UNITED STATES DEPARTMENT OF COMMERCE
WASHINGTON

National Bureau of Standards
Certificate of Analyses

Standard Sample 161
Nickel-Chromium Casting Alloy
(64 Ni-17 Cr)

ANALYST*	C	Mn	P		S		Si		Ni	Cr				Fe		
	Direct combustion		Gravimetric (weighed as $Mg_2P_2O_7$ after removal of arsenic)	Alkali-Molybdate [a]	Gravimetric (direct oxidation and final precipitation after reduction of iron)	Combustion	Perchloric acid dehydration	COPPER H_2S-CuS-CuO	Weighed as nickel dimethylglyoxime	$FeSO_4$-$KMnO_4$ titration	VANADIUM	MOLYBDENUM Colorimetric	COBALT		NITROGEN Solution—Distillation	
1	0.340	[b] 1.28	0.014	[c] 0.013	0.006	[d] 0.004	[e] 1.57	[f] 0.040	[g] 64.33	[h] 16.90	[i] 0.034	0.004	[j] 0.48	[k] 14.99	[l] 0.027	
2	.347	[m] 1.30		.012		[d].004	1.57	[n].04	[g] 64.22	[h] 16.86		.006	.45	15.02		
3	.348	[o] 1.27		.013	.008		1.56	[p].035	[g] 64.23	16.86		.005			[q].029	
4	.343	[r] 1.28		[c].010	.008	[s].007	1.55	[t].055	[u] 64.34	[v] 16.85	[w].023	.004	[x].47	[k] 15.02	[q].024	
	.337	[y] 1.28		.010		[s].007	1.54	[s].045	[z1] 64.35	[v] 16.84		.004				
6	.342	[z2] 1.28		[c].010		[d].003	1.55	[z3].056	[u] 64.2	16.92						
7	.340			.011		[d].004	1.57	.042	[g] 64.31	[h] 16.91			[z4].49			
8									[z5] 64.32							
9									[g] 64.32							
Average	0.342	1.28	0.014	0.011	0.007	0.005	1.56	0.045	64.29	16.88	0.029	0.005	0.47	15.01	0.027	
General average	0.342	1.28	0.012		0.006		1.56	0.045	64.29	16.88	0.029	0.005	0.47	15.01	0.027	

[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 23 NaOH:1P.
[b] Bicarbonate-bismuthate-$FeSO_4$-$KMnO_4$ titration method.
[c] Molybdenum-blue photometric method.
[d] 1-g sample burned in oxygen at 1,450° C, and sulfur dioxide absorbed in starch-iodine solution. The iodine was liberated from iodide by titration, during the combustion, with standard KIO_3 solution based on 93 percent of the theoretical factor.
[e] Double dehydration with intervening filtration.
[f] Diethyldithiocarbamate photometric method. See J. Research NBS 47, 380 (1951) RP2265.
[g] Double precipitation, using a 0.125-g sample, glyoxime precipitate dried to constant weight at 150° C.
[h] Persulfate oxidation and potentiometric titration with ferrous ammonium sulfate standardized with potassium dichromate.
[i] Nitric acid oxidation and potentiometric titration with ferrous ammonium sulfate.
[j] Ether separation, CrO_2Cl_2 volitalization, ZnO precipitation, α nitroso-β-napthol-Co_3O_4 on 5-g sample.
[k] $HClO_4$ oxidation, double precipitation with NH_4OH, $SnCl_2$ reduction, $K_2Cr_2O_7$ titration.
[l] See J. Research NBS 43, 201 (1949) RP2021.
[m] Bismuthate—$HgNO_3$ potentiometric titration method.
[n] Finished by electrolysis.
[o] CrO_2Cl_2 bismuthate method.
[p] KI-$Na_2S_2O_3$ titration method.
[q] Dissolved in diluted HCl (1-1).
[r] Periodate photometric method.
[s] Burned with tin, and iodate solution standardized on standard steels.
[t] Diethyldithiocarbamate photometric method.
[u] Dimethylglyoxime precipitation, cyanide titration.
[v] Perchloric acid oxidation.
[w] Differential titration with $KMnO_4$, using orthophenantholine indicator, after volatilization of chromium as CrO_2Cl_2.
[x] Cobalt chloride photometric method.
[y] ZnO-persulfate-arsenite method.
[z] H_2S-α-benzoinoxime-CuO.
[z1] Dimethylglyoxime-nickel oxide method.
[z2] CrO_2Cl_2-persulfate-arsenite-nitrite titration method.
[z3] CuCNS-cupric chloride photometric method.
[z4] Ether separation, cobalti-nitrite precipitation. Weighed as $CoSO_4$.
[z5] As in (g), except 0.36-g sample.

List of Analysts

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