

U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 4F

CAST IRON

ANALYST *	C			Mn	P		S		Si	COPPER H ₂ S-CuS-CuO	NICKEL Weighed as nickel dimethylglyoxime	CHROMIUM FeSO ₄ -KMnO ₄ titration	VANADIUM	MOLYBDENUM Colorimetric by developing color with KCNS and SnCl ₂	TITANIUM Colorimetric
	Total	Graphitic	Combined	Persulfate-Arsenite	Gravimetric (weighed as Mg ₃ P ₂ O 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	Sulfuric acid dehydration						
1.....	3.07	2.58	0.49	^d 0.738 .730	0.106	^e 0.110	0.060	0.061	^f 1.34	0.010	0.012	^g 0.011	^h 0.032	0.0005	ⁱ 0.072
2.....	3.08	2.54	.54	.75	.117	.118	.063	.063	1.34	.009	.009	.018	.027	.001	.071
3.....	3.03	2.53	.50	.74	.115	.115	.064	.062	1.33	.011	.009	.015	.028	.001	.069
4.....	3.03	2.50	.53	.72	.108	.108	.057	^k 0.061	^l 1.34		^m 0.013	ⁿ 0.013	^o 0.030	.002	^p 0.070
5.....	3.03	2.48	.52	.75	.114	.114	.060	.062	^f 1.33	^q 0.012	^r 0.014	^s 0.012			^t 0.068
	3.09	2.57	.52	^u .73	.114	.114	.063	^v 0.057	1.35	.014	.015	.015	.032		^u 0.073
	3.02	2.48	.54	.75	.117	.114	.060	^w 0.060	1.35	.013	.012	.010	.039	.002	^v 0.073
8.....	3.06	2.54	.52	^x 0.716	.109	^y 0.109	.061	^z 0.061	^{aa} 1.31	^{ab} 0.015	.016	.014	.029	.001	^{ac} 0.064
9.....	3.08	2.59	.49	.728	.104	.105	.060	.060	^{ad} 1.34	^{ae} 0.011	^{af} 0.010	.011	.025	.001	^{ag} 0.069
10.....	2.96	2.49	.47	.74	.107	.107	.063	.063	^{ah} 1.39	.015	.014	^{ai} 0.012			^{aj} 0.064
11.....	3.05	2.52	.53	^{ak} 0.72	.111	.111	.063	.063	^{al} 1.34	.012	.014	^{am} 0.010	^{an} 0.033	.001	^{ao} 0.08
12.....	3.01	2.49	.52	.72	.109	.109	.062	.062	^{ap} 1.36	.011	.014	^{aq} 0.010			^{ar} 0.078
Averages....	3.04	2.53	0.51	0.733	0.111	0.111	0.061	0.061	1.34	0.012	0.013	0.013	0.031	0.001	0.071
General average....	3.04	2.53	0.51	0.733	0.111	0.111	0.061	0.061	1.34	0.012	0.013	0.013	0.031	0.001	0.071

^a Precipitated at 40° C, washed with a 1-percent solution of KNO₃ and titrated with alkali standardized by the use of National Bureau of Standards acid potassium phthalate and the ratio 23NaOH:1P.
^b Sample annealed by covering with a layer of graphite, and heating for 20 minutes at 685° C.
^c Value obtained by standardizing the titrating solution by means of sodium oxalate through KMnO₄ and Na₂S₂O₈, and the use of the ratio 2I:1S.
^d Bismuthate oxidation, ferrous sulfate-permanganate titration.
^e Colorimetric method. See J. Research NBS 26, 405 (1941) RP1386.
^f Double dehydration.
^g Persulfate oxidation and potentiometric titration with ferrous ammonium sulfate solution standardized

with recrystallized potassium dichromate.
^h Nitric acid oxidation and potentiometric titration with ferrous ammonium sulfate solution standardized with recrystallized potassium dichromate.
ⁱ Solution in HCl (1+2). A few ml of a 6-percent solution of cupferron added. Precipitate ignited, vanadium separated by fusion with sodium carbonate.
^j Titrating solution standardized by use of a standard iron.
^k Combustion in oxygen.
^l Perchloric acid dehydration.
^m KCN-dimethylglyoxime colorimetric method.
ⁿ Potentiometric titration with ferrous ammonium sulfate.
^o Determined in residue from HCl (1+2) attack.
^p Ammonia-copper complex colorimetric method.

^q Dimethylglyoxime colorimetric method.
^r Diphenylcarbazide colorimetric method.
^s Bismuthate-arsenite.
^t Solution in HCl (1+1). Titrating solution standardized by use of a standard steel.
^u Solution in HCl (1+1). Titrating solution standardized by use of a standard iron.
^v Copper precipitated with KCNS. Precipitate dried at 105° C and weighed as CuCNS.
^w Finished by electrolysis.
^x Glyoxime precipitate titrated with KCN.
^y Sample treated with HCl (1+1). Solution filtered, filtrate treated with sodium thiosulfate, and precipitate added to the residue from HCl attack.
^z Solution in HCl (1+1).
^{aa} Perchloric acid oxidation.

* LIST OF ANALYSTS

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