National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 691

Reduced Iron Oxide

(In Cooperation with the American Society for Testing and Materials)

This Standard Reference Material (SRM) is intended primarily for use in evaluating chemical methods and in calibrations associated with optical emission and x-ray spectrometric methods of analysis. SRM 691 is a finely powdered material (-200 mesh) and must be kept in a tightly sealed bottle when not in use. It is recommended that the material be stored in a desiccator over a suitable desiccant when not in use. Long term (3 years) stability of this SRM has not been rigorously established. NIST will continue to monitor this material and any substantive changes will be reported to users.

The certified values given below in Table 1 are based on samples of at least 0.5 g, the minimum amount to be used for analysis. Non-certified values which are given for information only, are listed in Table 2.

Table 1

Constituent	Certified Value,[1] % by wt.	Estimated Uncertainty[2]	Constituent	Certified Value,[1] % by wt.	Estimated Uncertainty[2]
Iron (Total)	90.8	±0.5	Copper	0.032	±0.003
Iron (Metallic)[3]	84.6	±0.6	Cobalt	0.030	±0.007
SiO_2	3.7	±0.2	Phosphorus	0.006	±0.001
Al_2O_3	1.22	±0.07	Sulfur	0.008	±0.001
TiO_2	0.27	±0.04	Carbon (Total)	0.12	±0.03
CaO	0.63	±0.03			
MnO	0.043	±0.002			
MgO	0.52	±0.02			
Na_2O	0.186	±0.002			

[1] The certified value listed for a constituent is the present best estimate of the "true" value based on the results of the cooperative program for certification.

[2] The estimated uncertainty listed for a constituent is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability for samples 0.5 g or more. (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.)

[3] The metallic iron was determined by the ISO (bromine-methanol) method.

The overall coordination of the technical measurements leading to certification was performed under the direction of J.I. Shultz, Research Associate, ASTM-NIST Research Associate Program.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Standard Reference Materials Program by T.E. Gills.

Gaithersburg, MD 20899
October 10, 1991
(Revision of Certificate dated 4-12-82)

William P. Reed, Chief
Standard Reference Materials Program

(over)

PLANNING, PREPARATION, TESTING, ANALYSIS:

The material for this SRM was provided by Allis-Chalmers, Reduction Systems Division, Milwaukee, Wisconsin, courtesy of L.J. Wrangell. It was processed (crushed, ground, sieved, and mixed) at the Colorado School of Mines Research Institute, Golden, Colorado, under a contract to the National Institute of Standards and Technology. The final product (-200 mesh) was blended at NIST.

Homogeneity testing of selected samples representative of the final lot was performed at Allis-Chalmers, by L.J. Wrangell; at Ledoux & Co., Teaneck, New Jersey, by S. Kallmann; and at NIST by E.R. Deardorff.

Stability tests conducted over a seven-month period at NIST, during which samples were exposed to relative humidities of 75 and 90 percent at room temperature, indicated sufficient stability of the material for use as an SRM.

This material was packaged in a dry nitrogen atmosphere to prevent oxidation. If signs of oxidation are detected, please transmit this information to NIST for documentation into the monitoring program.

Cooperative analyses for certification were performed in the following laboratories:

-Andrew S. McCreath & Son, Inc., Harrisburg, Pennsylvania.; F.A. Pennington, Jr., R.F. Eakin, G.L. Dobbs, J.C. Forney, and L.W. Richards.

-Inland Steel Company, Indiana Harbor Works, East Chicago, Indiana; J.E. Joyce.

-Institut de Recherches de la Siderurgie, Maizieres-Les-Metz, France; G. Jecko.

-Ledoux and Company, Teaneck, New Jersey; S. Kallmann.

-National Bureau of Standards, Inorganic Analytical Research Division, C.G. Blundell, T.A. Butler, E.R. Deardorff, M.S. Epstein, R.M. Lindstrom, T.C. Rains, M. Dadjadi, and R.M. Stone.

-United States Steel Corp., Research Laboratory, Monroeville, Pennsylvania.; J.D. Selvaggio, D.S. Shafferman, A.W. Fioravanti, D.G. Cunningham, K.G. Mikos, R.C. Cline, and H.S. Karp.

The values shown below are not certified since they are not based on the results of at least two independent laboratories or methods. These values are included for information only.

Table 2

Element	Content % by Wt.	Element	Content µg/g
Cr	(0.03)	As	(14)
Ni	(0.3)	Zn	(40)
K	(0.06)	Pb	(<20)
		Cd	(<5)
		Mo	(<20)
		Sn	(<10)
		N	(50)
		V	(135)