

U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 12E

BASIC OPEN-HEARTH STEEL, 0.4% CARBON

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
	Direct combustion	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)	Evolution with HCl (1:1) ZnS-Iodine (theoretical sulfur titre) ^b	Combustion	Sulfuric acid dehydration					
	0.369	0.709	0.711	0.014	^c 0.013	0.025	0.027		^d 0.279	0.140	0.061	^e 0.050	^f 0.001	0.015
	.369		^g .71	.013	^g .014	.028	.026		.271	^h .137	.055	.054	<.002	ⁱ .018
3	.371		.704		.014	.022	^g .028		^d .282	^h .142	.057	.050	.002	.014
4	.368		^g .703		^g .014		^g .027	^k 0.027	^j .276	^l .140	.057	.050	.003	.016
5	.370	^m ^g .705	^g .707		^g .016	.025		^k .025	.277	ⁿ .148	^o .06	.049	.002	.016
6	.378		^g .70	.015	^g .014	.025	^g .025	^k .025	.283	.142	.059	^e .047	^p .002	.014
Averages	0.371	0.707	0.706	0.014	0.014	0.025	0.027	0.026	0.278	0.142	0.058	0.050	0.002	0.016
General average	0.371	0.706		0.014			0.026		0.278	0.142	0.058	0.050	0.002	0.016

^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 Value obtained by standardizing the titrating solution by means of sodium oxalate through KMnO₄ and Na₂S₂O₅, and use of the ratio 21:18.
^c Molybdenum-blue photometric method. See J. Research NBS 26, 405 (1941) RP1386.

^d Double dehydration.
^e Persulfate oxidation and potentiometric titration with ferrous ammonium sulfate.
^f Nitric acid oxidation and potentiometric titration with ferrous ammonium sulfate.
^g Titrating solution standardized with a standard steel.
^h Finished by electrolysis.
ⁱ MoS₂-MoO₃-PbMoO₄ method.

^j Perchloric acid dehydration.
^k Sulfur dioxide absorbed in starch-iodine solution. Titration with KIO₃ solution.
^l KI-Na₂S₂O₃ titration.
^m Arsenite titration.
ⁿ Na₂S₂O₅-α-benzoinoxime-CuO method.
^o Glyoxime precipitate titrated with KCN.
^p H₂O₂ colorimetric method.

*LIST OF ANALYSTS

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| <ol style="list-style-type: none"> 1. Ferrous laboratory, National Bureau of Standards, John L. Hague in charge. Analysis by J. P. Hewlett, Jr., J. I. Shultz, Jewel Doran, and Florence Yenchius. 2. J. B. Armstrong, Bethlehem Steel Co., Sparrows Point, Md. 3. H. J. Jameson, S. Partington, and H. Laine, The Detroit Testing Laboratory, Detroit, Mich. | <ol style="list-style-type: none"> 4. C. G. Hummon, Sheffield Steel Corporation, Kansas City, Mo. 5. R. F. Lab., L. W. Grimsley, and L. Oakley, Copperweld Steel Co., Warren, Ohio. 6. C. O. Geyer, Inland Steel Co., Indiana Harbor Works, East Chicago, Ind. |
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The steel for the preparation of this standard was furnished by the Inland Steel Co.

WASHINGTON, September 30, 1944.

LYMAN J. BRIGGS, *Director.*