Approved by State General Administration of the People's Republic of China for Quality Supervision and Inspection and Quarantine
GBW01432—GBW01433

Certificate of Certified Reference Material

Ferrosilicon

Sample Number

Date of Certification

Technology Center of Wuhan Iron and Steel
(Croup) Corporation
(Wuhan China)

This CRM is a ferrosilicon of Certified Reference Material. The CRM contair ed 21 components with guaranteed qualitative and quantitative chemical analysis and data. The CRM can be used in the comparison and assessment of any proposed analytical procedure for ferrosilicon in the calibration of the accuracy of analytical apparatus and in the evaluation of the competency of various analytical units and that of the individual analyst. The certilied reference material may as well be applied to arbitration analysis in business transaction and in technical exchange and international trade.

1. Method of Preparation

The ferrosilicon which is made in an furnace is subjected to: pouring, comminution, sieving (—0.08mm) , mixing , primary test for homogeneity, final test for homogeneity, chemical analysis and determination, data compilation and statistical evaluation, value confirmation successively.

2. Certified Value and Uncertainty

GBW No	Item	Chemical Composition (Weight Percent)						
		C	Si	Mn	P	S	Cu	Cr
GBW 01432	Certified Value Standard Deviation(S) No. of Groups (N)	0.024 0.002 9	78. 96 0.08 8	0.058 0.005 8	0. 0093 0. 0004 8	0. 0037 0. 0004 9	0.049 0.002 8	0. 0053 0. 0004 8
GBW 01433	Certified Value Standard Deviation(S) No. of Groups(N)	0. 19 0.01 9	55.73 0.07 8	0.22 0.01 8	0.038 0.001 8	0.0048 0. 0003 9	0.060 0.002 8	0.014 0. 001 8
		Ni	Ca	Al	Fe	V	Co	Ti
GBW 01432	Certified Value Standard Deviation (S) No. of Groups(N)	0.035 0. 002 8	0.064 0.004 8	0.24 0.01 8	20.24 0.05 8	0. 0024 0. 0002 8	0. 0031 0. 0003 8	0.032 0.002 8
GBW 01433	Certified Value Standard Deviation(S) No. of Groups(N)	0. 0063 0. 0004 8	0. 14 0.01 8	0.78 0.01 8	41.89 0.09 8	0.011 0.001 8	0. 0047 0. 0005 8	0. 119 0. 004 8
		B	Ba	Mo	Mg	Sn	As	O
GBW 01432	Certified Value Standard Deviation (S) No. of Groups(N)	0. 0029 0. 0002 8	0. 0060 0. 0004 8	0.0013 0.0002 8	0. 0051 0. 0002 8	0. 0003 0.0001 8	0.0012 0. 0002 8	(0.256)
GBW 01433	Certified Value Standard Deviation(S) No. of Groups (N)	0. 0032 0. 0002 8	0. 0043 0. 0002 8	0.011 0.001 8	0. 0068 0. 0003 8	0. 0004 0.0001 8	0. 0015 0. 0002 8	(0.665)

3. Analytical Methods

Element	Analytical Methods
C	Infrared absorption method; Titrimetric method in non — hydraulic solvent standarzied by basis sodium carbonate
Si	Perchloric acid dehydration—gravimetric method; Potassium fluosillcate titrimetric method
Mn	Sodium (potassium) periodate photometric method; Atomic absorption spectrophotometric method; ICP — AES method
P	Molybdenum blue photometric method; Reduced molybdobismuthyl phosphorc acid photometric method; Butyl acetate extraction photometric method; ICP —AES method

S	Infrared absorption method, Iodate photo — titricmetric method; combustion in nitrogen
Cu	Atomic absorption spectrophotometric method; ICP — AES method; BCO photometric method
Cr	Sodium carbonate separation — diphenyl carbazide photometric method; Atomic absorption spectrophotometric method; ICP —AES method
Ni	Dim ethylglyoxime — trichloromethane extraction photometric method; Atomic absorption spectrophotometric method; ICP —AES method
Ca	Potassium permanganate volumetric method; Atomic absorption spectrophotometric method; ICP —AES method
Al	EDTA volumetric method;Chromazurol S photometrpic method; ICP-AES method
Fe	Potassium dichromate volumetric method
Ba	Grarimetric method; Extraction photometric method; ICP-AES method
V	Photometrpic method; ICP —AES method
Co	Photometrpic method; ICP —AES method; AAS method
Ti	Photometrpic method; ICP —AES method
B	Extraction photometric method; ICP — AES method; Distillation separation photometric method; Ion selective electrode method; Photoelectric emission spectroscopic method
Mo	Extraction photometric method; ICP —AES method; GAAS method
Mg	Atomic absorption spectrophotometric method; ICP —AES method
Sn	Extraction photometric method ; ICP —AES method; GAAS method Photoelectric emission spectroscopic method
As	Extraction photometric method; ICP — AES method; HAAS method; Distillation separation photometric method; Atomic fluorescence method; Reduced by hydride; GAAS method
O	Thermal conductivity method; Infrared absorption method

4. The Examining of Hompgeneity and Stability

Take $2\sqrt[3]{N}$ of the number of sample in bottle at random Si、Mn、P、Cu、Nu、Ca、Al、S、Ba Ti arc delcrmined by x — rayfluorcscence method, and Fe is determined by potassium dichromate titrimetric. The data obtained are then subjected to a F — test for the homogeneity —testing. The sample banlanced for determining is at least 0. 2g. The results show that the homogeneity of the sample is considered acceptable, because of $F<F\alpha$.

The stability has been examined by determining the character value twice in a interval of four years. It shows that all of the range of the character value of the CRMs are less than the certified error. So the stability is demonstrated. The term of validity is 10 yaers.

5. Package and Storage

The CRM is packed in a glass bottle and sealed with poastic coating Eath marked contains 70g. The bottle is contained in a small carton. Store in dry place. Once the specimen is used, be sure to screw the outer and the inner lids tightly and place the bottle a desiccator.

6. Co —operating Analysts

Technology Center of Wuhan Iron and Steel (Croup) Corporation
Jilin Ferroalloy Works
Wuhan University of Science and Technology
Fushun Special Steel Corporation Ltd.
National Iron and Steel Determination Center

Ma —Anshan Iron and Steel Co. Etd.
Shanghai No. 5 Steel Corporation
Chengdu Seamless Pipe Corporation
The Institute of Geology Hubei Province
Shanghai No. 1 Steel Corporation