MAIN EDITION

BUREAU OF ANALYSED SAMPLES LTD

4004

BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF ANALYSIS
BCS-CRM No. 389/1
HIGH PURITY MAGNESIA

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

CO-OPERATING ANALYSTS AND FIRMS

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ANALYSES

Mean of 4 values - mass content in %. All results relate to the ignited (1025°C) sample

Analyst No.	SiO_2	Al_2O_3	Fe_2O_3	MnO	CaO	MgO	TiO_2	P_2O_5	*Cr_2O_3*	*B_2O_3*
1	...	...	0.6158	...	...	97.7985	0.0060	...	...	...
2	0.2645	0.0880	0.6073	0.1033	0.8835	97.9413	0.0058	0.0298	*0.0050*	*0.0155*
3	0.2712	0.0974	0.6006	0.1023	0.8808	97.9466	0.0053	0.0286	*0.0047*	*0.0154*
4	...	...	...	0.0975	0.8800	97.7750	...	...	*0.0043*	...
5*	...	...	...	...	...	...	...	...	...	...
6	0.2690	0.1123	0.6015	0.0958	0.8668	...	...	...	...	...
7	0.2708	0.0888	0.6090	0.1048	0.8815	97.9675	0.0035	0.0315	*0.0055*	...
8	0.2700	0.1375	0.6050	0.0950	...	97.9125	...	0.0300	...	...
9	0.2952	0.0993	...	0.0998	0.8851	...	0.0051	0.0278	*0.0021*	*0.0146*
M_M	**0.2735**	**0.1039**	**0.6065**	**0.0998**	**0.8796**	**97.8902**	**0.0051**	**0.0295**		
s_M	0.0109	0.0187	0.0056	0.0038	0.0066	0.0824	0.0010	0.0014		
s_w	0.0106	0.0052	0.0135	0.0030	0.0047	0.1428	0.0004	0.0011		

The above values 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. s_w: intralaboratory standard deviation.

Figures given above in small italic type are for information only

*Analyst No. 5 determined trace elements only, see table below

CERTIFIED VALUES (Cv)

mass content in %

	SiO_2	Al_2O_3	Fe_2O_3	MnO	CaO	MgO	TiO_2	P_2O_5
Cv	**0.274**	**0.104**	**0.607**	**0.100**	**0.880**	**97.89**	**0.0051**	**0.0295**
C(95%)	0.012	0.020	0.006	0.004	0.007	0.09	0.0013	0.0018

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.

DESCRIPTION OF SAMPLE

The sample consists of material passing a nominal 150µm aperture sieve. It is sold in bottles containing 100g.

TRACE ELEMENTS

This table gives additional information on Trace Elements supplied by Analyst No. 5. It is given for information only.

Mass content in µg/g.

Element	Ba	Ni	Sr	Y	Zn	Zr
µg/g	13	12	6	23	23	6

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NOTES ON METHODS USED

SILICA

All Analysts, except No. 3, determined silica by X-Ray Fluorescence Spectrometry (XRF) using a fused bead technique. Analyst No. 3 determined silica gravimetrically and also determined residual silica in the filtrate according to ISO 10058:1992.

ALUMINA

All Analysts, except No. 3, determined alumina by XRF using a fused bead technique. Analyst No. 3 determined alumina gravimetrically as oxine after a sodium hydroxide separation.

IRON OXIDE

All Analysts, except No. 3, determined iron oxide by XRF using a fused bead technique. Analyst No. 3 determined iron oxide photometrically with o-phenanthroline according to ISO 10058:1992.

MANGANESE OXIDE

All Analysts, except No. 3, determined manganese oxide by XRF using a fused bead technique. Analyst No. 3 determined manganese oxide photometrically after periodate oxidation according to ISO 10058:1992.

CALCIUM OXIDE

All Analysts, except No. 3, determined calcium oxide by XRF using a fused bead technique. Analyst No. 3 determined calcium oxide by titration with ethyleneglycol diaminoethyl tetra-acetic acid after separation with potassium hydroxide according to ISO 10058:1992.

MAGNESIA

All Analysts, except No. 3, determined magnesia by XRF using a fused bead technique. Analyst No. 3 determined magnesia by titration with 2-diaminocyclohexane tetra-acetic acid according to ISO 10058:1992.

TITANIA

All Analysts, except No. 3, determined titania by XRF using a fused bead technique. Analyst No. 3 determined titania photometrically with diantipyrylmethane according to ISO 10058:1992.

PHOSPHORUS PENTOXIDE

All Analysts, except No. 3, determined phosphorus pentoxide by XRF using a fused bead technique. Analyst No. 3 determined phosphorus pentoxide photometrically as phosphovanadomolybdate.

CHROMIUM OXIDE

All Analysts, except No. 3, determined chromium oxide by XRF using a fused bead technique. Analyst No. 3 determined chromium oxide photometrically with diphenylcarbazide according to ISO 10058:1992.

BORON OXIDE

Analysts Nos. 2 and 9 determined boron using Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES). Analyst No. 3 determined boron photometrically with curcumin.

TRACE ELEMENTS

Analyst No. 5 determined trace elements by wavelength dispersive XRF using samples prepared as compressed pellets. Values were obtained against a calibration originally verified for silicate rocks.

DESCRIPTION OF SAMPLE

Bottles of 100g of finely divided material for chemical analysis passing a nominal 90 micron aperture.

INTENDED USE & STABILITY

This sample is intended for the verification of analytical methods, such as those used by the participating laboratories, for the calibration of analytical instruments, for establishing values for secondary reference materials and for training purposes.

It will remain stable provided that the bottle remains sealed and is stored in a dry atmosphere. When the bottle has been opened the lid should be secured immediately after use.

In order to ensure that a fully representative sample is taken users should take a minimum sub-sample size of 1.0g. Users of this material should be aware that the use of a smaller sub-sample size will invalidate the certified values and the associated 95% confidence limits. Provided that the material is stored in a suitable environment there will be no contribution to the uncertainty from the long term stability of this CRM.

MEASUREMENT UNCERTAINTY

In establishing the measurement uncertainty of a Certified Reference Material four factors have to be considered: uncertainty arising from the analysis of the material, from the homogeneity examination of the material, from the long term storage of the material and from the transportation of the material. In the case of high purity silica the contributions from the homogeneity, the long term storage and the transportation of the CRM are negligible.

TRACEABILITY

The characterisation of this material has been achieved by chemical analysis involving inter-laboratory study, each laboratory using the method of their choice, details of which are given above. Most methods used were either international or national standard methods or methods which are technically equivalent. All laboratories used either stoichiometric analytical techniques or methods which were calibrated predominantly against pure metals or stoichiometric compounds, ensuring traceability of the individual results to the SI.

Bureau of Analysed Samples Ltd is the Reference Material Producer as defined in ISO Guide 34:2009 section 3.1 and is fully responsible for assigning the certified values and their uncertainties in accordance with ISO Guides 34:2009 and 35:2006.

Bureau of Analysed Samples Ltd is a UKAS Accredited Reference Material Producer No 4004.

Further information and advice on this or other Certified Reference Materials or Reference Materials produced by Bureau of Analysed Samples Ltd may be obtained from the address below.

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