UNITED STATES DEPARTMENT OF COMMERCE
WASHINGTON 25, D. C.

National Bureau of Standards
Certificate of Analyses

Standard Sample 122 D
Cast Iron
(Car-Wheel)

ANALYST[1]	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)	Combustion	Evolution (HCl, sp. gr. 1.18, ZnS-iodine[b] theoretical sulfur titer[c])	Perchloric acid dehydration		Weighed as nickel dimethylglyoxime	$FeSO_4$–$KMnO_4$ titration		Photometric	H_2O_2 photometric		Distillation-titration
1	3.27	2.50	[d]0.499	0.282	[e]0.280	0.094	[f]0.093	0.096	[g]0.621	[h]0.055	0.031	[i]0.032	[j]0.012	0.004	[k]0.008	[e]0.018	[l]0.003
	[m]3.31 3.28	2.48	.507		.277	.093	[n].094		[g].63	[o].052	.025	[p].034	[q].011	.004	[r].009	[s].023	.005
3	[t]3.27		.50		.278		[u].090		.616	[v].060	.027	.031	[q].007	[w].007			
4	3.27	2.52	[x].506		.285 [e].287	.091	[x].091		.619	[y].054	.036	.030	[q].011	.004	[z].008		
5	3.32	2.50	[z1].504		.277		.086		[g].611	[z2].054	.028	[z3].034	.011	.004	.007		[z4].004
6	3.30	2.48	[x].510		.278	.093		[z5].089	[z6],[g].63	[o].050	.027	.033	[q].013	.005	.006		
7	3.23	2.48	[x].50		.278	.091			[z6],[g].64	[v].054	.031	.033	[q].009	.003	.005	[s].021	.004
Average	3.28	2.49	0.504	0.282	0.280	0.092	0.091	0.092	0.624	0.054	0.029	0.032	0.011	0.004	0.007	0.021	0.004
General average	3.28	2.49	0.504	0.280		0.092			0.624	0.054	0.029	0.032	0.011	0.004	0.007	0.021	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 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 the ratio 2I:1S.
[d] Potentiometric titration.
[e] Molybdenum-blue photometric method.
[f] 1-g sample burned in oxygen at 1,425°C, and sulfur dioxide absorbed in starch-iodide solution. The iodine was liberated from iodide by titration, during the combustion, with standard KIO_3 solution based on 93 percent of the theoretical factor.
[g] Double dehydration with intervening filtration.
[h] Diethyldithiocarbamate photometric method. See J. Research NBS **47**, 380 (1950) RP 2265.
[i] Chromium separated from the bulk of the iron 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 the sample in diluted HCl (1+2). Vanadium separated by treatment with NaOH.
[l] Sulfuric acid digestion for 4 hr of a 1-g sample. See J. Research NBS **43**, 201 (1949) RP2021.
[m] Gaseometric method.
[n] Combustion gases absorbed in NaOH–H_2O_2, and excess NaOH titrated with H_2SO_4.
[o] H_2S–CuS–CuO.
[p] Bicarbonate hydrolysis-perchloric acid oxidation.
[q] $FeSO_4$–$(NH_4)_2S_2O_8$–$KMnO_4$ method.
[r] Vanadium separated by Na_2CO_3 fusion.
[s] Distillation—H_2S–As_2S_3.
[t] Combustion-titration method.
[u] Combustion gases absorbed in $AgNO_3$ solution, and excess HNO_3 titrated with NaOH.
[v] H_2S—KI–$Na_2S_2O_3$ titration.
[w] Alpha-benzoinoxime method.
[x] Titrating solution standardized with a standard cast iron or steel.
[y] Finished by electrolysis.
[z] Spectrographic determination.
[z1] Bismuthate—$FeSO_4$–$KMnO_4$.
[z2] Neocuproine photometric method.
[z3] Diphenylcarbazide photometric method.
[z4] Finished photometrically with Nessler's reagent.
[z5] Solution in diluted HCl (1+1) and H_2S absorbed in ammoniacal cadmium chloride.
[z6] Sulfuric acid dehydration.

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