



# Certificate of Analysis

## Standard Reference Material 12H

### Basic Open-Hearth Steel 0.4% Carbon

ANALYST	C	Mn	P	S	Si	Cu	Ni	Cr	V	Mo	N
	Direct combustion	Persulfate-Arsenite	Photometric	Combustion Iodate titration	Perchloric acid dehydration	Photometric	Photometric	FeSO <sub>4</sub> -KMnO <sub>4</sub> titration		Photometric	Distillation-Photometric
1.....	0.411	<sup>a</sup> 0.839	<sup>b</sup> 0.018	<sup>c</sup> 0.027	<sup>d</sup> 0.238	<sup>e</sup> 0.074	0.034	<sup>f</sup> 0.077	<sup>g</sup> 0.002	0.005	0.006
2.....	<sup>h</sup> .405	<sup>i</sup> .844	<sup>j</sup> .018	<sup>k</sup> .027	<sup>l</sup> .237	<sup>m</sup> .072	.032	.074	<sup>n</sup> .002	.006	.005
3.....	.406	<sup>o</sup> .840	.017	<sup>p</sup> .028	.237	<sup>q</sup> .072	.033	.070	{ <sup>r</sup> .004 <sup>s</sup> .003 }	.005	.006
4.....	.406	<sup>t</sup> .845	<sup>u</sup> .017	.026	.232	.073	.031		< .005	.007	.007
5.....	<sup>v</sup> .409	<sup>w</sup> .840	.018	.027	{ .234 <sup>x</sup> .233 }	.072	<sup>y</sup> .032	<sup>z</sup> .077	<sup>aa</sup> .033	{ <sup>ab</sup> .005 <sup>ac</sup> .006 }	.006
Average.....	0.407	0.842	0.018	0.027	0.235	0.073	0.032	0.074	0.003	0.006	0.006

<sup>a</sup> Potentiometric titration.  
<sup>b</sup> Molybdenum blue photometric method. See J. Res. NBS 26, 405 (1941)RP1386.  
<sup>c</sup> 1-g sample burned in oxygen at 1,425 °C and sulfur dioxide absorbed in starch-iodide solution. Iodine is liberated from iodide by titration, during the combustion, with standard KIO<sub>3</sub> solution. Titer is based on 93 percent of the theoretical factor.  
<sup>d</sup> Double dehydration with intervening filtration.  
<sup>e</sup> Diethyldithiocarbamate photometric method. See J. Res. NBS 47, 380 (1951)RP2265.  
<sup>f</sup> Chromium separated from the bulk of the iron in a 10-g sample by hydrolytic precipitation with NaHCO<sub>3</sub>, oxidized with persulfate, and titrated potentiometrically with ferrous ammonium sulfate.  
<sup>g</sup> Vanadium separated as in (f), oxidized with HNO<sub>3</sub>, and titrated potentiometrically with ferrous ammonium sulfate.  
<sup>h</sup> Differential gasometric method.  
<sup>i</sup> Titrating solution standardized with a standard steel.  
<sup>j</sup> Alkali-molybdate method.  
<sup>k</sup> Neocuproine photometric method.  
<sup>l</sup> Mercury cathode separation. Vanadium oxidized with HNO<sub>3</sub>, and titrated with ferrous ammonium sulfate.  
<sup>m</sup> Diethyldithiocarbamate photometric method.  
<sup>n</sup> H<sub>2</sub>O<sub>2</sub> photometric method.  
<sup>o</sup> Phosphotungstovanadate photometric method  
<sup>p</sup> KIO<sub>4</sub> photometric method.  
<sup>q</sup> Conductometric method.  
<sup>r</sup> Sodium pyrophosphate method.  
<sup>s</sup> Volumetric method.  
<sup>t</sup> Spectrographic method.

A value of 0.038 percent aluminum was obtained by spectrochemical analysis by D. M. Bouchette at NBS. This is not a certified value, but is given as additional information.

### List of Analysts

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