



National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 693

Iron Ore (Nimba)

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

This material is in the form of powder (<0.1 mm) for use in checking chemical methods of analysis and in calibration with instrumental methods of analysis.

(Results based on samples dried for one hour at 105 °C)

Constituent	Total Fe	SiO ₂	Al ₂ O ₃	P	S	TiO ₂	MnO	CaO	MgO	Na ₂ O	K ₂ O
Certified ¹ Value (Wt. %)	65.11	3.87	1.04	0.056	0.005	0.035	0.091	0.016	0.013	0.0028	0.0028
Estimated ² Uncertainty	0.04	0.02	0.05	0.001	0.001	0.003	0.004	0.004	0.002	0.0005	0.0006
Method ³											
Labs	SnCl ₂ - K ₂ Cr ₂ O ₇	HClO ₄ Dehydration	Atomic Absorption	Photometric	Combustion- Titration	Photometric	Atomic Absorption	Atomic Absorption	Atomic Absorption	Atomic Absorption	Atomic Absorption
A	^a 65.11	^b 3.87	1.04	^c 0.056	<0.005	^d 0.034	0.094	0.016	0.013	0.0029	0.003
B	^e 65.13 65.14	3.83	1.11	0.055	0.005	^f 0.036	^g 0.095	^h 0.020	^h 0.011	^h 0.0023	^h 0.003
C	65.10	3.89	ⁱ 1.06	---	---	ⁱ 0.032	0.087	ⁱ 0.015	0.012	ⁱ 0.0030 0.0033	ⁱ 0.003
D	65.11	^g 3.86 3.88	^j 0.98	0.056	0.005	^f 0.038	0.090	0.01	0.015	0.003	0.003
E	65.09	3.87	^k 0.98 1.06	0.056	0.007	^f 0.033	^g 0.091	0.018	0.015	0.002	0.002

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

2. The estimated uncertainty 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 of 0.5 g or more. (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determinations.)

3. A detailed description of many of the methods of analysis employed in the certification program for this SRM may be found in Part 12, Chemical Analysis of Metals and Metal Bearing Ores, Annual Book of ASTM Standards.

a H₂S reduction

b Sample fused in Na₂CO₃

c Alkali-molybdate method

d H₂O₂ photometric

e Silver reductor

f Chromotropic acid photometric

g Photometric method

h Spectroscopic method

i Flame emission

j Chromazurol S photometric

k Mercury cathode-NH₄OH-Cupferron-AlPO₄

Gaithersburg, MD 20899

July 31, 1990

(Revision of certificate dated 10-24-78)

(over)

William P. Reed, Acting Chief
Standard Reference Materials Program

PLANNING, PREPARATION, TESTING, ANALYSIS:

The iron ore material for this SRM was prepared in final powder form, minus 74 μm (200 mesh), by the Bethlehem Steel Corporation, Bethlehem, PA through the courtesy of J. M. Karpinski.

At NIST, the material was resieved and thoroughly blended.

Homogeneity testing of selected samples representative of the final lot was performed at NIST by R. K. Bell, Assistant Research Associate, ASTM/NIST Research Associate Program. The results for iron indicate that the material variability (0.5 g samples) is < the method imprecision.

Chemical analyses for certification were performed in the following laboratories:

Bethlehem Steel Corporation, Homer Research Laboratories, Bethlehem, PA, D. A. Flinchbaugh.

Ledoux and Company, Teaneck, New Jersey, S. Kallman and C.L. Maul.

National Institute of Standards & Technology, Gaithersburg, MD, T. C. Rains, T. J. Brady, J. D. Messman, T. A. Rush, and by R.K. Bell, ASTM Assistant Research Associate.

STELCO, The Steel Company of Canada, Ltd., Hilton Works, Hamilton, Ontario, Canada, O. P. Bhargava.

United States Steel Corporation, Research Laboratory, Monroeville, PA, L. M. Melnick, J. D. Selvaggio, R. W. Cline, D. G. Cunningham, A. W. Fioravanti, J. R. Lucas II, C. W. Ponsonby, L. E. Povirk, D. Shafferman and R. J. Wargo.

The overall direction and coordination of the technical measurements leading to certification were performed jointly by R. E. Michaelis, Office of Standard Reference Materials Program and by 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 and its revision were coordinated through the Standard Reference Materials Program by W. P. Reed and P. A. Lundberg.