

U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 101c

18 CHROMIUM—9 NICKEL STEEL

ANALYST*	C	Mn	P		S		Si	Ni	Cr	VANADIUM	MOLYBDENUM Colorimetric	COBALT Zinc oxide- α -nitroso- β -naphthol	COLUMBIUM	TIN	NITROGEN—Distillation Solution		
	Direct combustion	Zinc Oxide-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 (HCl sp gr 1.18-ZnS ₂ after theoretical sulfur titer. ^b	Combustion		Perchloric acid dehydration							COPPER H ₂ S-CuS-CuO	Weighted as nickel dimethylglyoxime
1.....	0.074	0.644	0.023	0.024	0.016	0.016	0.016	0.586	0.123	9.25	18.21	0.051	0.094	0.085	0.103	0.007	0.036
2.....	.073	1.638		0.025			0.016	.595	0.127	9.26	18.22		.10	0.095		0.008	0.034
3.....	.070	.642		.023	.018		0.018	0.601	0.130	9.26	18.18	0.046	0.093	0.077	0.098		0.035
4.....	.074	.655		0.023	.017		0.018	.592	0.127	9.28	18.20	0.049	0.098	0.089	0.115	0.009	0.034
5.....	.072	1.647	0.023	0.023	0.016		0.016	0.576	0.118	9.29	18.24	0.052	0.096	0.078	0.109	0.009	0.036
6.....	.074	1.622		.024	0.016	0.015	0.014	0.594	0.126	9.26	18.23	0.046	0.090		0.116		0.034
.....	.069	1.632	.021	.022	0.016		0.015	0.582	.114	9.31	18.22	0.048		0.08	0.095	0.009	0.036
Averages	0.072	0.640	0.022	0.023	0.017	0.016	0.016	0.589	0.124	9.27	18.21	0.049	0.095	0.084	0.106	0.008	0.035
General averages	0.072	0.640	0.023			0.016		0.589	0.124	9.27	18.21	0.049	0.095	0.084	0.106	0.008	0.035

^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 Value obtained by standardizing the titrating solution by means of sodium oxalate through KMnO₄ and use of the ratio 2I:1S.
^c Bicarbonate-bismuthate-FeSO₄-KMnO₄ titration method.
^d Molybdenum-blue photometric method.
^e 1-g sample burned in oxygen at 1,400° C, and sulfur dioxide absorbed in starch-iodine solution. Iodine liberated from iodide by titration, during the combustion, with standard KIO₃ solution based on 93 percent of the theoretical factor.
^f Double dehydration with intervening filtration.
^g Persulfate oxidation and potentiometric titration with ferrous ammonium sulfate standardized against potassium dichromate.
^h Nitric acid oxidation, potentiometric titration with ferrous ammonium sulfate.
ⁱ HCl solution of a 10-g sample treated with cupferron. Precipitate ignited, fused in bisulfate, leached with HCl,

diluted and treated with H₂SO₄. Precipitate filtered, ignited, treated with H₂SO₄-HClO₄-HF. Solution treated with excess of NH₄OH, and filtered. Precipitate digested with HCl, diluted and treated with H₂SO₄. Mixed oxides ignited, weighed and calculated to Cb by use of ratio 2Cb:Cb₂O₃.
^j Sulfide-iodine method. See BS J. Research 8, 309 (1932) RP415.
^k Semimicrodistillation-titration method. 0.5 g sample digested 4 hours with H₂SO₄.
^l Chromium volatilized as CrO₂Cl₂.
^m CuCNS precipitation, CuCl₂ photometric method.
ⁿ Ether extraction-CrO₂Cl₂ volatilization-cupferron- α -nitroso- β -naphthol method.
^o Solution in HCl, distillation-titration method.
^p Sulfur gases absorbed in NaOH-H₂O₂. Titration with H₂SO₄.
^q Copper-ammonia complex photometric method.
^r Glyoxime precipitate titrated with KCN and AgNO₃.
^s Cupferron-KMnO₄ titration method.
^t Double hydrolysis from acid solution with H₂SO₄.
^u Solution in HCl-HF, distillation-titration method.

^v Diethyldithiocarbamate photometric method.
^w CrO₂Cl₂ volatilization. Differential titration with o-phenanthroline indicator.
^x ZnO-HCl photometric method.
^y Double hydrolysis from acid solution with H₂SO₄, with intervening treatment with NH₄OH.
^z Weighed as ammonium phosphomolybdate.
¹ H₂S- α -benzoinoxime-CuO method.
² Nitroso R-photometric method.
³ As in (t), photometric determination using H₂O₂ color.
⁴ PbCrO₄-bismuthate-arsenite method.
⁵ Meinel method.
⁶ H₂S-phenylthiohydantoic acid-CuO method.
⁷ As in (o), finished photometrically with Nessler's reagent.
⁸ As in (e), except tin used as flux, and factor based on standard steel.
⁹ Cupferron-double SO₂ hydrolysis. Columbium reduced and titrated with KMnO₄.
¹⁰ As in (u), except insoluble residue fumed in H₂SO₄ and added to main solution.

* LIST OF ANALYSTS

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steel for the preparation of this standard was furnished by the Rustless Iron and Steel Division of the American Rolling Mill Co.

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E. U. CONDON, Director.