Department of Commerce and Labor

Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE No. 25

MANGANESE ORE (Dried at 120°)

Furnished by Harshaw, Fuller & Goodwin, Elyria, Ohio

ANALYST.	AVAILABLE OXYGEN.	CALCULATED MnO_2.	METHOD FOR AVAILABLE OXYGEN.	PRIMARY STANDARD.	TOTAL MANGANESE.	METHOD FOR MANGANESE.
1 *a*	16.14	87.70	$FeSO_4$	$Na_2C_2O_4$	56.63	Ford.
b	16.11	87.55	$H_2C_2O_4$	$Na_2C_2O_4$	56.53	$MnSO_4$.
c	16.09	87.43	$Na_2C_2O_4$	Gravimetric	56.56	$MnSO_4$.
d	16.07	87.32	$HCl \rightarrow KI$	*a* $KMnO_4$; *b* Cu *c* I_2	56.53	Volhard.
e					56.43	Ford-Williams.
f					56.32	v. Knorre.
g					56.33	Bismuthate.
2	15.99	86.89	$H_2C_2O_4$	Fe (electrolytic)	56.50	Bismuthate.
3 *a*					56.25	Ford.
b					56.19	Acetate.
4	16.03	87.12	$H_2C_2O_4$	(Fe wire)	56.32	Acetate.
5 *a*	16.11	87.55	$H_2C_2O_4$	$H_2C_2O_4$; Fe (electrolytic); $Fe(NH_4)_2(SO_4)_2\,6\,H_2O$	56.16	Ford.
b					56.15	Pattinson.
6	15.86	86.19	$H_2C_2O_4$	$Fe(NH_4)_2(SO_4)_2\,6\,H_2O$	56.45	Acetate.
7	15.91	86.44	$H_2C_2O_4$		56.18	Acetate.
8	15.96	86.74	$H_2C_2O_4$	Fe (wire)	56.30	Acetate.
AVERAGE	16.03	87.09			56.36	

INDEX TO ANALYSTS

1. William Blum, Bureau of Standards.
2. Booth, Garrett & Blair, Philadelphia, Pa.
3. J. M. Camp, Carnegie Steel Co., Duquesne Works.
4. C. A. Little, Harshaw, Fuller & Goodwin, Elyria, Ohio.
5. Ledoux & Company, New York, N. Y.
6. A. S. McCreath & Son, Harrisburg, Pa.
7. Ricketts & Banks, New York, N. Y.
8. Porter W. Shimer, Easton, Pa.

NOTES.

1. *Available oxygen.*—The mean value is probably low, due to uncertainty as to the composition of the materials used for standardizing the permanganate solutions. The mean of 19 determinations by four methods, at the Bureau of Standards, is 16.11 per cent available oxygen or 87.53 per cent MnO_2. We recommend the values 16.1 per cent available oxygen or 87.5 per cent MnO_2.

2. *Manganese.*—The mean value of the 18 determinations at the Bureau of Standards is 56.44 per cent. We consider that the round number 56.4 per cent represents the true value as closely as can be determined from the results submitted.

3. So far as known, all calculations are based upon the 1910 atomic weights.

4. A complete analysis of the ore showed the following constituents, manganese only having been determined with special accuracy:

Insoluble	5.93	SO_3	0.16
Al_2O_3	.99	P_2O_5	.35
Fe_2O_3	.67	CO_2	.09
CuO+NiO	.31	H_2O (above 120°)	1.43
BaO	.74	Mean MnO_2	87.11
CaO	.53	Mean MnO	1.71
MgO	.22	Total	100.24

The insoluble matter contains only traces of manganese, 0.03 per cent being the largest amount found in numerous tests. In all the gravimetric methods it was fused and added to the main solutions. Vanadium, in small amount, was detected, but not determined.

5. *Special attention is called to the necessity for drying each portion of the ore at 120° and weighing from a closed bottle. Numerous experiments have shown that failure to do so may result in serious error, due to the hygroscopic nature of the ore.*

6. For methods of analysis employed by the various chemists consult Circular No. 25, "Analyzed Iron and Manganese Ores—Methods of Analysis."

S. W. STRATTON,
Director.

July 1, 1910.

Washington, D. C.