MAIN EDITION

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BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF ANALYSIS
BCS-CRM No. 182/3
11% SILICON ALUMINIUM ALLOY

(BS 1490:1963:LM20)

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

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ANALYSES

Mean of 4 values - mass content in %.

Analyst No.	Si	Fe	Cu	Mn	Mg	Zn	Ti	Pb	Sn	Ni
1	11.05	0.50	0.038	0.26	0.067	0.127	0.104	0.055	0.026	0.045
2	11.10	0.54	0.036	0.28	0.066	0.135	0.105	0.058	…	0.050
3	10.99	0.51	0.038	0.25	0.065	0.133	0.109	0.054	0.025	0.045
4	11.07	0.51	0.035	0.26	0.069	0.121	0.106	0.046	0.029	0.037
5	10.99	0.51	0.039	0.26	0.066	0.130	0.105	0.061	0.027	0.052
6	10.99	0.51	…	0.24	0.068	0.120	0.116	0.060	…	0.050
7	11.03	0.51	0.036	0.25	0.072	0.130	0.103	0.057	0.027	0.047
M_M	**11.03**	**0.51**	**0.037**	**0.26**	**0.068**	**0.128**	**0.107**	**0.056**	**0.027**	**0.047**
s_M	0.05	0.02	0.002	0.02	0.003	0.006	0.005	0.006	0.002	0.005

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

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

CERTIFIED VALUES (Cv)

mass content in %

	Si	Fe	Cu	Mn	Mg	Zn	Ti	Pb	Sn	Ni
Cv	**11.03**	**0.51**	**0.037**	**0.26**	**0.068**	**0.128**	**0.107**	**0.056**	**0.027**	**0.047**
C(95%)	0.05	0.02	0.002	0.02	0.003	0.006	0.005	0.005	0.002	0.005

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.

BCS-CRM 182/3 11% SILICON ALUMINIUM ALLOY

NOTES ON METHODS USED

SILICON

All Analysts, except No. 7, used gravimetric methods involving decomposition of the sample in sodium hydroxide solution followed by acidification and evaporation. Nos. 1, 2, 3, 4 and 5 acidified with perchloric acid and carried out a double dehydration. Nos. 1, 3, 4 and 5 used the Standard method BS 1728: Part 11: 1960. No. 2 used ASTM E34-78. No. 6 acidified with sulphuric acid and flocculated the silicic acid with gelatin (British Aluminium Co. Ltd., Publication No. 405, 1961, p 125). No. 7 used ICP-OES.

Analyst No. 7 also used a gravimetric method and found 11.03%.

IRON

Analysts Nos. 1, 4 and 6 determined iron using FAAS. Nos. 2 and 7 used ICP-OES. Nos. 3 and 5 determined iron photometrically with 1.10-phenanthroline according to the Standard method BS 1728: Part 8: 1957.

Analyst No. 7 also determined iron photometrically and found 0.51%.

COPPER

Analysts Nos. 1, 3, and 4 determined copper using FAAS. Nos. 2 and 7 used ICP-OES. No. 5 determined copper photometrically with *bis*-cyclohexanone oxalyldihydrazone.

Analysts Nos. 5 and 7 also used FAAS and found 0.040% and 0.039% respectively.

MANGANESE

Analysts Nos. 1, 4 and 6 determined manganese using FAAS. Nos. 2 and 7 used ICP-OES. Nos. 3 and 5 determined manganese photometrically after oxidation with periodate according to the Standard method BS 1728: Part 10: 1957.

Analysts Nos. 5 and 7 also used FAAS and found 0.26% and 0.25% respectively.

MAGNESIUM

Analysts Nos. 1, 3, 4, 5 and 6 determined magnesium using FAAS. Nos. 2 and 7 used ICP-OES. Analyst No. 7 also used FAAS and found 0.068%.

ZINC

All Analysts except No. 7 determined zinc using FAAS. No. 7 used ICP-OES.

Analyst No. 7 also used FAAS and found 0.14%.

TITANIUM

Analyst No. 1 determined titanium using FAAS. Nos. 2 and 7 used ICP-OES. Nos. 3, 5 and 6 determined titanium photometrically with hydrogen peroxide. No. 4 used D.C. Plasma - Optical Emission Spectrometry.

Analyst No. 7 also determined titanium photometrically and found 0.094%.

LEAD

All Analysts determined lead using FAAS.

Analyst No. 4 also determined lead using FAAS after solvent extraction with ammonium pyrrolidine dithiocarbamate and also by polarography. He found 0.046% and 0.048% respectively.

TIN

Analyst No. 1 determined tin using FAAS. No. 3 determined tin titrimetrically with potassium iodate (British Aluminium Co. Ltd. Publication No. 405, 1961, p 139). No. 4 used polarography. Nos. 5 and 7 determined tin photometrically. No. 5 used catechol violet.

NICKEL

Analysts Nos. 1, 2, 3, 4 and 6 determined nickel using FAAS. No. 5 used a photometric method with dimethylglyoxime. No. 7 used ICP-OES.

Analysts Nos. 5 and 7 also used FAAS and found 0.050% and 0.047% respectively.

Analyst No. 4 also determined nickel using FAAS after solvent extraction with ammonium pyrrolidine dithiocarbamate and found 0.038%.

Abbreviations:

FAAS Flame Atomic Absorption Spectrometry.

ICP-OES Inductively Coupled Plasma - Optical Emission Spectrometry.

DESCRIPTION OF SAMPLE

Bottles of 100g chips graded 1700-250 micron (10-60 mesh) for chemical analysis.

INTENDED USE & STABILITY

The sample 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.

TRACEABILITY

The traceability of this BCS-CRM to the SI is ensured by the use of either stoichiometric analytical techniques or methods which are calibrated against pure metals or stoichiometric compounds.

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For BUREAU OF ANALYSED SAMPLES LTD

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