DEPARTMENT OF COMMERCE

Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE No. 50

CHROME–TUNGSTEN–VANADIUM STEEL

ANALYST.	CARBON.		SILICON.		PHOSPHORUS.		SULPHUR.		MANGANESE.		CHROMIUM.		TUNGSTEN.		VANADIUM.	COPPER.	Molybdenum.
	Recommended Method.	Analyst's Method.	Recommended Method.	Analyst's Method.	Recommended Method.	Analyst's Method.	Recommended Method.	Analyst's Method.	Recommended Method.	Analyst's Method.	Recommended Method.	Analyst's Method.	Recommended Method.	Analyst's Method.	Analyst's Method.	H_2S—CuS—CuO.	
1	.655		.152	.164[a]	.026		.031		.201		3.60		17.55	17.51[b]	.757[c]	.044	.01
2	.667		.175		.025		.031		.199	.200	3.52		17.50		.803[d]		
3		.660[e]		.164	.031	.031	.030	.030	.201	.196[f]		3.62[f]	17.53	17.53	.759[f]	.045 .049[z]	
4		.650[g]		.164		.025[h]		.030[i] .031[j]		.200[k]		3.63[l]		17.61	.762[m]		
5	.639	.635	.140	.135			.033	.023[n]		.228[o]	3.63	3.64	17.53	17.58[p]		trace	
6		.630[e]	.130	.152[a]	.026	.026[q]		.026[r] .023[n]		.21[s]		3.54[l]		17.59		trace	
7	.682		.159		.026		.032		.190			3.57[f]	17.38	17.38	.736[f]		
8	.669		.13	.166	.027	.024[q]	.031	.028[r]	.215	.21[t]	3.68	3.64[u]	17.65	17.65[v]	.755[w]	trace	
9	.67		.15		.025						3.52		17.48				
10	.641			.135								3.64[x]	17.49		.705[x]		
11	.665	.668[y]	.163	.162				.034[r]		.194[k]		3.64[l]	17.70	17.79	.774[m]	.063	
Aver.	.661	.649	.150	.155	.027	.027	.031	.030	.201	.205	3.59	3.62	17.53	17.58	.756	.050	.01
Gen. Av.	.656		.153 *		.027		.031		.204		3.61		17.56		.756	.050	.01

* Recommended value, 0.16.

NOTE.—When analyst's method differs only in detail from the recommended method, no footnote is given.

a H_2SO_4 dehydration.
b Solution in HCl, precipitation with HNO_3+cinchonine, solution in NH_4OH and reprecipitation with acid and cinchonine.
c Reduction with SO_2 after removal of WO_3 with HNO_3 digestion, precipitation with $NaHCO_3$, then B. S. fusion method.
d Same as *c*, but reduced with zinc.
e Absorbed in soda-asbestos.
f Titrated electrometrically; J. Ind. Eng. Chem., 10, 19 (1918).
g Absorbed in KOH.
h Precipitated with a water solution of $(NH_4)_2MoO_4$ in an oxidized solution; J. Ind. Eng. Chem., 11, 113 (1919).
i Last traces of WO_3 removed with cinchonine before precipitation with $BaCl_2$.
j Volatilization of sulphur as H_2S by passing H_2+HCl over drillings at 950° C.—1000° C.
k PbO_2—arsenite after removal of chromium with ZnO.
l $KMnO_4$ oxidation.
m $KMnO_4$ oxidation and $FeSO_4$ titration using $K_3Fe(CN)_6$ as internal indicator.
n Volumetric and not included in average.
o Recommended method, finishing with arsenite.
p Used quinine hydrochloride instead of cinchonine in recommended method.
q Same as recommended but dissolved in aqua regia.
r Same as recommended, without zinc reduction.
s Bismuthate—arsenite.
t Ford-Williams' method.
u $KClO_3$ oxidation and titration with $KMnO_4$ and $FeSO_4$.
v Same as recommended, but without cinchonine.
w $KClO_3$ oxidation and titration with $FeSO_4$ using $K_3Fe(CN)_6$ as internal indicator.
x Cain & Hostetter method.
y Chips mixed with red lead before combustion.
z $Na_2S_2O_3$—CuS—CuO.

INDEX TO ANALYSTS

1. J. I. Hoffman, Bureau of Standards.
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5. W. D. Huffman, General Motors Corporation, Detroit, Mich.
6. G. S. Longley, jr., Pratt & Whitney Co., Hartford, Conn.
7. P. L. Tyson, The Carpenter Steel Company, Reading, Pa.
8. J. V. Emmons, The Cleveland Twist Drill Co., Cleveland, Ohio.
9. F. A. Hull, General Electric Co., Schenectady, N. Y.
10. A. Sloan, Watertown Arsenal, Watertown, Mass.
11. Geo. M. Berry, Halcomb Steel Co., Syracuse, N. Y.

This standard is not recommended for colorimetric carbon determinations, because of uncertainty as to the condition of the carbon.

S. W. STRATTON,
Director.

Washington, D. C., February 1, 1921.