor, B.N., Guide for the Use of the International System of Units (SI), NIST Special Publication 811, 1995 Ed., (April 1995).

[2] Lembeck, J., The Calibration of Small Volumetric Laboratory Glassware, NBSIR 74-461, National Bureau of Standards, Washington, D.C., 20234.