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

National Bureau of Standards Certificate of Analyses

Standard Sample 7 G

Cast Iron

(High-Phosphorus)

ANALYST	C		Mn	P		S			Si	Cu	Ni	Cr	V	Mo	Ti	As	N
	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)	Evolution (HCl, sp. gr. 1.18, ZnS–iodine [b] theoretical sulfur titer [c])	Combustion Iodate titration	Perchloric acid dehydration	H_2S–CuS–CuO	Weighed as nickel dimethylglyoxime	$FeSO_4$–$KMnO_4$ titration	Colorimetric	H_2O_2 photometric		Distillation-titration
1	2.68	2.57	[d] 0.613	0.799	[e] 0.789	0.061	0.060	[f] 0.058	[g] 2.40	[h] 0.132	0.124	[i] 0.048	[j] 0.010	0.013	[k] 0.044	[l] 0.011	[m] 0.004
2	2.69	2.58	.619	.....	.806	.061	.....	[n] .060	[g] 2.44	.125	.122	[o] .047	[p] .012	.011	[q] .041	[r] .017	.004
3	2.69	2.61	[s] .611	.796	.799	.060	.....	[s] .060	[g] 2.40	[t] .129	.122	.048	[p] .010	.012	.048	[u] .010	[m] .004
4	2.69	2.58	[s] .613	.....	.804	.062	.....	.060	[v,g] 2.42	.126	.114	.045	[p] .012	.....	.041	.....	.....
5	2.69	2.59	[s] .62	.796	.784	.061	.061	.061	[v,g] 2.35	.123	.125	.049	[p] .010	.013	.048	[r] .016	[w] .007
6	[x] 2.71	.....	.594	.....	.777	.....	.....	[y] .062	2.43	[s] .135	.116	.051	[p] .009	[z] .011	.....	.....	[w] .003
Average	2.69	2.59	0.612	0.797	0.793	0.061	0.060	0.060	2.41	0.128	0.120	0.048	0.010	0.012	0.044	0.014	0.004
General average	2.69	2.59	0.612	0.794		0.060			2.41	0.128	0.120	0.048	0.010	0.012	0.044	0.014	0.004

[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 annealed by covering with a layer of graphite and heating for 20 min at 685°C.

[c] Value obtained by standardizing the titrating solution by means of sodium oxalate through $KMnO_4$ and $Na_2S_2O_3$, and use of the ratio 2I:1S.

[d] Potentiometric titration.

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

[f] 1-g sample burned in oxygen at 1,425°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.

[g] Double dehydration with intervening filtration.

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

[i] Chromium separated from the bulk of the iron in a 10-g sample by hydrolytic precipitation with $NaHCO_3$, oxidized with persulfate, and titrated potentiometrically with ferrous ammonium sulfate.

[j] Vanadium separated as in (i), oxidized with HNO_3 and titrated potentiometrically with ferrous ammonium sulfate.

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

[l] Molybdenum-blue photometric method. See J. Research NBS 24, 7 (1940) RP1267.

[m] Sulfuric acid digestion for 4 hr of 0.5-g sample. See J. Research NBS 43, 201 (1949) RP2021.

[n] Combustion gases absorbed in NaOH-H_2O_2, and excess NaOH titrated with H_2SO_4.

[o] Bicarbonate hydrolysis-perchloric acid oxidation.

[p] Bicarbonate hydrolysis - $FeSO_4$ - $(NH_4)_2S_2O_8$ - $KMnO_4$ method.

[q] Vanadium separated by Na_2CO_3 fusion.

[r] Distillation-H_2S-As_2S_3.

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

[t] Copper precipitated with $Na_2S_2O_3$ and finished by electrolysis.

[u] Distillation-titration.

[v] Sulfuric acid dehydration.

[w] Finished photometrically with Nessler's reagent.

[x] Volumetric method.

[y] Combustion gases absorbed in $AgNO_3$ solution, and liberated HNO_3 titrated with NaOH.

[z] KI-$Na_2S_2O_3$ titration.

[z'] α—benzoinoxime method.

Lists of Analysts

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The iron for the preparation of this standard was furnished by the American Cast Iron Pipe Company, Birmingham, Ala.

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