U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 116

FERROTITANIUM

(Low Carbon)

*ANALYST**	*Titanium*	*Carbon*	*Silicon*	*Chromium*	*Vanadium*	*Aluminum*
1	[a] 25.46	[b] 0.094	[c] 1.26	[d] 0.062	[e] 0.33	[f] 5.46
2	[g] 25.42	[h] .095				
3	[a] 25.59	[i] .10	[c] 1.30	[j] .05	[j] .30	
4	[k] 25.43	[h] .099			[l] .31	
5	[m] 25.42	[n] .095	[o] 1.30	[p] .07	[q] .34	[r] 5.58
6	[s] 25.70	[t] .09	[o] 1.24		[u] .29	[v] 5.46
7	[w] 25.45	[h] .10	[x] 1.26	[y] .08	[z] .32	[aa] 5.55
8	[w] 25.40	.102	1.26			
Averages	**25.48**	**0.097**	**1.27**	**0.066**	**0.32**	**5.51**

Sample treated with sulfuric-nitric-hydrochloric acids. Solution evaporated mes of sulfuric acid, diluted, and filtered. Ignited residue treated with HF-H_2SO_4, fused with $K_2S_2O_7$, and melt dissolved in the silica filtrate. Iron precipitated in ammoniacal tartrate solution with $(NH_4)_2S$. Solution filtered, precipitate dissolved and iron again precipitated with $(NH_4)_2S$ in the presence of tartrate. Titanium precipitated in the acidified combined filtrates with cupferron. Ignited oxide corrected for V_2O_5, and traces of Fe_2O_3 and ZrO_2. For detailed discussion, see the text "Titanium," by W. M. Thornton, Jr., The Chemical Catalog Co. (1927).

[b] No accelerator used.

[c] Double dehydration with sulfuric acid.

[d] Silver nitrate-persulfate oxidation and potentiometric titration with $FeSO_4$.

[e] Nitric acid oxidation and potentiometric titration.

[f] Sample decomposed as in (a). Iron removed by electrolysis with a mercury cathode. Titanium and vanadium precipitated with cupferron. Nitric and perchloric acids added to filtrate. Solution evaporated to fumes of perchloric acid, diluted, and aluminum precipitated with ammonia. Solution filtered, and precipitate dissolved. Solution evpaorated to fumes of perchloric acid, diluted, filtered, and aluminum precipitated with ammonia. Ignited oxide corrected for P_2O_5 and SiO_2.

[g] Titanium separated from most of the iron by the cyanide-ammonia process. Solution filtered, precipitate dissolved, and residual iron separated in ammoniacal-citrate solution with $(NH_4)_2S$. Titanium precipitated in the acidified filtrate with cupferron. Ignited oxides corrected for V_2O_5 and traces of Fe_2O_3.

[h] Ingot iron used as an accelerator.

[i] Tin used as an accelerator.

[j] Na_2O_2 fusion, melt leached with water, precipitate filtered, and chromium and vanadium precipitated in the filtrate with lead acetate. Solution filtered, precipitate dissolved, and lead removed as sulfate. Chromium determined by the silver nitrate-persulfate method and vanadium by the ferrous sulfate-persulfate method.

[k] As in (a), except that vanadium was removed in the acid solution of the alloy by NaOH-Na_2O_2 before the sulfide separation.

[l] Ferrous sulfate-persulfate method.

[m] Mercury cathode-cupferron. Ignited oxide corrected for V_2O_5.

[n] Red lead used as an accelerator.

[o] Sulfuric acid dehydration.

[p] Na_2O_2 fusion, silver nitrate-persulfate method.

[q] Na_2O_2 fusion, ferrous sulfate-persulfate method.

[r] Mercury cathode-cupferron-8 hydroxyquinoline.

[s] Acetic acid-thiosulfate method, see Sampling and Analysis of Ferro Alloys, by chemists of the U. S. Steel Corporation, Pittsburgh, Pa., p. 26.

[t] Copper oxide and ingot iron used as an accelerator.

[u] Vanadium reduced in perchloric acid solution with $FeSO_4$. Excess $FeSO_4$ oxidized with 0.01 *N* $KMnO_4$, using orthophenanthroline indicator. Phosphoric acid and K_2HPO_4 added, and vanadium titrated with 0.01 *N* $KMnO_4$.

[v] Phosphate method, after separation of titanium by the thiosulfate method as in footnote (s).

[w] Acid solution poured into an excess of sodium hydroxide solution (10 percent) containing some sodium peroxide. Solution boiled, cooled, and filtered. Precipitate dissolved and solution passed through a Jones reductor and titrated with 0.1 *N* ferric ammonium sulfate.

[x] Na_2O_2 fusion, sulfuric acid dehydration.

[y] Na_2O_2 fusion, colorimetric.

[z] Iron, titanium, and the like removed by a double NaOH-Na_2O_2 treatment. Filtrate acidified and treated with cupferron. Ignited precipitate fused, and vanadium determined by the ferrous sulfate-persulfate method.

[aa] Iron, titanium, and the like precipitated with cupferron. Filtrate treated to destroy cupferron. Aluminum precipitated with ammonia. Solution filtered, precipitate dissolved, and aluminum determined as $AlPO_4$.

Analyst 1 also reported 0.03% of Zr. Analyst 5 also reported 1.10% of Mn, and 0.096% of P. Analyst 7 also reported 1.18% of Mn, 0.10% of P, and 0.025% of S.

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