

*Hand*

# Bureau of Standards

## Certificate of Analyses

OF  
STANDARD SAMPLE No. 21b  
ACID OPEN-HEARTH STEEL, 0.6% CARBON

ANALYST.*	C	Mn		P		S		Si	COPPER. H <sub>2</sub> S-CuS-CuO.	NICKEL. Weighed as nickel dimethylglyoxime.	CHROMIUM. FeSO <sub>4</sub> -KMnO <sub>4</sub> titration.	VANADIUM.	MOLYBDENUM.	ARSENIC.
	CARBON. Direct combustion.	MANGANESE 1. Bisulfate (FeSO <sub>4</sub> -KMnO <sub>4</sub> ).	2. Other methods.	PHOSPHORUS. 1. Alkali-Molybdate. <sup>a</sup>	2. Gravimetric (Weighed as Mg <sub>2</sub> P <sub>2</sub> O <sub>7</sub> after removal of arsenic).	1. SULPHUR. Gravimetric (Direct oxidation and final precipitation in reduced solution).	2. SULPHUR. Evolution with HCl (1:1) ZnS-Iodine (theoretical sulphur titre <sup>b</sup> ).	SILICON. Sulphuric acid dehydration.						
1.....	0.608	0.560		0.065	0.063	0.037	0.037	0.163	0.031	0.060	0.024	0.004	0.005	0.01
2.....	.606	.564		.064	.063	.037	.036	.161	.031	.060	.025	.005	.007	.008
3.....	.602	.572	0.565 <sup>c</sup>	.062		.039	.038	{.162 <sup>d</sup> .162	} .037 <sup>e</sup>	.06		.007		
.....	.604	.569	.57 <sup>c</sup>	.065	.064	.035	.035	.159	.028	.063			.005	
5.....	.609	.558		.065		{.034 <sup>f</sup> .034	.034	.157						
6.....	.591		.566 <sup>g</sup>	.063		.035	.035	{.164 <sup>h</sup> .162 <sup>i</sup>	} .026	.064 <sup>j</sup>				
7.....	.616		.554 <sup>k</sup>	.065		.035		.164	.033 <sup>l</sup>	.065 <sup>l</sup>	.015			
8.....	.600		.563 <sup>c</sup>	.065		.036	.035	.162			.017			
Averages .....	.605	.565	.564	.064	.063	.036	.036	.162	.031	.062	.020	.005	.006	.009
General Averages...	.605	.564		.064		.036		.162	.031	.062	.020	.005	.006	.009

<sup>a</sup> Precipitated at 40° C., washed with 1 per cent KNO<sub>3</sub> solution and titrated with alkali standardized by the use of B. S. benzoic acid and the 23:1 ratio.  
<sup>b</sup> Value obtained by standardization of titrating solution against sodium oxalate through KMnO<sub>4</sub> and Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>.

<sup>c</sup> Persulphate-arsenite.  
<sup>d</sup> Solution in HCl and dehydration with H<sub>2</sub>SO<sub>4</sub>.  
<sup>e</sup> Finished by electrolysis.  
<sup>f</sup> Precipitated in FeCl<sub>3</sub> solution.  
<sup>g</sup> Bismuthate-arsenite.  
<sup>h</sup> HCl dehydration.

<sup>i</sup> Solution in HNO<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub>.  
<sup>j</sup> Weighed as NiO.  
<sup>k</sup> PbO<sub>2</sub>-arsenite.  
<sup>l</sup> Finished by titration with KCN.

### \* LIST OF ANALYSTS

- |   |   |
|---|---|
| 1. James I. Hoffman, Bureau of Standards.                           | 6. E. J. Daggett, Chicago, Burlington & Quincy Railroad Co., Aurora, Ill. |
| 2. Routine Laboratory, Bureau of Standards, H. A. Bright in charge. | 7. C. M. Johnson, The Crucible Steel Co. of America, Pittsburgh, Pa.      |
| 3. J. L. Harvey, Carnegie Steel Co., Munhall, Pa.                   | 8. R. B. Hooper, Dodge Brothers, Detroit, Mich.                           |
| 4. W. F. Muehlberg, Newburgh Steel Works, Cleveland, Ohio.          |   |
| 5. H. E. Slocum, Jones & Laughlin Steel Corp., Pittsburgh, Pa.      |   |

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

Washington, D. C.  
September 26, 1923.

GOVERNMENT PRINTING OFFICE

GEORGE K. BURGESS,  
Director.