National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 692

Iron Ore (Laborador)

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

This Standard Reference Material (SRM) is in the form of powder (<0.1mm) and is intended primarily for use in checking chemical methods of analysis and in calibration with instrumental methods of analysis. Results are given below and are based on samples that were dried for one hour at 105 °C.

Constituent	Total Fe	SiO_2	Al_2O_3	P	S	TiO_2	MnO	CaO	MgO	Na_2O	K_2O
Certified[1] Value, % by wt.	59.58	10.14	1.41	0.039	0.005	0.045	0.46	0.023	0.035	0.008	0.039
Estimated[2] Uncertainty	0.06	0.05	0.04	0.002	0.001	0.005	0.01	0.003	0.004	0.002	0.003
Method[3] / Labs	$SnCl_2$-$K_2Cr_2O_7$	$HClO_4$ Dehydration	Atomic Absorption	Photometric	Combustion-Titration	Atomic Absorption	Atomic Absorption	Photometric	Atomic Absorption	Atomic Absorption	Atomic Absorption
A	[a]59.55	[b]10.09	1.40	[c]0.039	<0.005	[d]0.041	0.47	0.022	0.034	0.008	0.040
B	59.58	10.26	1.48	[c]0.035	0.004	[e]0.05	0.45	0.02	0.04	0.005	0.036
C	[f]59.63 59.62	10.10	1.42	0.040	0.007	[g]0.048	[h]0.47	[i]0.025	[i]0.028	[i]0.008	[j]0.040 [i]0.039
D	59.60	10.16	[j]1.40	-----	-----	[j]0.043	0.47	[j]0.021	0.033	[j]0.010 0.009	[j]0.041
E	59.50	[h]10.12 10.05	[k]1.41	0.039	0.004	[g]0.050	0.46	0.01	0.038	0.008	0.041
F	59.58	10.18	[l]1.37 1.46	0.040	0.005	[g]0.043	[h]0.46	0.026	0.035	0.008	0.035

[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]H_2S reduction.
[b]Sample fused in Na_2CO_3.
[c]Alkali-molybdate method.
[d]H_2O_2 photometric.
[e]Atomic absorption.
[f]Silver reductor.
[g]Chromotropic acid photometric.
[h]Photometric method.
[i]Spectroscopic method.
[j]Flame emission.
[k]Chromazurol S photometric.
[l]Mercury cathode-NH_4OH-Cupferron-$AlPO_4$.

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
January 30, 1992
(Revision of Certificate dated 10-24-78)

William P. Reed, Chief
Standard Reference Materials Program

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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, Pennsylvania 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 less than or equal to the method imprecision.

Chemical analyses for certification were performed in the following laboratories:

-Bethlehem Steel Corporation, Homer Research Laboratories, Bethlehem, Pennsylvania, D.A. Flinchbaugh.

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

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

-National Institute of Standards and Technology, Center for Analytical Chemistry, Gaithersburg, Maryland, T.C. Rains, T.J. Brady, J.D. Messman, T.A. Rush, and 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, Pennsylvania, L.M. Melnick, J.D. Selvaggio, R.W. Cline, D.G. Cunningham, A.V. 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, 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 were coordinated through the Standard Reference Materials Program by W.P. Reed. Revision of the certificate was coordinated through the Standard Reference Materials Program by J.S. Kane.