U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 139

CHROMIUM-NICKEL-MOLYBDENUM STEEL

(N.E. 8637)

ANALYST*	C	Mn		P		S			Si	Cu	Ni	Cr	V	Mo		
	Direct combustion	Bismuthate ($FeSO_4$-$KMnO_4$)	Persulfate-Arsenite	Gravimetric (weighed as $Mg_2P_2O_7$ after removal of arsenic)	Alkali-Molybdate[a]	Gravimetric (direct oxidation and final precipitation after reduction of iron)	Evolution (HCl sp gr 1.18—ZnS - iodine - theoretical sulfur titer)[b]	Combustion	Sulfuric acid dehydration	H_2S-CuS-CuO	Weighed as nickel dimethylglyoxime	$FeSO_4$-$KMnO_4$ titration		Gravimetric	Colorimetric	
1	0. 389	0. 864	0. 869	0. 019	[c]0. 018	0. 023	0. 023		[d]0. 295	0. 088	0. 560	[e]0. 548	[f]0. 002	[g]0. 177	0. 179	
2	[h]. 390		[i]. 860	. 019	[i]. 019			[j]0. 022	[k]. 280	[l]. 102	[m]. 560	. 545			. 172	
	. 398		[i]. 867	. 018	. 019	. 025	[n]. 022		. 292	. 084	. 561	. 542			. 178	
4	[h]. 394		[i]. 869		[i]. 020			[i]. 021	[o]. 295	[p]. 090	. 560	. 551	[o]. 002		. 180	
5	. 397	[i]. 872	[r]. 872		[i]. 019	[s]. 025		[t]. 024	[o d]. 298	[l]. 088	[u]. 570	[v]. 554	[w]. 002	[x]. 178	. 179	
6	. 398		[i]. 867		. 020	. 024	[n]. 026		[o d]. 293	. 084	. 565	. 552			. 178	
Averages	**0. 394**	**0. 868**	**0. 867**	**0. 019**	**0. 019**	**0. 024**	**0. 024**	**0. 023**	**0. 292**	**0. 089**	**0. 563**	**0. 549**	**0. 002**	**0. 178**	**0. 178**	
General averages	**0. 394**	**0. 867**		**0. 019**		**0. 024**			**0. 292**	**0. 089**	**0. 563**	**0. 549**	**0. 002**	**0. 178**		

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

[d] Double dehydration with intervening filtration.

[e] Persulfate oxidation and potentiometric titration with ferrous ammonium sulfate.

[f] Nitric acid oxidation and potentiometric titration with ferrous ammonium sulfate.

[g] α-Benzoinoxime method. See BS J. Research **9**, 1 (1932) RP453.

[h] Differential gasometric method.

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

[j] Sulfur dioxide absorbed in starch-iodine solution, the iodine being liberated from iodide by titration, during the combustion, with KIO_3.

[k] Nitric-sulfuric acid dehydration.

[l] Finished by electrolysis.

[m] Glyoxime-cyanide titration method.

[n] Absorbed in ammoniacal cadmium chloride solution.

[o] Perchloric acid dehydration.

[p] KI-$Na_2S_2O_3$ titration.

[q] Ferrous sulfate-persulfate method.

[r] Bismuthate-arsenite method, end point obtained photometrically.

[s] 5-g sample dissolved in bromine and water. $HClO_4$ added, solution evaporated to fumes, diluted, and iron precipitated with NH_4OH. Solution diluted to 1,000 ml, one-half filtered, and sulfur precipitated as $BaSO_4$.

[t] Gases absorbed in NaOH-H_2O_2 solution.

[u] Glyoxime precipitate ignited and weighed as NiO.

[v] Perchloric acid oxidation.

[w] Phospho-vanado-tungstate colorimetric method.

[x] H_2S-$PbMoO_4$ method.

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The steel for the preparation of this standard was furnished by the Bethlehem Steel Co.

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