



Certificate of Analysis

Standard Reference Material 10G

Bessemer Steel, 0.2% Carbon

| ANALYST | C | Mn | P | | S | | | Si | Cu | Ni | Cr | V | Mo | N |
|----------------------|-------------------|---------------------|---|-------------------------------|--|-----------------------------|---|-----------------------------|--|--------------------|--|--------------------|-------------|--------------------------|
| | Direct combustion | Persulfate-Arsenite | Gravimetric (weighed as Mg ₂ P ₂ O ₇ after removal of arsenic) | Alkali-Molybdate ^a | Gravimetric (direct oxidation and precipitation after reduction of iron) | Combustion Iodate titration | Evolution with HCl (1 + 1) ZnS-Iodine (theoretical sulfur titer) ^b | Perchloric acid dehydration | | Photometric | FeSO ₄ -KMnO ₄ titration | | Photometric | Distillation-Photometric |
| 1..... | 0.239 | ^c 0.851 | 0.084 | ^d 0.085 | 0.112 | ^e 0.110 | 0.110 | ^f 0.023 | ^g 0.008 | ^h 0.004 | ⁱ 0.009 | ^j 0.006 | 0.001 | ^k 0.014 |
| 2..... | .241 | ^l .846 | .085 | ^m .086 | .105 | ⁿ .112 | | ^{m,f} .016 | { ⁿ .006 ^o .008} | .005 | .009 | ^p .006 | .001 | .015 |
| 3..... | .240 | ^s .857 | | .084 | | ^t .109 | | .010 | ^u .009 | .006 | ^r .009 | | .003 | |
| 4..... | .241 | ^w .850 | .084 | .086 | .112 | ^x .110 | .109 | ^m .024 | ^s .006 | .004 | ^t .008 | ^u .009 | .001 | .015 |
| 5..... | ^v .240 | ^w .847 | | ^x .089 | | ^y .105 | | ^z .024 | ^{z1} .009 | .006 | ^{z2} .006 | ^{z3} .006 | .001 | .015 |
| 6..... | .245 | ¹ .849 | .089 | .090 | | ¹ .110 | | .018 | ^{z4} .007 | .007 | ^u .01 | ^u .008 | .001 | .014 |
| | .235 | .850 | | ^{z5} .086 | .108 | ¹ .108 | | .024 | { ^{z6} .008 ^o .010} | ^{z7} .005 | .007 | ^{z8} .006 | .003 | ^{z9} .015 |
| verage..... | 0.240 | 0.850 | 0.086 | 0.086 | 0.109 | 0.109 | 0.110 | 0.020 | 0.008 | 0.005 | 0.008 | 0.007 | 0.002 | 0.015 |
| General average..... | 0.240 | 0.850 | 0.086 | | 0.109 | | | 0.020 | 0.008 | 0.005 | 0.008 | 0.007 | 0.002 | 0.015 |

^a Precipitated at 40 °C, washed with a 1-percent solution of KNO₃, and titrated with alkali standardized by the use of acid potassium phthalate and the ratio 23 NaOH:1P.

^b Value obtained by standardizing the titrating solution by means of sodium oxalate through KMnO₄ and Na₂S₂O₅ and the use of the ratio 2I:1S.

^c Potentiometric titration.

^d Molybdenum-blue photometric method. See J. Research NBS 26, 405 (1941) RP1386.

^e 1-g sample burned in oxygen at 1,425 °C and sulfur dioxide absorbed in starch-iodide solution. Iodine liberated from iodide by titration, during the combustion, with standard KIO₃ solution. Titer based on 93 percent of the theoretical factor.

^f Double dehydration with intervening filtration.

^g Diethyldithiocarbamate photometric method. See J. Research NBS 47, 380 (1951) RP2265.

^h Weighed as nickel dimethylglyoxime.

ⁱ Chromium separated from the bulk of the iron in a 10-g sample by hydrolytic precipitation with NaHCO₃,

oxidized with persulfate, and titrated potentiometrically with ferrous ammonium sulfate.

^j Vanadium separated as in (i), oxidized with HNO₃, and titrated potentiometrically with ferrous ammonium sulfate.

^k Sulfuric acid digestion for 4 hr of a 1-g sample. See J. Research NBS 43, 201 (1949) RP2021.

^l Titrating solution standardized with a standard steel.

^m Sulfuric acid dehydration.

ⁿ H₂S-CuS-CuO.

^o Diethyldithiocarbamate photometric method.

^p As in (j), but titrated with FeSO₄-K₂Cr₂O₇.

^q Iron precipitated with an excess of NH₄OH in a HNO₃-persulfate solution. Copper determined electrolytically in an aliquot portion of the filtrate.

^r Perchloric acid oxidation, titration with FeSO₄-K₂Cr₂O₇, diphenylamine sulfonate indicator.

^s Finished by electrolysis.

^t Diphenylcarbazide photometric method.

^u Photometric method.

^v Differential gasometric method.

^w KIO₄ photometric method.

^x Molybdenum-blue photometric method. Colored complex extracted into iso-butyl alcohol and measured at 730 millimicrons.

^y Sulfur gases absorbed in H₂O₂, and H₂SO₄ titrated with standard NaOH using brom-cresol-purple indicator.

^z Molybdenum-blue photometric method.

^{aa} Neocuproine photometric method.

^{ab} Chromate photometric method. See ASTM Method E30-56.

^{ac} NaHCO₃ hydrolysis followed by mercury cathode. Vanadium determined by the phosphotungstovanadate photometric method.

^{ad} Copper-ammonia-complex photometric method.

^{ae} Molybdenum-blue photometric method.

^{af} CuS precipitated with Na₂S₂O₅. Precipitate ignited, dissolved, and titrated with KI-Na₂S₂O₅.

^{ag} Dimethylglyoxime precipitate titrated with cyanide.

^{ah} Nitric acid oxidation, potentiometric titration with ferrous ammonium sulfate.

^{ai} Distillation-titration.

List of Analysts

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