MAIN EDITION

BUREAU OF ANALYSED SAMPLES LTD

BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF ANALYSIS

BCS-CRM No. 348

BALL CLAY

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 %. All results relate to the dried (105°c) sample.

Analyst No.	SiO_2	Al_2O_3	TiO_2	Fe_2O_3	CaO	MgO	Na_2O	K_2O	P_2O_5	Cr_2O_3	LOI	*BaO*	*ZrO_2*	*C_{total}*	*S*
1	50.92	31.41	1.066	1.006	...	0.307	0.320	...	0.071	...	11.64	...	...	...	...
2	51.09	31.69	1.090	1.020	0.170	0.305	0.362	2.255	0.072	0.020	11.64	*0.05*	*0.04*	*1.63*	...
3	51.39	31.61	1.077	1.042	0.175	0.298	0.334	2.210	0.072	0.014	11.68	*0.03*	*0.03*	...	...
4	51.03	31.57	1.065	1.038	0.165	0.310	0.358	2.195	0.086	0.015	11.82	*0.05*	*0.03*	...	...
5	51.34	31.65	1.062	1.041	0.177	0.314	0.312	2.213	0.075	0.018	11.78	*0.05*	*0.02*	...	...
6	51.00	31.51	1.076	1.042	0.188	0.280	0.340	2.234	0.058	...	11.82	...	*0 04*	*1.65*	*0.1*
7	51.14	31.71	1.100	1.068	0.180	0.315	0.353	2.220	0.060	0.015	11.86	...	*0 02*	...	...
8	51.35	31.37	1.093	1.027	0.172	0.308	...	2.264	...	...	11.95	...	...	...	...
9	50.92	31.80	1.127	1.082	0.158	0.305	0.370	2.250	...	...	11.60	...	...	...	...
M_M	**51.1**	**31.6**	**1.08**	**1.04**	**0.17**	**0.30**	**0.34**	**2.23**	**0.071**	**0.016**	**11.8**	...	...	...	...
s_M	0.2	0.2	0.03	0.03	0.01	0.02	0.03	0.03	0.010	0.003	0.2	...	...	...	...

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.

EQUIVALENT % ELEMENT CONTENT OF OXIDE CONSTITUENTS

	Si	Al	Ti	Fe	Ca	Mg	Na	K	P	Cr
M_M	**23.9**	**16.7**	**0.65**	**0.73**	**0.12**	**0.18**	**0.26**	**1.85**	**0.031**	**0.011**

CERTIFIED VALUES (Cv)

mass content in %

	SiO_2	Al_2O_3	TiO_2	Fe_2O_3	CaO	MgO	Na_2O	K_2O	P_2O_5	Cr_2O_3	LOI
Cv	**51.1**	**31.6**	**1.08**	**1.04**	**0.17**	**0.30**	**0.34**	**2.23**	**0.071**	**0.016**	**11.8**
C(95%)	0.2	0.2	0.02	0.02	0.01	0.01	0.02	0.03	0.009	0.004	0.1

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.

Note. The dried sample is hygroscopic and rapidly reabsorbs moisture if exposed to the atmosphere. Analysis should preferably be carried out on the "as received" sample and corrected for moisture content.

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NOTES ON METHODS USED

SILICA

Analysts Nos. 1, 3 and 4 determined the bulk of the silica gravimetrically after double dehydration, and determined the residual silica photometrically as molybdenum blue. The remaining Analysts determined silica by XRF, using a fused bead technique and synthetic calibration with pure materials.

ALUMINA

Analysts Nos. 1, 3, 4 and 9 separated iron and titanium by solvent extraction with cupferron and chloroform. No. 1 determined alumina gravimetrically as the oxinate. Nos. 3, 4 and 9 determined alumina titrimetrically. Nos. 3 and 9 added an excess of EDTA, and back titrated with standard zinc solution. No. 4 used an excess of DCTA. The remaining Analysts used XRF.

Analyst No. 9 also determined alumina by XRF and obtained a mean value of 31.92%.

TITANIA

Analysts Nos. 1, 3, 4 and 9 determined titania photometrically, No. 1 with tiron, No. 3 with diantipyrylmethane and Nos. 4 and 9 with hydrogen peroxide. The remaining Analysts used XRF. Analyst No. 9 also determined titania by XRF and obtained a mean value of 1.16%.

FERRIC OXIDE

Analysts Nos. 1 and 3 determined iron photometrically with 1, 10-phenanthroline. No. 4 determined iron titrimetrically with titanous chloride solution. The remaining Analysts used XRF.

CALCIUM OXIDE

Analysts Nos. 2, 5, 6, 7, 8 and 9 determined calcium by XRF. Nos. 3 and 4 used AAS.

MAGNESIUM OXIDE

Analyst No. 1 determined magnesium titrimetrically with EDTA. Nos. 2, 5, 6, 7, 8 and 9 used XRF. Nos. 3 and 4 used AAS.

Analyst No. 9 also determined magnesium by AAS and obtained a mean value of 0.275%.

SODIUM OXIDE

Analysts Nos. 1, 3, 4, 6, 7 and 9 determined sodium by flame emission spectrometry. The remaining Analysts used XRF.

POTASSIUM OXIDE

Analysts Nos. 2, 5, 6, 8 and 9 determined potassium by XRF. The remaining Analysts used flame emission spectrometry.

Analyst No. 9 also used flame emission spectrometry and obtained a mean value of 2.28%.

PHOSPHORUS PENTOXIDE

Analysts Nos. 1, 3 and 4 determined phosphorus photometrically, No. 1 as molybdenum blue and Nos. 3 and 4 as phosphovanadomolybdate. The remaining Analysts used XRF.

CHROMIC OXIDE

Analysts Nos. 2, 5 and 7 determined chromium by XRF. No. 3 determined chromium photometrically with diphenylcarbazide. No. 4 used AAS.

LOSS ON IGNITION

Loss on ignition was determined by heating to constant weight at 1025 ±25°C. (Analyst No. 3 determined the loss on the "as received" sample and corrected for moisture by a current moisture determination.).

BARIUM OXIDE

Analysts Nos. 2 and 5 determined barium by XRF. Nos. 3 and 4 used AAS.

ZIRCONIUM OXIDE

Analysts Nos. 2, 5, 6 and 7 determined zirconium by XRF. Nos. 3 and 4 determined zirconium photometrically, No. 3 with arsenazo III and No. 4 with xylenol orange.

CARBON (Total)

Analysts Nos. 2 and 6 determined carbon after high frequency combustion, No. 2 gravimetrically and No. 6 by infrared absorption.

SULPHUR

Analyst No. 6 determined sulphur by high frequency combustion and infrared absorption.

DESCRIPTION OF SAMPLE

Bottles of 100g powder graded < 75μm (200 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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For BUREAU OF ANALYSED SAMPLES LTD

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