

DEPARTMENT OF COMMERCE

Bureau of Standards

Certificate of Analysis

OF

STANDARD SAMPLE No. 33 a

NICKEL STEEL

ANALYST.	CARBON.	SILICON.		PHOSPHORUS (ALKALI-MOLYBDATE).	SULPHUR.		MANGANESE.		NICKEL.		CHROMIUM	COPPER (CuS-CuO).	COBALT.	ARSENIC.	MOLYBDENUM.	VANADIUM.
		SULPHURIC ACID DE-HYDRATION.	OTHER METHODS.		GRAVIMETRIC, DIRECT OXIDATION (final precipitation in reduced solution).	EVOLUTION ZNS-IODATE (theoretical sulphur titre o).	BISMUTHATE METHOD (after removal of Cr and V by precipitation with NaHCO ₃).	OTHER METHODS.	DIMETHYLGLYOXIME METHOD.	OTHER METHODS.						
1	.294	.125		{.028} b.027	.029	.027	.445	c.457	3.23	c3.24	{c.200 .195}	c.079 •075	c.040	.012	.01	Trace.
2	.292	.122		.026	.030	.027	.444		3.22	c 3.24	d.198	{e.081 .074}	.031		.008	d < .002
3	.305	.126		.028	.029	.027		f.47	3.23		.219	.084				
4	.290	.125		.027	.030			g.461	3.20		.19	.090				
5	.298	.125	.126	.025	.028	.030	.44	i.45		h 3.22	.18	{e.08 .09}				
6	.301	.117	l.120	.028	.026		.460	j.460	3.22	v 3.23	d.203	{k.068 .072}				
7	.289	.122		.028	.029	.028		g.47	3.23			m.10				
8	.299	.132		.029	.031	.026		i.463	3.28		n.177	.083				
9	{o.297 .295}	.120	q.116	{r.025 .026}	{p.031 .032}	.028	.466	f.448	3.26		{s.188 d.199}	{k.066 .072}	.052		.012	
10	{t.311 o.305}	.132		.026	{p.031 .032}	.026	.439	u.456	3.26	h3.23	.212	{k.075 .086}				
11	.31	.123		.020				u.474		v3.24	s.206	h.084				
AVERAGE	.299	.124	.121	.027	.030	.027	.449	.461	3.24	3.23	.197	.080	.041	.012	.010	< .002
GENERAL AVERAGE	.299	.124		.027	.030	.027	.456		3.24		.197	.080	.041	.012	.010	< .002

NOTE.—By the use of methods employing empirical titres for evolution sulphur an average of 0.029% was obtained by eight analysts.

a Value obtained by standardization of titrating solution against sodium oxalate through KMnO₄ and Na₂S₂O₅.
 b Gravimetric, weighed as Mg₂P₂O₇.
 c Method described in J. Ind. & Eng. Chem., 13, 1921, 540.
 d Electrometric titration.
 e Electrolysis.
 f Ford Williams.
 g Persulphate—Arsenite.
 h Direct cyanide titration.

i Bismuthate—Arsenite.
 j Titrated electrometrically with mercurous nitrate after oxidation with bismuthate.
 k Na₂S₂O₅-CuS-CuO.
 l HCl dehydration.
 m Color comparison method.
 n KClO₃-FeSO₄-KMnO₄.
 o Mixed with red lead.
 p Precipitated in FeCl₃ solution.
 q Solution in nitric and hydrochloric acids.

r Reduced in Jones reductor and titrated with KMnO₄.
 s KMnO₄ oxidation.
 t Combustion of residue after solution in copper potassium chloride.
 u Removed chromium with ZnO; then PbO₂-arsenite.
 v Precipitated nickel as nickel-dimethylglyoxime, dissolved the precipitate, and titrated with KCN.

INDEX TO ANALYSTS

- James I. Hoffman, Bureau of Standards.
- Routine Laboratory, Bureau of Standards, H. A. Bright in charge.
- G. H. Corey, Ledoux & Co., New York, N. Y.
- John W. Horne, The Timken Roller Bearing Co., Canton, Ohio.
- W. D. Huffman, General Motors Corporation, Detroit, Mich.
- R. T. Bohn, Midvale Steel & Ordnance Co., Philadelphia, Pa.

- M. B. Mayfield, Pittsburgh Testing Laboratory, Pittsburgh, Pa.
- A. S. Townsend, Cleveland Twist Drill Co., Cleveland, Ohio.
- Paul L. Tyson, Carpenter Steel Co., Reading, Pa.
- Geo. M. Berry, Halcomb Steel Co., Syracuse, N. Y.
- C. M. Johnson, Crucible Steel Co. of America, Pittsburgh, Pa.

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Washington, D. C.

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