U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 55 B

OPEN-HEARTH IRON

ANALYST*	C	Mn	P		S		Si	COPPER H_2S-CuS-CuO	NICKEL Weighed as nickel dimethylglyoxime	CHROMIUM $FeSO_4$-$KMnO_4$ titration	VANADIUM	MOLYBDENUM Colorimetric	COBALT	TIN	ALUMINUM (total)	ALUMINUM OXIDE (Al_2O_3)	ARSENIC	NITROGEN
			Gravimetric (weighed as $Mg_2P_2O_7$ after removal of arsenic)	Alkali-Molybdate [a]	Gravimetric (direct oxidation and final precipitation in reduced solution)	Evolution with HCl (1–1) ZnS-Iodine (theoretical sulfur titre) [b]	Sulfuric acid dehydration											
1	[c]0.010$_7$	[d]0.015	0.002	[e]0.003	0.019	0.020	0.001	0.042	0.016	[f]0.002	<0.001	0.003	[g]0.006	[h]0.005	0.002	[i]0.001	[j]0.009	[k]0.003
2	[c].009$_4$	[d].017		.003		[l].018	[m].001	[n].039	.016	[o].003		.004	[g].005	[p].007	.002	[q].002		
3	[r].010$_2$	[s].018		[t].004		[u].019	[v].001	[n].042	.016	[t].004		.004	[w].006	[x],[t].006	.003			
4	[r].009$_7$	[y].014	[z].003		[z1].018	.019	.001	[z2].042										
5	[c].011$_5$	[d].017	.003	.003	.016	.018	.001	[z3].039	.015			[z4].003	[z5].008					
6	[c].011$_6$	[z6].015		.002		.021	[v].001	[z3].046	.019	[z7].001		.005	[z6].005	[z8].007	.003			
7	[r].010$_9$																	
	[r].009$_6$																	
ges	**0.010$_5$**	**0.016**	**0.003**	**0.003**	**0.018**	**0.019**	**0.001**	**0.042**	**0.016**	**0.003**	**<0.001**	**0.004**	**0.006**	**0.006**	**0.003**	**0.002**	**0.009**	**0.003**
General average	**0.010$_5$**	**0.016**	**0.003**		**0.019**		**0.001**	**0.042**	**0.016**	**0.003**		**0.004**	**0.006**	**0.006**	**0.003**	**0.002**		

[a] Precipitated at 40° C, washed with a 1-percent solution of KNO_3, 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 $KMnO_4$ and $Na_2S_2O_3$, and the use of the ratio 2I:1S.

[c] Direct combustion.

[d] 10-g samples extracted with ether. Bismuthate ($FeSO_4$-$KMnO_4$) method.

[e] Molybdenum-blue photometric method. See J. Research NBS 26, 405 (1941) RP1386.

[f] 10-g sample, bicarbonate hydrolysis, persulfate oxidation and potentiometric titration with ferrous ammonium sulfate.

[g] Ether separation on a 10-g sample. Double ZnO precipitation and cobalt precipitated with α-nitroso-β-naphthol. Ignited precipitated dissolved and acid solution treated with H_2S, filtered, cobalt precipitated with α-nitroso-β-naphthol, ignited and weighed as Co_3O_4. See BS J. Research 7, 883 (1931) RP380.

[h] 50-g sample, H_2S-distillation-cupferron method. Determination made by R. K. Bell. See BS J. Research 8, 309 (1932) RP415 and J. Research NBS 33, 307 (1944) RP1610.

[i] 50-g sample dissolved in diluted HNO_3 (1:4).

[j] Distillation-molybdenum-blue photometric method. See J. Research NBS 24, 7 (1940) RP1267.

[k] Determination made by Marie C. Wallace by the vacuum-fusion method. See BS J. Research 7, 375 (1931) RP346.

[l] Same value obtained by evolution and combustion methods.

[m] Sulfuric-nitric acid dehydration.

[n] KI-$Na_2S_2O_3$ titration.

[o] 10-g sample, phenylhydrazine concentration, diphenylcarbazide colorimetric method.

[p] Solution in diluted HNO_3, tin precipitated with H_2S, dissolved by fuming in H_2SO_4-HNO_3, and precipitated with NH_4OH. Precipitate dissolved in HCl, and tin reduced with antimony and titrated with KIO_3 solution standardized on high-purity tin.

[q] 50-g sample dissolved in diluted HCl (1:1).

[r] Low pressure-combustion method.

[s] Persulfate-arsenite method.

[t] Titrating solution standardized by use of a standard steel.

[u] Combustion method, SO_2 bubbled through H_2O_2-NaOH solution, and excess alkali titrated with H_2SO_4.

[v] Perchloric acid dehydration.

[w] ZnO-α-nitroso-β-naphthol method.

[x] Solution in HCl, titration with KIO_3 solution.

[y] Periodate photometric method.

[z] Weighed as $P_2O_5.24MoO_3$.

[z1] Iron extracted with isopropyl ether.

[z2] Copper-ammonia-complex colorimetric method.

[z3] Finished by electrolysis.

[z4] MoS_3-MoO_3 method.

[z5] Iron removed by ether and basic acetate separations, copper by H_2S. Cobalt separated with KNO_2, and weighed as $CoSO_4$.

[z6] Ether extraction, spectrochemical determination.

[z7] Bicarbonate hydrolysis, peroxide fusion, K_2CrO colorimetric method.

[z8] Solution in HCl, iodimetric titration.

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