



BUREAU OF ANALYSED SAMPLES LTD

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BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF ANALYSIS

BCS-CRM No. 238/2 (ECRM 061-1)

0.2% CARBON STEEL

Prepared under rigorous laboratory conditions and, AFTER CERTIFICATION ANALYSIS IN GREAT BRITAIN,
issued by the Bureau of Analysed Samples Ltd.

CO-OPERATING ANALYSTS

INDEPENDENT ANALYSTS

1 COE, F. R., *BSc*, British Welding Research Association, Cambridge.

2 COPPINS, W. C., *MSc, ARIC*, Ridsdale & Co. Ltd., Middlesbrough.

ANALYSTS representing MANUFACTURERS and USERS

3 BAGSHAW, B., *AMet, FIM, MInstF*,

Brown Firth Research Laboratories, Sheffield.

ANALYSTS representing MANUFACTURERS and USERS (cont.)

4 BURNLEY, H., Skinningrove Iron Co. Ltd., Saltburn.

5 HENRYS, F., *AMCT, AIM*, Exors of James Mills Ltd., Stockport.

6 JONES, R. F., Steel Company of Wales Ltd., Port Talbot.

7 KYLE, J. H., *AIM*, W. Beardmore & Co. Ltd., Glasgow.

ANALYSES

Mean of 4 values - mass content in %.

Analyst No.	C	Si	Mn	P	S	Ni	Cu
1	0.215	0.12	...	...	...	...	...
2	0.210	0.115	<i>0.61</i>	<i>0.019</i>	<i>0.034</i>	<i>0.21</i>	<i>0.10</i>
3	0.205	0.115	...	...	...	...	...
4	0.210	0.11	...	...	...	...	...
5	0.205	0.120	...	...	...	...	...
6	0.205	0.125	...	...	...	...	...
7	0.210	0.115	...	...	...	...	...
M_M	0.209	0.12	...	...	...	...	...
s_M	0.004	0.01	...	...	...	...	...

The above figures are those which each Analyst has decided upon after careful verification.

Figures in bold type standardized, figures in small italic type only approximate.

M_M: Mean of the intralaboratory means. **s_M**: standard deviation of the intralaboratory means.

CERTIFIED VALUES (C_v)

mass content in %

	C	Si
C_v	0.21	0.12
C(95%)	0.01	0.01

The half width confidence interval $C(95\%) = \frac{t \times s_M}{\sqrt{n}}$ where "t" is the appropriate two sided Student's t value at the 95% confidence level for "n" acceptable mean values.

For further information regarding the confidence interval for the certified value see ISO Guide 35:2006 sections 6.1 and 10.5.2.

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NOTES ON METHODS USED

CARBON

Analysts Nos. 1, 4, 5 and 7 determined carbon gravimetrically using the Standard method B.S. 1121: Part 11: 1967. Nos. 2 and 6 used a non-aqueous titration method (Jones, et al., Analyst, 1965, **90**, 623; 1966, **91**, 399). No. 3 used a low-pressure method (Cook and Speight, Analyst, 1956, **81**, 144).

Analyst No. 2 also used the British Standard gravimetric method and found 0.21%. No. 3 also found 0.20% by non-aqueous titration and 0.20% by infrared absorption (Tipler, Analyst, 1963, **88**, 272).

SILICON

Analysts Nos. 1, 4, 5 and 7 determined silicon gravimetrically after double dehydration with perchloric acid according to the Standard method B.S. 1121: Part 10: 1967 (Nos. 1, 5 and 7) or with hydrochloric acid (No. 4). Nos. 2, 3 and 6 determined silicon photometrically as molybdenum-blue after reduction of the silicomolybdate complex with ascorbic acid (Nos. 2 and 3) or stannous chloride (No. 6).

Analyst No. 3 also used the British Standard gravimetric method and found 0.11%. Nos. 4 and 5 also determined silicon photometrically as molybdenum-blue and found 0.11% and 0.12% respectively.

MANGANESE

Titrimetric method depending on oxidation with persulphate/silver nitrate and titration with arsenite/nitrite solution (Analoid method No. 53).

PHOSPHORUS

Titrimetric phosphomolybdate method (Analoid method No. 21).

SULPHUR

Standard gravimetric method B.S. 1121: Part 1: 1966.

NICKEL

Photometric method using dimethylglyoxime (Analoid method No. 42).

COPPER

Photometric method using bis-cyclohexanone oxalyldihydrazone (Analoid method No. 65).

DESCRIPTION OF SAMPLE

British Chemical Standard - bottles of 100g chips graded 1700 - 250 μ m (10 - 60 mesh) for chemical analysis.

INTENDED USE & STABILITY

The chip sample, BCS-CRM 238/2 (ECRM 060-1), is intended for the verification of analytical methods, such as those used by the participating laboratories, for the calibration of analytical instruments in cases where the calibration with primary substances (pure metals or stoichiometric compounds) is not possible and for establishing values for secondary reference materials.

It will remain stable provided that the bottle remains sealed and is stored in a cool, dry atmosphere. When the bottle has been opened the lid should be secured immediately after use. If the contents should become discoloured (e.g. oxidised) by atmospheric contamination they should be discarded.

This Certified Reference Material has been prepared in accordance with the recommendations specified in ISO Guides 30 to 35, available from the International Standards Organisation in Geneva.

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For BUREAU OF ANALYSED SAMPLES LTD

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