

Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE No. 25a

MANGANESE ORE (Dried at 120°)

This sample is a part of the identical lot from which the original sample No. 25 was taken

ANALYSIS OF ORIGINAL SAMPLE NO. 25.

ANALYST.	AVAILABLE OXYGEN.	CALCULATED MnO ₂ .	METHOD FOR AVAILABLE OXYGEN.	PRIMARY STANDARD.	TOTAL MANGANESE.	METHOD FOR MANGANESE.
1a.....	16.14	87.70	FeSO ₄	Na ₂ C ₂ O ₄	56.63	Ford.
b.....	16.11	87.53	H ₂ C ₂ O ₄	Na ₂ C ₂ O ₄	56.53	MnSO ₄ .
c.....	16.09	87.43	Na ₂ C ₂ O ₄	Gravimetric	56.56	MnSO ₄ .
d.....	16.07	87.32	HCl→KI	{ <i>a</i> KMnO ₄ <i>b</i> Cu <i>c</i> 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 ₂ C ₂ O ₄	Fe (electrolytic)	56.50	Bismuthate.
3a.....					56.25	Ford.
b.....					56.19	Acetate.
4.....	16.03	87.12	H ₂ C ₂ O ₄	(Fe wire)	56.32	Acetate.
5a.....	16.11	87.53	H ₂ C ₂ O ₄	{ H ₂ C ₂ O ₄ Fe (electrolytic) Fe (NH ₄) ₂ (SO ₄) ₂ 6 H ₂ O }	56.16	Ford.
b.....					56.15	Pattinson.
6.....	15.86	86.19	H ₂ C ₂ O ₄	Fe (NH ₄) ₂ (SO ₄) ₂ 6 H ₂ O	56.45	Acetate.
7.....	15.91	86.44	H ₂ C ₂ O ₄		56.18	Acetate.
8.....	15.96	86.74	H ₂ C ₂ O ₄	Fe (wire)	56.30	Acetate.
AVERAGE.....	16.03	87.09			56.36	

ANALYSIS OF RENEWAL NO. 25a.

9.....	16.07	87.32	FeSO ₄	Na ₂ C ₂ O ₄	56.36	Bismuthate.
--------	-------	-------	-------------------	---	-------	-------------

INDEX TO ANALYSTS

- | | |
|---|--|
| 1. William Blum, Bureau of Standards. | 6. A. S. McCreath & Son, Harrisburg, Pa. |
| 2. Booth, Garrett & Blair, Philadelphia, Pa. | 7. Ricketts & Banks, New York, N. Y. |
| 3. J. M. Camp, Carnegie Steel Co., Duquesne Works. | 8. Porter W. Shimer, Easton, Pa. |
| 4. C. A. Little, Harshaw, Fuller & Goodwin, Elyria, Ohio. | 9. J. I. Hoffman, Bureau of Standards. |
| 5. Ledoux & Company, New York, N. Y. | |

(SEE OTHER SIDE)

NOTES.

1. *Available oxygen.*—The mean value obtained for Sample No. 25 was probably low, owing 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, was 16.11 per cent available oxygen, or 87.53 per cent MnO_2 . In view of these analyses and recent analyses of the renewal, Sample No. 25a, we recommend for sample No. 25a the values 16.1 per cent available oxygen, or 87.5 per cent MnO_2 .

2. *Manganese.*—In an exhaustive study of the bismuthate method (Blum; J. Am. Chem. Soc., 34, 1912, p. 1396) the value 56.25 per cent Mn was obtained for Sample No. 25. Analyses of the renewal Sample No. 25a gave an average of 56.36 per cent Mn. We consider that the value 56.3 per cent Mn represents the true value as closely as can be determined from the results at hand.

3. So far as known, all calculations used in the analysis of Sample No. 25 were based upon the 1910 atomic weights; the calculations used in the analysis of Sample No. 25a were based upon the 1920 atomic weights.

4. A complete analysis of Sample No. 25, and checked on Sample No. 25a, showed the following constituents, manganese only having been determined with special accuracy:

Insoluble.....	5.93	SO ₃	0.16
Al ₂ O ₃99	P ₂ O ₅35
Fe ₂ O ₃67	CO ₂09
CuO + NiO.....	.31	H ₂ O (above 120°).....	1.43
BaO.....	.74	Selected MnO ₂	87.50
CaO.....	.53	Selected MnO.....	1.30
MgO.....	.22	Total.....	100.22

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. 26, "Analyzed Iron and Manganese Ores—Methods of Analysis."

S. W. STRATTON,
Director.

Washington, D. C., June 1, 1920.