

UNITED STATES DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

Standard Sample 107A

Nickel-Chromium-Molybdenum Cast Iron

ANALYST	C		Mn		P		S		Si	Cu	Ni	Cr	V	Mo		Ti
	Total	Graphitic	Bismuthate (FeSO ₄ -KMnO ₄)	Persulfate-Arsenite	Gravimetric (weighed as Mg ₂ P ₂ O ₇ after removal of arsenic)	Alkali-Molybdate *	Gravimetric (direct oxidation and precipitation after reduction of iron)	Combustion	Perochloric acid dehydration	H ₂ S-CuS-CuO	Weighed as nickel dimethylglyoxime	FeSO ₄ -KMnO ₄ titration		Gravimetric	Colorimetric	Colorimetric
1-----	2.70	1.86		^b 0.582	0.286	^c 0.28	0.095	^d 0.094	^{e,f} 1.36	0.106	0.968	^g 0.479	^h 0.029	ⁱ 0.762	0.77	^j 0.033
-----	2.72	1.83	.587	^k 1.585	.278	^l .278	-----	^m 1.094	1.33	ⁿ .103	.96	.469	^b .028	-----	.774	ⁱ 0.036
3-----	2.71	1.81	^o .58	^l .58	.275	.277	.096	^d 1.097	1.35	ⁿ .101	.970	.479	^p .031	ⁱ .760	-----	^q 0.031
4-----	2.74	1.82	.579	-----	.278	.275	.096	-----	1.35	^r .098	.961	.481	^o .024	ⁱ .777	-----	-----
5-----	2.69	1.86	-----	^l .579	-----	^l .276	-----	^d .093	^e 1.36	ⁿ .111	.98	.491	.025	ⁱ .784	-----	.040
6-----	2.74	1.85	-----	^u .581	.275	-----	.093	-----	^f 1.33	ⁿ .101	^v .966	^w .475	^p .029	-----	.765	ⁱ 0.037
7-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	ⁱ .771	.773	-----
Average--	2.72	1.84	0.582	0.581	0.278	0.277	0.095	0.095	1.35	0.103	0.968	0.479	0.028	0.771	0.771	0.035
General average.	2.72	1.84	0.582	0.581	0.278	0.277	0.095	0.095	1.35	0.103	0.968	0.479	0.028	0.771	0.771	0.035

^a Precipitated at 40° C, washed with a 1-percent solution of KNO₃ and titrated with alkali standardized by the use of acid potassium phthalate and the ratio 23NaOH:1P.

^b Potentiometric titration.

^c Molybdenum-blue photometric method. See J. Research NBS 26, 401 (1941) RP1386.

^d 1-g burned in oxygen at 1,425° C, and sulfur dioxide absorbed in starch-iodine solution. Iodine liberated from iodide by titration, during the combustion, with standard KIO₃ solution based on 93 percent of the theoretical factor.

^e Sulfuric acid dehydration.

^f Double dehydration with intervening filtration.

^g Chromium separated from the bulk of iron in a 5-g sample by NaHCO₃ hydrolysis, oxidized with persulfate, and titrated potentiometrically with ferrous ammonium sulfate.

^h Vanadium separated as in (g), oxidized with HNO₃, and titrated potentiometrically with ferrous ammonium sulfate.

ⁱ Alpha-benzoinoxime method. See BS J. Research 9, 1 (1932) RP453.

^j Solution in HCl(1:2). Precipitation with cupferron. Precipitate ignited, fused in KHSO₄, and vanadium separated with NaOH.

^k Bismuthate-arsenite method.

^l Titrating solution standardized by use of a standard iron or steel.

^m Combustion at 2,500° F.

ⁿ Finished by electrolysis.

^o Chromium removed by volatilization as CrO₂Cl₂.

^p Bicarbonate hydrolysis, phosphotungstovanadate photometric method.

^q Cupferron-hydroquinone photometric method.

^r KI-Na₂S₂O₃ titration.

^s FeSO₄-(NH₄)₂S₂O₈-KMnO₄ titration.

^t Alpha-benzoinoxime-PbMoO₄ method.

^u KIO₃ photometric method.

^v Dimethylglyoxime photometric method.

^w Chromium separated as in (g) and titrated with FeSO₄-K₂Cr₂O₇, using diphenylaminesulfonate indicator.

List of Analysts

1. Ferrous Laboratory, National Bureau of Standards, John L. Hague in charge. Analysis by J. I. Shultz, C. T. Litsey, and J. R. Baldwin.
2. D. Harmon and A. B. Cargill, Allegheny Ludlum Steel Corp., Dunkirk, N. Y.
3. Perkins, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.
4. A. Finlayson and H. A. Conyne, Pacific Car and Foundry Co., Renton, Wash.
5. W. E. Steiner, Bethlehem Steel Corp., Johnstown, Pa.
6. M. D. Cooper, Research Laboratories, General Motors Corp., Detroit, Mich.
7. R. H. Maurer, Climax Molybdenum Co., Detroit, Mich.

The iron for the preparation of this standard was furnished by the International Nickel Co.

WASHINGTON, D. C., September 28, 1950.

E. U. CONDON, *Director*.