MAIN EDITION

BUREAU OF ANALYSED SAMPLES LTD

BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF ANALYSIS

BCS-CRM No. 316

8% ALUMINIUM MAGNESIUM ALLOY

Prepared under rigorous laboratory conditions and, AFTER CERTIFICATION ANALYSIS IN GREAT BRITAIN, 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	Zn	Pb	Sn	Ni	Al
1	0.058	0.008	0.038	0.28	0.68	0.022	0.005	0.004	8.05
2	0.050	0.010	0.039	0.27	0.67	0.027	0.003	0.005	8.02
3	0.056	0.010	0.040	0.29	0.69	0.022	0.006	0.005	8.01
4	0.053	0.009	0.042	0.28	0.67	0.026	0.005	0.004	7.94
5	0.050	0.009	0.040	0.30	0.70	...	0.005	0.004	8.06
6	0.053	0.009	0.041	0.29	0.68	0.021	0.005	0.004	8.07
7	0.060	0.009	0.039	0.28	0.67	0.024	0.004	0.004	7.92
M_M	**0.054**	**0.009**	**0.040**	**0.28**	**0.68**	**0.024**	**0.005**	**0.004**	**8.01**
s_M	0.004	0.001	0.002	0.01	0.02	0.003	0.001	0.001	0.06

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	Zn	Pb	Sn	Ni	Al
Cv	**0.054**	**0.009**	**0.040**	**0.28**	**0.68**	**0.024**	**0.005**	**0.004**	**8.01**
C(95%)	0.004	0.001	0.002	0.01	0.02	0.003	0.001	0.001	0.06

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 316 8% ALUMINIUM MAGNESIUM ALLOY

NOTES ON METHODS USED

SILICON

Analyst No. 1 determined silicon gravimetrically after dissolving in nitric acid (50% v/v) and fuming with perchloric acid. The other Analysts used photometric methods depending on formation of silicomolybdate. No. 3 measured the yellow silicomolybdate complex whereas the others reduced to molybdenum-blue with metabisulphite/1-amino-2-naphthol-4-sulphonic acid (No. 2) or stannous chloride (Nos. 4, 5, 6 and 7).

IRON

All Analysts determined iron by photometric methods. Nos. 1, 2, 3, 4 and 7 used 1:10-phenanthroline, Nos. 1 and 7 following the procedure of the Standard method B.S. 3907: Part 2: 1966. No. 5 used thiocyanate and No. 6 thioglycollic acid.

Analyst No. 2 also used atomic-absorption spectroscopy and found 0.010%. No. 7 also used a thioglycollic acid method and found 0.008%.

COPPER

All Analysts determined copper photometrically. Nos. 1 and 3 used *bis*-cyclohexanone oxalyldihydrazone. Nos. 2, 4, 5 and 6 used sodium diethyldithiocarbamate. No. 7 used oxalyldihydrazide according to the Standard method B.S. 3907: Part 3: 1966.

Analyst No. 2 also found 0.038% by atomic-absorption spectroscopy. No. 7 also found 0.043% by a photometric diethyldithiocarbamate method.

MANGANESE

Analyst No. 1 determined manganese titrimetrically by oxidation with persulphate/silver nitrate and titration with arsenite/nitrite solution. The other Analysts determined manganese photometrically after oxidation with periodate; No. 7 used the Standard method B.S. 3907: Part 4: 1966.

Analyst No. 2 also found 0.27% by atomic-absorption spectroscopy.

ZINC

Analysts Nos. 1 and 2 determined zinc by a direct polarographic method using an ammoniacal citrate solution of the alloy. No. 3 determined zinc gravimetrically as the quinaldate. Nos. 4 and 7 separated zinc by ion exchange and determined it titrimetrically by titration with EDTA; No. 7 also used a gravimetric determination as zinc mercuric thiocyanate after ion-exchange separation. Nos. 5 and 6 precipitated zinc as sulphide from a buffered formate solution and determined it gravimetrically after ignition to the oxide.

Analyst No. 2 used two alternative methods (1) precipitation as sulphide from a buffered formate solution followed by gravimetric determination as zinc phosphate (2) atomic-absorption spectroscopy, giving a result of 0.68%. No. 7 also determined zinc photometrically with dithizone and found 0.69%.

LEAD

Analysts Nos. 1 and 2 determined lead polarographically. Nos. 3 and 7 used atomic-absorption spectroscopy No. 4 separated lead by ion exchange and titrated with EDTA. No. 6 determined lead photometrically with dithizone.

Analyst No. 2 also determined lead by atomic-absorption spectroscopy and found 0.025%.

TIN

Analysts Nos. 1, 2, 3, 4 and 7 determined tin photometrically. Nos. 1 and 3 used a direct quercetin method. No. 2 extracted the tin as iodide into toluene, re-extracted into sodium hydroxide solution and completed photometrically with catechol violet. Nos. 4 and 7 determined tin photometrically with phenylfluorone after separation by ion exchange (No. 4) or by distillation as the bromide (No. 7). Nos. 5 and 6 determined tin titrimetrically by titration with iodate/iodide solution.

Analyst No. 1 also determined tin titrimetrically and found 0.004%.

NICKEL

All Analysts determined nickel by photometric methods. Nos. 1 and 4 formed the dimethylglyoxime complex in ammoniacal citrate solution and extracted with chloroform; the nickel complex was then extracted from the chloroform with dilute hydrochloric acid and determined photometrically in the aqueous phase with dimethylglyoxime. Nos. 2, 5 and 7 used direct dimethylglyoxime methods without extraction. No. 3 used furil α-dioxime. No. 6 used 1:2-cyclohexanedione dioxime.

Analyst No. 2 also determined nickel by atomic-absorption spectroscopy and found 0.004%.

ALUMINIUM

All Analysts determined aluminium gravimetrically after precipitation as oxinate. Nos. 1, 2, 3, 4, 6 and 7 carried out preliminary separation from interfering elements by precipitation of aluminium as benzoate according to the Standard Method B.S. 3907: Part 1: 1965 (Nos. 1, 2, 4 and 7) or the A.S.T.M. method Designation E35-63 (No. 6). No. 5 separated aluminium by precipitation with ammonia and removed interfering elements with sulphide before determining the aluminium as oxinate.

Analyst No. 2 also determined aluminium by carrying out a mercury-cathode separation, precipitating the aluminium with ammonia and igniting to oxide; the result by this method was 7.97%. No. 3 also found 8.11% after ammonia separation and gravimetric determination as oxinate. No. 7 also found 7.94% by benzoate precipitation followed by titration with EDTA.

DESCRIPTION OF SAMPLE

Bottles of 100g powder graded 1000-250 micron (16-60 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.

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