National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 665

Electrolytic Iron

This Standard Reference Material (SRM) is in the form of a rod 3.2 mm (1/8 in.) in diameter and 51 mm (2 in) long for application in microchemical methods of analysis such as electron probe microanalysis, spark source mass spectrometric analysis, and laser probe analysis.

Certified Values[1]

Element	% by Wt.	Element	% by Wt.
Carbon	0.008	Cobalt	0.007_0
Manganese	0.0057	Titanium	0.0006
Phosphorus	0.002_5	Arsenic	(0.0002)[2]
Sulfur	0.0059	Aluminum (total)	(0.0007)
Silicon	0.008_0	Boron	0.00013
Copper	0.0058	Lead	0.00001_5
Nickel	0.041	Iron (by difference)	99.9
Chromium	0.007_2		
Vanadium	0.0006		
Molybdenum	0.0050		

[1]The certified value listed for an element is the present best estimate of the "true" value based on the results of the cooperative program for certification. The value listed is not expected to deviate from the "true" value by more than ± 1 in the last significant figure reported; for a subscript figure, the deviation is not expected to be more than ± 5. Based on the results of homogeneity testing, maximum variations within and among samples are estimated to be less than the uncertainty figures given above.

[2]Values in parentheses are not certified as they are based on the results from a single laboratory or analytical method.

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 in this certificate.

Gaithersburg, MD 20899
December 25, 1991
(Revision of Certificate dated 8-15-72)

William P. Reed, Chief
Standard Reference Materials Program

(over)

Additional Information on the Composition

Values in parentheses in the following table are not certified and are given for information only.

Elements Detected:

Element	Upper Limit (mg/kg)	Detected Value (mg/kg)	Method
Tungsten	< 1	(0.4)	Neutron activation
Tin	< 5	(2)	Spark source mass spectrometry
Niobium	< 0.5	(<0.1)	Spark source mass spectrometry
Silver	< 0.2	(0.02)	Spark source mass spectrometry
Zinc	< 3	(< 1)	Atomic absorption
Nitrogen	< 20	(~11)	Distillation-photometric
Germanium	< 50	(~14)	Spark source mass spectrometry
Oxygen	< 70	(63)	Vacuum fusion
Hydrogen	< 5	(1)	Vacuum fusion

Elements Sought But Not Detected:

Element	Upper Limit (mg/kg)	Method
Tantalum	< 0.5	Neutron activation
Zirconium	< 0.1	Spark source mass spectrometry
Antimony	< 0.5	Neutron activation
Bismuth	< 0.1	Spark source mass spectrometry
Calcium	< 0.1	Atomic absorption
Magnesium	< 0.2	Atomic absorption
Selenium	< 0.1	Spark source mass spectrometry
Tellurium	< 0.1	Spark source mass spectrometry
Cerium	< 0.05	Spark source mass spectrometry
Lanthanum	< 0.05	Spark source mass spectrometry
Praseodymium	< 0.05	Spark source mass spectrometry
Gold	< 0.02	Neutron activation
Hafnium	< 0.2	Spark source mass spectrometry
Neodymium	< 0.05	Spark source mass spectrometry

The material for this SRM was vacuum melted and cast at the Carpenter Technology Corporation, Reading, Pennsylvania, under a contract with the National Institute of Standards and Technology. The contract was made possible by a grant from the American Iron and Steel Institute.

The ingots were processed by Carpenter Technology Corporation to provide material of the highest possible homogeneity. Following acceptance of the composition based on NIST analyses, selected portions of the ingot material were extensively tested for homogeneity at NIST by J.R. Baldwin, D.M. Bouchette, S.D. Rasberry, and J.L. Weber, Jr. Only those portions meeting a critical evaluation were processed to the final sizes.

Chemical analyses for certification were made on composite samples representative of the accepted lot of material.

Cooperative analyses for certification were performed in the analytical laboratories of Bethlehem Steel Corporation, Sparrows Point Plant, Maryland, R.H. Rouse; Carpenter Technology Corporation, Research and Development Center, Reading, Pennsylvania, E.J. Cramer; The Timken Roller Bearing Company, Steel & Tube Division, Canton, Ohio, R.G Cover; United States Steel Corporation, Applied Research Laboratory, Monroeville, Pennsylvania, L. Melnick; and Gary Steel Works, Gary, Indiana, E.H. Shipley.

Analyses were performed in the Inorganic Analytical Research Division of NIST by the following: R. Alvarez, J.R. Baldwin, D.A. Becker, R.K. Bell, R.W. Burke, B.S. Carpenter, E.L. Garner, T.E. Gills, G.J. Lutz, L.A. Machlan, E.J. Maienthal, J. McKay, L.J. Moore, C.W. Mueller, T.J. Murphy, P.J. Paulsen, T.C. Rains, S.D. Rasberry, T.A. Rush, K.M. Sappenfield, B.A. Thompson, S.A. Wicks, and J. Wing.

The overall direction and coordination of the technical measurements at NIST leading to certification were performed under the direction of K.F.J. Heinrich, O. Menis, B.F. Scribner, J.I. Shultz, and J.L. Weber, Jr.

The technical and support aspects involved in the original preparation, certification, and issuance of this Standard Reference Material were coordinated through the Standard Reference Materials Program by R.E. Michaelis. Revision of this certificate was coordinated through the Standard Reference Materials Program by P.A. Lundberg.