

U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 15D

BASIC OPEN-HEARTH STEEL, 0.1% 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					
1.....	0. 097	0. 388	0. 393	0. 018	° 0. 018	0. 032	0. 033	.....	^d 0. 082	0. 057	0. 024	^o 0. 062	^f 0. 001	0. 006
2.....	. 101	.....	. 395	.....	^g 0. 019	. 034	^g 0. 034	^h 0. 034	^{i, d} 0. 075	^j 0. 055	. 025	^k 0. 060	.....	. 006
.....	. 101	. 396	. 395	.....	. 018	. 032	.....	^l 0. 034	ⁱ 0. 076	^m 0. 056	. 022	. 057	.....	. 006
.....	. 099	.....	. 398	.....	^g 0. 017	. 033	.....	ⁿ 0. 033	^{i, d} 0. 077	. 055	. 025	. 059	.....	. 009
5.....	. 098	.....	. 396	.....	^g 0. 017	.....	^g 0. 033	.....	ⁱ 0. 079	^o 0. 052	^p 0. 024	^q 0. 061	.....	. 008
6.....	. 100	.....	. 398	.....	. 018	.....	^r 0. 035	.....	^{i, d} 0. 080	^j 0. 052	. 026	. 060	.....	. 006
7.....	. 103	.....	. 39	. 017	. 018	. 033	. 034	.....	. 083	^o 0. 050	. 022	. 060	^s 0. 001	. 007
Averages.....	0. 100	0. 392	0. 395	0. 018	0. 018	0. 033	0. 034	0. 034	0. 079	0. 054	0. 024	0. 060	0. 001	0. 007
General average	0. 100	0. 393		0. 018		0. 033			0. 079	0. 054	0. 024	0. 060	0. 001	0. 007

^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 Na₂S₂O₈, and use of the ratio 2I:1S.
^c Colorimetric method. See J. Research NBS 26, 405 (1941) RP1386.
^d Double dehydration.
^e Persulfate oxidation and potentiometric titration

with ferrous ammonium sulfate solution standardized with recrystallized potassium dichromate.
^f Nitric acid oxidation and potentiometric titration with ferrous ammonium sulfate solution standardized with recrystallized potassium dichromate.
^g Titrating solution standardized by use of a standard steel.
^h Absorbed in neutral hydrogen peroxide. Titrated with NaOH standardized with standard steels.
ⁱ Perchloric acid dehydration.
^j Thiosulfate-electrolytic.
^k Diphenylcarbazide colorimetric method.

^l Sulfur dioxide absorbed in starch-iodide solution Titration with KIO₃. See Steel 111 No. 9, 56 (1942).
^m Alpha-benzoinoxime method.
ⁿ Absorbed in H₂O₂-NaOH solution. Titrated with H₂SO₄.
^o Hydrogen sulfide-electrolytic.
^p Dimethylglyoxime colorimetric method.
^q Perchloric acid oxidation.
^r Dissolved in HCl (2:1).
^s Colorimetric.

* LIST OF ANALYSTS

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The steel for the preparation of this standard was furnished by the Bethlehem Steel Co.

WASHINGTON, December 3, 1943.

LYMAN J. BRIGGS, *Director.*