

Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE No. 32b

CHROME-NICKEL STEEL

ANALYST*	C	Mn		P	S		Si	Ni	Cr	VANADIUM	MOLYBDENUM	ARSENIC		
	CARBON Direct combustion	MANGANESE 1. Bismuthate (FeSO ₄ -KMnO ₄) 2. Other methods	PHOSPHORUS 1. Alkali-Molybdate 2. Gravimetric (Weighed as Mn ₃ P ₂ O ₇ after removal of arsenic)	SULPHUR 1. SULPHUR Gravimetric (Direct oxidation and final precipitation in reduced solution) 2. SULPHUR Evolution with HCl (1:1) ZnS-Iodine (theoretical sulphur titre b)	SILICON Sulphuric acid dehydration	COPPER H ₂ S-CuS-CuO	NICKEL Weighed as nickel dimethylglyoxime		CHROMIUM FeSO ₄ -KMnO ₄ titration					
1	0.413	0.624 ^e	0.623 ^d	0.015	0.016	0.018	0.017	0.220	0.117	{ 1.21 1.20 ^e }	0.642 ^f	0.008	0.006 ^g	0.015 ^h
2	.420	.62 ^e	.62 ⁱ	.014		.017	.017	.215	.11 ^j	1.20	.62 ^f			
3	.420		.63 ^k	.015 ^o		.020 ^m	.019 ⁿ	.230	.125 ⁱ	1.22 ^g	.65			
4	.412		.636 ⁱ	.013 ^l	.013	.020	.019	.211	.132	1.20	.637			
	.406		.614 ^k	.017	.016	.019	.020	.216	.120	1.21	.653	.007	.006	.018
6	.412	.63 ^e	.64 ⁱ	.015		.019	.018	.218	.113	1.19 ^e	.63		.006	
7	.42	.621 ^e		.016	.017 ^p	.016 ^m	.016	.22	.11	1.19	.635			
8	.404	.623	{ .619 ^l .620 ^q }	.015		.017	.019	.212		1.20	.643 ^f	.002	.003	
9	.41	.62 ^e		.013		.016	.015	.22		1.24 ^r	.63			
10	.414	.626 ^e		.017		.017	.015	.21	.11	1.19	.63			
11	.409 ^s		.629 ^t	.016			.018	.212		1.22 ^e	.644			
12	.420		.614 ^u	.015			.018	.217	.119	1.22	.642			
Averages	.413	.623	.625	.015	.016	.018	.018	.217	.117	1.21	.638	.006	.005	.017
General Averages	.413	.624		.016		.018		.217	.117	1.21	.638	.006	.005	.017

* Precipitated at 40° C., washed with a 1 per cent solution of KNO₃ and titrated with alkali standardized by means of B. S. benzoic acid and the 2:1 ratio.
Value obtained by standardization of titrating solution against sodium oxalate through KMnO₄ and Na₂S₂O₈.
o Chromium and vanadium removed before the bismuthate oxidation.
d Electrometric titration with HgNO₂.
e Finished by electrolysis.
f Electrometric titration.

* Colorimetric by developing color with KSCN and SnCl₂.
h Distilled as AsCl₃, precipitated as As₂S₃, converted to arsenate, precipitated as Ag₃AsO₄, dissolved in HNO₃ and titrated with KSCN.
i Persulphate-arsenite.
j Finished by electrolysis.
k Bismuthate-arsenite.
l Acid-alkali solution standardized against a standard steel.
m Precipitated in FeCl₂ solution.

* Titrating solution standardized against a standard steel.
e Precipitated with dimethylglyoxime, dissolved and titrated with KCN.
p Weighed as yellow precipitate.
q Volhard's method.
r Direct cyanide titration.
s Solution in double chloride of copper and potassium.
t ZnO-lead peroxide-arsenite.
u ZnO-persulphate-arsenite.

* LIST OF ANALYSTS

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| 1. Ferrous Laboratory, Bureau of Standards, H. A. Bright, in charge; analysis by C. P. Larrabee and W. C. Fedde. | 7. H. E. Campbell, Carnegie Steel Co., Clairton, Pa. |
| 2. H. E. Slocum, Jones & Laughlin Steel Corporation, Pittsburgh, Pa. | 8. Earl R. Vance, The Timken Roller Bearing Co., Canton, Ohio. |
| W. F. Lantz, Bethlehem Steel Co., Bethlehem, Pa. | 9. F. L. Clifton and R. G. Schaeffer, General Motors Corporation, Detroit, Mich. |
| A. D. Beers, Illinois Steel Co., Gary, Ind. | 10. J. V. Emmons, Cleveland Twist Drill Co., Cleveland, Ohio. |
| 5. W. F. Muehlberg, Newburgh Steel Works, Cleveland, Ohio. | 11. G. M. Berry, Halcomb Steel Co., Syracuse, N. Y. |
| 6. W. D. Brown, Carnegie Steel Co., Duquesne, Pa. | 12. Karl Pitschner, American Chain Co., Bridgeport, Conn. |

This standard is not recommended for colorimetric carbon determinations because of uncertainty as to the condition of the carbon.

Washington, D. C.
September 20, 1927

George H. Burgess
Director.