

UNITED STATES DEPARTMENT OF COMMERCE
WASHINGTON

National Bureau of Standards

Certificate of Analyses

Standard Sample 122 C

Cast Iron

(Car-Wheel)

ANALYST	C		Mn		P	S		Si	Cu	Ni	Cr	V	Mo	Ti	N	
	Total	Graphitic	Bismuthate (FeSO ₄ -KMnO ₄)		Persulfate-Arsenite	Gravimetric (weighed as Mg ₂ P ₂ O ₇ after removal of arsenic)	Alkali-Molybdate ^a	Gravimetric (direct oxidation and precipitation after reduction of iron)	Combustion	Evolution with HCl (sp. gr. 1.18) ^b ZnS-Iodine (theoretical sulfur titre) ^c	Sulfuric acid dehydration	H ₂ S-CuS-CuO	Weighted as nickel dimethylglyoxime	FeSO ₄ -KMnO ₄ titration	Colorimetric	Colorimetric
1	3.06	2.34	0.551	0.289	0.288	0.115	0.114	0.111	0.637	0.051	0.023	0.033	0.012	0.003	0.009	0.005
2	3.05	2.35	0.545	.291	.288	.115			0.641	0.049	0.026	0.034	.014	.003	0.01	.004
3	3.08	2.38	.55	.54	.281			0.116	0.65			0.037				
4			0.56			.12		0.12	0.62							
Averages	3.06	2.36	0.552	0.546	0.290	0.286	0.116	0.116	0.637	0.050	0.024	0.035	0.013	0.003	0.010	0.005
General average	3.06	2.36	0.549		0.287		0.115		0.637	0.050	0.024	0.035	0.013	0.003	0.010	0.005

^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 Sample annealed by covering with 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 use of the ratio 21:1S.

^d Potentiometric titration.

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

^f 1-g sample burned in oxygen at 1,400° C, and sulfur dioxide absorbed in starch-iodine solution. The iodine was liberated from iodide by titration, during the combustion,

with standard KIO₃ solution based on 93 percent of the theoretical factor.

^g Double dehydration with intervening filtration.

^h Diethylthiocarbamate photometric method. See J. Research NBS 47, 380 (1950) RP2265.

ⁱ Chromium separated from the bulk of iron in a 10-g sample by hydrolytic precipitation with NaHCO₃. Persulfate oxidation and potentiometric titration with ferrous ammonium sulfate.

^j Vanadium separated as in (i). Nitric acid oxidation and potentiometric titration 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 hours of a 0.5-g sample. See J. Research NBS 43, 201 (1949) RP2021.

^m Perchloric acid dehydration.

ⁿ KI-Na₂S₂O₈ titration.

^o Dimethylglyoxime precipitation, KCN titration.

^p Perchloric acid oxidation.

^q Ether-cupferron-H₂O₂. Vanadium separated with NaOH.

^r Titrating solution standardized with a standard iron.

^s Nitric-sulfuric acid dehydration.

^t Permanganate oxidation.

^u Arsenite titration.

List of Analysts

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| <p>1. Ferrous Laboratory, National Bureau of Standards. Analysis by J. I. Shultz, C. C. Marshall, R. A. Paulson, E. J. Maienthal, and H. Jacobson.</p> <p>2. J. B. Armstrong, Bethlehem Steel Co., Sparrows Point Plant, Sparrows Point, Baltimore, Md.</p> | <p>3. V. E. Amspacher, The Pennsylvania Railroad Chemical Laboratory, Altoona, Pa.</p> <p>4. George Horn, American Car and Foundry Co., St. Louis, Mo.</p> |
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The iron for the preparation of this standard was furnished by the Association of Manufacturers of Chilled Car Wheels.

WASHINGTON, D. C., March 31, 1955.

A. V. ASTIN, *Director.*