

# National Bureau of Standards

## Certificate of Analyses

OF

STANDARD SAMPLE 14c

### BASIC OPEN-HEARTH STEEL, 0.8% 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 Colorimetric	ALUMINUM (acid-soluble)	ALUMINUM OXIDE (Al <sub>2</sub> O <sub>3</sub> )
	Direct combustion	Bismuthate (FeSO <sub>4</sub> -KMnO <sub>4</sub> )	Persulphate Arsenite	Gravimetric (Weighed as Mg <sub>2</sub> P <sub>2</sub> O <sub>7</sub> after removal of arsenic)	Alkali-molybdate <sup>a</sup>	Gravimetric (Direct oxidation and final precipitation in reduced solution)	Evolution with HCl (1-1) ZnS-Iodine (theoretical sulphur titre) <sup>b</sup>	Sulphuric acid dehydration							
1	0.791	0.460	0.463	0.011	0.013	0.030	0.028	0.059	0.026	0.008	0.024 <sup>c</sup>	0.003 <sup>e</sup>	0.002	0.021 <sup>d</sup>	0.006
2	.789		.460	.012	.012	.026	.026	.055 <sup>e</sup>	.026	.010	.026	.001	.001		
3	.79		.46	.012	.010	.030	.030 <sup>f</sup>	.05 <sup>g</sup>	.027 <sup>h</sup>	.008	.02 <sup>i</sup>	.005	.005		.006
4	.795		.45 <sup>j</sup>		.015 <sup>k</sup>	.030	.031 <sup>k</sup>	.060 <sup>e</sup>	.020 <sup>h</sup>						
	.79	.46	.46		.014	.030	.028	.058	.027	.014	.026 <sup>c</sup>			.022 <sup>l</sup>	.005
	.785	.470		.012	.012 <sup>k</sup>	.032	.031	.062 <sup>m</sup>	.025	.007	.026	.002 <sup>i</sup>	.003		
7	.803	.468	.467		.013		.032	.063 <sup>n</sup>	.024 <sup>h</sup>	.010 <sup>n</sup>	.026	.002	.001	.022 <sup>o</sup>	.005
8	.79	.455	.465	.010	.010	.030	.030	.056 <sup>g</sup>	.020 <sup>p</sup>	.015 <sup>q</sup>	.03	<.003	<.001	.023 <sup>r</sup>	.007
9	.790		.46		.015	.029	.029	.055	.028 <sup>h</sup>		.022		.001		
Averages	.791	.463	.461	.011	.013	.030	.029	.058	.025	.010	.025	.003	.002	.022	.006
Recommended values	0.791	0.462		0.012		0.030		0.058	0.025	0.010	0.025	0.003	0.002	0.022	0.006

<sup>a</sup> Precipitated at 40° C, washed with a 1-percent solution of KNO<sub>3</sub> and titrated with alkali standardized by the use of National Bureau of Standards acid potassium phthalate and the 23:1 ratio.

<sup>b</sup> Value obtained by standardizing the titrating solution by means of sodium oxalate through KMnO<sub>4</sub> and Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, and the use of the ratio 2I=S.

<sup>c</sup> Potentiometric titration.

<sup>d</sup> Solution in diluted H<sub>2</sub>SO<sub>4</sub> (1+9). Aluminum precipitated by NaHCO<sub>3</sub>. Precipitate filtered and dissolved in HCl; iron and the like precipitated with NaOH, and aluminum precipitated as AlPO<sub>4</sub> in the filtrate after removal of tin with H<sub>2</sub>S.

<sup>e</sup> Sulphuric-nitric acid dehydration.

<sup>f</sup> Sample ignited in a stream of oxygen, and sulphur titrated as H<sub>2</sub>SO<sub>4</sub>.

<sup>g</sup> Perchloric acid dehydration.

<sup>h</sup> Finished by electrolysis.

<sup>i</sup> Colorimetric.

<sup>j</sup> Bismuthate-arsenite method.

<sup>k</sup> Titrating solution standardized by use of a standard steel.

<sup>l</sup> Solution in diluted HCl (1+2). Iron removed with ether and NaOH, and aluminum determined as AlPO<sub>4</sub>.

<sup>m</sup> HCl-H<sub>2</sub>SO<sub>4</sub> dehydration.

<sup>n</sup> Glyoxime precipitate titrated with standard KCN solution.

<sup>o</sup> Solution in diluted H<sub>2</sub>SO<sub>4</sub> (1+9). Aluminum precipitated by NaHCO<sub>3</sub>. Precipitate filtered and dissolved in diluted H<sub>2</sub>SO<sub>4</sub>, residual iron removed with the mercury cathode, and aluminum determined as AlPO<sub>4</sub>.

<sup>p</sup> Thiocyanate method.

<sup>q</sup> Copper removed by reduction with aluminum wire, and nickel titrated with standard KCN solution.

<sup>r</sup> Solution in diluted H<sub>2</sub>SO<sub>4</sub> (1+9). Aluminum separated from most of the iron by hydrolysis in a sulphurous acid solution. Precipitate filtered and dissolved in acid. Iron precipitated with NaOH, and aluminum precipitated in the filtrate with 8-hydroxyquinoline. Aluminum quinolate filtered, dissolved, and titrated with KBrO<sub>3</sub>.

### \* LIST OF ANALYSTS

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

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Director.

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