

DEPARTMENT OF COMMERCE

Bureau of Standards  
Certificate of Analyses

OF

STANDARD SAMPLE No. 20c

ACID OPEN-HEARTH STEEL, 0.4% 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. Bismuthate (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)	SILICON Sulphuric acid dehydration								
1	0.425	0.674	0.044	0.043	0.026	0.025	0.224	0.25	0.183	0.056 <sup>c</sup>	0.007 <sup>c</sup>	0.007 <sup>d</sup>	0.009	
2	0.403 <sup>e</sup>	.673	0.67 <sup>f</sup>	.045	.024	.025	.226	.263	.177	.055				
3	.422	.665	.044	.045	.026	.026	.215	.26 <sup>g</sup>		.056	.008	.007		
4	.434	.673	.675 <sup>h</sup>	.043	.025	.024	.220	.264 <sup>g</sup>	.175	.056				
5	.430	.68 <sup>i</sup>	.044		.027	.026	.230 <sup>j</sup>	.235 <sup>g</sup>	.190 <sup>k</sup>	.06				
6	.425	.676	.043		.027	.026	.221	.252						
7	.419	.67 <sup>l</sup>	.044		.026	.027	.220 <sup>j</sup>					.005 <sup>d</sup>		
8	.419	.671 <sup>l</sup>	.044	.043	.028	.027	.230	.261	.180	.047	.006	.007	.007	
Averages	.425	.672	.673	.044	.044	.026	.026	.223	.255	.181	.055	.007	.007	.008
General Averages	.425	.673	.044	.026	.026	.223	.255	.181	.055	.007	.007	.008	.008	

*19 direct*  
*.012*  
*(S.L.H.)*

\* Precipitated at 40°C., washed with a 1 per cent solution of KNO<sub>3</sub> and titrated with alkali standardized by means 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>5</sub>.  
<sup>c</sup> Electrometric titration.  
<sup>d</sup> Determined colorimetrically by developing color with KCNS and SnCl<sub>4</sub>.  
<sup>e</sup> Omitted from the average.

<sup>f</sup> Persulphate oxidation.  
<sup>g</sup> Finished by Electrolysis.  
<sup>h</sup> Persulphate-Arsenite.  
<sup>i</sup> Bismuthate-Arsenite.  
<sup>j</sup> Dissolved sample in HCl, HNO<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub>.  
<sup>k</sup> KCN titration.  
<sup>l</sup> Volhard's method.

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

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Director.