



# National Institute of Standards & Technology

## Certificate of Analysis Standard Reference Material 1265a

### Electrolytic Iron

This Standard Reference Material (SRM) is in the form of disks 32 mm (1 1/4 in) in diameter and 19 mm (3/4 in) thick, generally for use in optical emission and x-ray spectrometric analysis.<sup>a</sup>

<u>Element</u>	<u>Percent by Weight</u>	<u>Element</u>	<u>Percent by Weight</u>
Carbon	0.0067 ± 0.0003	Cobalt	0.007 <sub>0</sub>
Manganese	.0057	Titanium	(.0001)
Phosphorus	.0011 ± .0001	Arsenic	(.0002) <sup>b</sup>
Sulfur	.0055 ± .0003	Aluminum (total)	(.0007)
Silicon	.008 <sub>0</sub>	Boron	.00013
Copper	.0058	Lead	.000015
Nickel	.041	Iron (by diff.)	99.9
Chromium	.007 <sub>2</sub>		
Vanadium	.0006		
Molybdenum	.0050		

<sup>a</sup>This material also is available in the form of chips, SRM 365, for use in chemical methods of analysis; rods SRM 1099, 6.4 mm (1/4 in) in diameter and 102 mm (4 in) long for the determination of gases in metals by vacuum fusion and neutron activation methods of analysis; and rods, SRM 665, 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.

<sup>b</sup>Values in parentheses are not certified as they are based on the results from a single laboratory or analytical method.

**CERTIFICATION:** The value listed for a certified element is the present best estimate of the "true" value based on the results of the analytical program. 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.

Renewals of the "1200 series", 1261a-1265a, were prepared from the same ingots used for the original series, but from adjacent positions within the ingots. Little or no change in elemental composition was observed by comparison analysis utilizing several analytical techniques: optical emission spectrometric analysis, J.A. Norris and D.E. Brown; x-ray fluorescence analysis, P.A. Pella and J.R. Sieber; combustion-infrared, B.I. Diamondstone.

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 preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R.E. Michaelis and W.P. Reed.

June 12, 1989  
Gaithersburg, MD 20899  
(Revision of certificate dated 2-24-81)

Stanley D. Rasberry, Chief  
Office of Standard Reference Materials

ADDITIONAL INFORMATION ON THE COMPOSITION: Certification is made only for the elements indicated. The five replacements, however, contain a graded series for 40 elements and information on the elements not certified may be of importance in the use of the material. Although these are not certified, upper limit values are presented in the following table for the remaining elements.

Elements Detected (ppm by weight)

<u>Element</u>	<u>Upper Limit</u>	<u>(Estimated value)</u>	<u>Method</u>
Tungsten	< 1	(0.4)	Neutron activation
Tin	< 2	(2)	Spark source mass spectrometry
Antimony	< 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 (ppm by weight)

<u>Element</u>	<u>Upper Limit</u>	<u>Method</u>
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

PLANNING, PREPARATION, TESTING, ANALYSIS: This standard is one of five replacements for the original eight 1100 series iron and steel SRM's. Material from the same melt is available in a variety of forms to serve in checking methods of analysis and in calibrating instrumental techniques.

The material for this standard was vacuum melted and cast at the Carpenter Technology Corporation, Reading, Pennsylvania, under a contract with the National Institute of Standards & 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 for the highest possible homogeneity. Following acceptance of the composition based on NIST analysis, 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 that material meeting a critical evaluation was 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 Research Laboratories of Armco Steel Corporation by R.L. LeRoy and J.F. Woodruff.

Analyses were performed in the Analytical Chemistry Division of the National Institute of Standards & Technology by the following: R. Alvarez, J.R. Baldwin, E. Belkas, B.S. Carpenter, M.M. Darr, E.R. Deardorff, E.L. Garner, 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.