U.S. DEPARTMENT OF COMMERCE
WASHINGTON 25, D.C.

National Bureau of Standards Certificate of Analyses

Standard Sample 341

Ductile Cast Iron

ANALYST	C		Mn	P		S		Si	Cu	Ni	Cr	V	Mo	Ti	Mg
	Total	Graphitic	Persulfate-Arsenite	Gravimetric (weighed as $Mg_2P_2O_7$ after removal of arsenic)	Alkali-Molybdate [a]	Gravimetric (direct oxidation and final precipitation after reduction of iron)	Combustion-Iodate titration	Perchloric acid dehydration		Weighed as nickel dimethylglyoxime	$FeSO_4$–$KMnO_4$ titration		Photometric	H_2O_2 photometric	
1	1.81	[b]1.21	[c]0.91	0.021	[d]0.023	0.008	[e]0.005	[f]2.43	[g]0.151	[h]20.29	[i]1.99	[j]0.012	0.011	[k]0.018	[l]0.067
2	[m]1.79	1.24	[n].90	[o].022		.005		2.44	[p].159	[q]20.30	1.99	[r].011	.008	.019	[s].070 [r].066
3	1.82	1.21	.92		.027	.008	[t].008	2.45	[u].149	[v]20.35	[w]1.95	[x].013	.008	.016	[y].064
4	1.81	1.22	[c].91	.022	.022	.007	.007	[f]2.46	[p].153	20.31	[i]1.95	[z].010	.012	.020	[l].070
5	1.85		[a′].94		.030		.011	2.44	[p].157	[q]20.37					[r].068
6	1.80	1.24	[b′].91		[c′].021		[e].006	[f]2.45	[p].151	[q]20.32	1.99		.010		[r].070
7	1.78	1.24			[d].026	.006	[c′].006	2.40	[p].145		2.02	[x].016			[r].070
Average	1.81	1.23	0.92	0.022	0.025	0.007	0.007	2.44	0.152	20.32	1.98	0.012	0.010	0.018	0.068
General average	1.81	1.23	0.92	0.024		0.007		2.44	0.152	20.32	1.98	0.012	0.010	0.018	0.068

[a] Precipitated at 40° C, washed with a 1-percent solution of KNO_3, and titrated with alkali standardized by the use of acid potassium phthalate and the ratio 23 NaOH:1P.

[b] Sample treated with HNO_3 (Sp. gr. 1.20), filtered and washed. Residue digested with HCl (Sp. gr. 1.19), filtered, washed, dried and burned.

[c] Potentiometric titration.

[d] Molybdenum-blue photometric method. See J. Research NBS **26**, 405 (1941) RP1386.

[e] 1-g sample burned in oxygen at 1,450° C, and sulfur dioxide absorbed in starch-iodide solution. Iodine liberated from iodide by titration, during the combustion, with standard KIO_3 solution. Titer based on 93-percent of the theoretical factor.

[f] Double dehydration with intervening filtration.

[g] Diethyldithiocarbamate photometric method. See J. Research NBS **47**, 380 (1951) RP2265.

[h] Nickel precipitated with dimethylglyoxime from an aliquot portion of a 2-g sample.

[i] Persulfate oxidation, potentiometric titration with $FeSO_4$.

[j] Mercury cathode-HNO_3 oxidation, potentiometric titration with $FeSO_4$.

[k] Cupferron separation after solution of the sample in diluted HCl (1+2). Vanadium separated by treatment with NaOH.

[l] Ether separation on a 10-g sample. Magnesium precipitated as phosphate. $Mg_2P_2O_7$ corrected for calcium and manganese.

[m] Gasometric method.

[n] KIO_4 photometric method.

[o] Weighed as ammonium phosphomolybdate.

[p] Electrolytic method.

[q] Dimethylglyoxime-electrolytic method after removal of copper.

[r] Spectrochemical determination.

[s] Magnesium precipitated as phosphate.

[t] Sulfur gases absorbed in NaOH–H_2O_2 solution and excess NaOH titrated with H_2SO_4.

[u] H_2S–CuS–CuO.

[v] Dimethylglyoxime-nickel oxide method.

[w] Perchloric acid oxidation.

[x] $FeSO_4$–$(NH_4)_2S_2O_8$–$KMnO_4$.

[y] Ether separation. Magnesium precipitated as phosphate.

[z] Ether-cupferron separation on a 10-g sample. Vanadium titrated with $KMnO_4$.

[a′] ZnO-Bismuthate method.

[b′] Bismuthate ($FeSO_4$–$KMnO_4$) method.

[c′] Titrating solution standardized by the use of a standard iron or steel.

List of Analysts

1. Ferrous Laboratory, National Bureau of Standards, J. I. Shultz, in charge. Analysis by E. June Maienthal and T. W. Freeman.
2. C. M. Davis, R. G. Lomell, and J. H. Haines, The International Nickel Co., Inc. Research Laboratory, Bayonne, N.J.
3. R. H. Elder and R. E. Deas, American Cast Iron Pipe Co., Birmingham, Ala.
4. J. B. Armstrong, Bethlehem Steel Co., Sparrows Point Plant, Sparrows Point, Md.
5. C. K. Mitchell, Lehigh Testing Laboratories, Wilmington, Del.
6. A. E. Schuh and C. P. Gaskill, United States Pipe and Foundry Co., Burlington, N.J.
7. J. Gurski, Ford Motor Co., Dearborn, Mich.

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A. V. ASTIN, *Director.*