PRELIMINARY EDITION

BUREAU OF ANALYSED SAMPLES LTD

Directors:-
R.P.MEERES, *BA (Oxon), MRSC* (Managing)
G.C.FLINTOFT, *ACMA*

BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF ANALYSIS

BCS-CRM No. 376/1 POTASH FELDSPAR

SGT FELDSPAR 1

Prepared under rigorous laboratory conditions and, AFTER CERTIFICATION ANALYSIS IN GREAT BRITAIN, THE CZECH REPUBLIC, GREECE, SWEDEN AND THE UNITED STATES OF AMERICA, issued by the Bureau of Analysed Samples Ltd and the Society of Glass Technology

ANALYSES

Mean of 4 values - mass content in %. All results relate to the dried (105°C) sample.

Analyst No.	SiO_2	Al_2O_3	Fe_2O_3	CaO	Na_2O	K_2O	BaO	PbO	LOI
1	65.7255	18.7083	0.0865	…	3.0313	11.5595	0.0218	…	…
2	65.8465	18.7543	0.0746	0.4105	3.0350	11.7400	0.0243	0.0094	0.1843
3	65.4426	18.5918	0.0926	0.4417	2.9489	11.6316	0.0190	0.0083	0.2005
4	65.6603	18.5198	0.0957	0.4290	2.9693	…	…	0.0095	0.2063
5	65.3538	18.6755	…	0.3945	…	11.5210	…	…	…
6	65.5540	18.6808	0.0988	0.4270	3.0555	11.5635	…	0.0091	0.2100
7	66.0550	…	0.0875	0.4153	2.9900	…	…	0.0089	0.2138
8	65.8585	18.8220	…	0.4195	2.9655	…	0.0193	…	0.2123
9	65.8438	…	0.0740	0.4070	3.0992	11.4927	0.0246	…	0.1930
10	…	18.6050	0.0888	0.4688	3.0300	11.6050	0.0190	…	0.1950
11	…	18.5151	0.0770	0.4000	2.9300	11.5175	0.0190	..	0.2175
12	…	18.4525	…	0.4600	2.9700	11.5200	…	…	…
13	66.0320	18.5480	0.0705	0.3995	2.9510	11.7815	…	…	0.1830
14	66.0713	18.7070	…	0.4050	…	…	…	…	0.2138
M_M	**65.7676**	**18.6317**	**0.0846**	**0.4214**	**2.9980**	**11.5932**	**0.0210**	**0.0090**	**0.2027**
s_M	0.2452	0.1107	0.0100	0.0234	0.0514	0.0984	0.0026	0.0005	0.0123
s_w	0.1754	0.0852	0.0022	0.0061	0.0273	0.0417	0.0016	0.0005	0.0084

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

CERTIFIED VALUES (Cv)

mass content in %

	SiO_2	Al_2O_3	Fe_2O_3	CaO	Na_2O	K_2O	BaO	PbO	LOI
Cv	**65.77**	**18.63**	**0.085**	**0.421**	**3.00**	**11.59**	**0.0210**	**0.0090**	**0.203**
C(95%)	0.18	0.08	0.008	0.015	0.04	0.08	0.0024	0.0006	0.009

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 section 10.5.2.

Additional Information (mass content in %)

Analyst No	*TiO_2*	*MgO*	*Mn_2O_3*	*P_2O_5*	*Cr_2O_3*	*ZrO_2*	*CoO*
1	*0.0043*	*0.0313*	*0.0050*	*0.0153*	*<0.001*	*<0.001*	…
2	…	…	…	*0.0205*	…	…	…
3	*0.0113*	*0.0170*	*0.0013*	…	*0.0022*	*0.0020*	*0.0009*
4	*0.0053*	*0.0477*	*0.0016*	…	*0.0003*	…	…
5	…	…	…	…	…	…	…
6	*0.0143*	*0.0313*	*0.0038*	*0.0333*	*0.0003*	*0.0009*	*<0.0005*
7	…	*0.0097*	…	…	*0.0002*	…	
8	*0.0100*	…	*0.0056*	*0.0358*	*0.0025*	…	…
9	…	*0.0311*	…	*0.0161*	…	…	…
10	*0.0037*	…	…	…	…	…	…
11	*0.0075*	…	…	…	…	…	…
12	*0.0070*	…	…	…	…	…	…
13	*<0.01*	*0.0405*	*0.0067*	…	*<0.0002*	*<0.01*	…
14	…	…	…	…	…	…	…

Analyst No. 6 determined Rb, Sr, Y and Nb by XRF and found 0.0436%, 0.0044%, 0.0006% and 0.0002% respectively

BCS-CRM No. 376/1 POTASH FELDSPAR
SGT FELDSPAR 1

NOTES ON METHODS USED

SILICA

All Analysts with the exceptions of Nos. 3, 4 and 7 determined silica using X-ray Fluorescence Spectrometry (XRF). Analysts Nos. 3 and 4 determined silica gravimetrically after dehydration with hydrochloric acid, No.3 according to the method in Bennett and Reed, Chemical Methods of Silicate Analysis (1971) and No.4 according to the British Standard Method BS 1902 part 2B.

ALUMINA

All Analysts except for Nos. 3 and 4 determined alumina using XRF. Analyst No 3 used Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) and No. 4 determined alumina by titration with ethylenediaminetetra-acetic acid (EDTA) according to BS 1902, part 2B.

FERRIC OXIDE

All Analysts except for Nos. 3, 4 and 7 determined ferric oxide using XRF. Analyst No 3 used ICP-OES and No. 4 used the 1, 10 phenanthroline photometric method according to the British Standard Method BS 1902 part 2B

CALCIUM OXIDE

All Analysts except for Nos. 3, 4 and 7 determined calcium oxide using XRF. Analyst No. 3 determined calcium oxide by using ICP-OES, whilst Nos. 4and 7 used Flame Atomic Absorption Spectrometry (FAAS), No. 4 following the Standard Method BS 1902 part 2B.

SODIUM OXIDE

All Analysts except for Nos. 3, 4 and 7 determined sodium oxide using XRF. The other Analysts all used FAAS, no 4 according to the British Standard Method BS 1902 part 2B.

POTASSIUM OXIDE

All Analysts except for No.3 determined potassium oxide using XRF. Analyst No. 3 determined the constituent using FAAS.

BARIUM OXIDE

All Analysts except Nos. 3 and 7 determined barium oxide using XRF. Analyst No. 3 determined barium oxide using ICP-OES and Analyst No. 7 by using FAAS.

LEAD OXIDE

Analyst No. 3 determined lead oxide using ICP-OES. Analysts Nos. 4, 5 and 7 used FAAS, No. 7 according to the British Standard Method BS 1902 Part 2B whilst Analyst No. 6 used XRF. In addition Analyst No. 10 was able to supply a single value for lead oxide of 0.0084%, determined using ICP-OES.

LOSS ON IGNITION

All Analysts determined the loss on ignition gravimetrically by heating at 1000° ± 25° C to constant weight.

TITANIA

All Analysts except for Nos. 3, 4 and 10 determined titania using XRF. Analyst No. 3 determined titania using ICP-OES, Analyst No. 4 used a photometric method with tiron, and No. 10 determined titania photometrically with diantipyrylmethane.

MAGNESIUM OXIDE

Analysts Nos. 1, 6, 9 and 13 determined magnesium oxide using XRF. Analyst No. 4 used ICP-OES, whilst Analysts Nos. 4 and 7 used FAAS. Analyst No. 7 used the Standard Method BS 1902 part 2 to prepare the sample solutions.

MANGANESE OXIDE

All Analysts except Nos. 3 and 4 determined manganese oxide using XRF. Analyst No. 43 determined manganese oxide using ICP-OES and Analyst No. 4 used FAAS after preparing the sample solutions according to BS 1902 Part 2

PHOSPHORUS PENTOXIDE

All Analysts determined phosphorus pentoxide using XRF.

CHROMIUM OXIDE

All Analysts except for Nos. 3, 4 and 7 determined chromium oxide using XRF. Analyst No 3 used ICP-OES and Analyst No. 4 determined chromium oxide photometrically with diphenylcarbazide according to the British Standard Method BS 2975.

ZIRCONIUM OXIDE

Analysts Nos. 1, 6 and 13 determined zirconium oxide by XRF, whilst Analyst No. 3 used ICP-OES.

COBALT OXIDE

Analyst No. 3 determined cobalt oxide by ICP-OES, whilst Analyst No. 6 used XRF

CO-OPERATING ANALYSTS

INDEPENDENT ANALYSTS

1	BURTON, R., *MSc,*	Sheffield Hallam University, Sheffield.
2	JOHNSON, K., *BSc, PhD,*	Ceram Research Ltd, Stoke on Trent.
3	JONES, S.J., *BSc, CChem, MRSC,*	Ridsdale & Co. Ltd., Middlesbrough.
4	KAKLOPOULOS, B.,	Agricultural Research and Analytical Laboratories, Athens, Greece.
5	NEVE, L., *MSc, MRSC,*	University of Leeds, Leeds.
6	POTTS, P., *BSc, PhD, DSc, CChem, FRSC,*	Open University, Milton Keynes.
7	SUNDBERG, P	Glasforskningsinstitutet, Växjö, Sweden.
8	THOMAS, F, *MRSC,*	Camborne School of Mines, Penryn.

ANALYSTS representing MANUFACTURERS and USERS

9	FLOWER, M.,	Glass Technology Services Ltd., Sheffield.
10	JAMIESON, S., *MSc, CChem, MRSC,*	Pilkington European Technology Centre Ltd., Lathom.
11	MAYHER, J.,	Guardian Glass, Carleton, USA.
12	MIKOLAJKOVA, I,	Calumite s.r.o., Ostrava, Czech Republic.
13	MORAN, T.,	WBB Minerals, Group Central Laboratory, Whiston.
14	SCHWARZ, R.R., *PhD,*	London and Scandinavian Analytical Services, Rotherham.

DESCRIPTION OF SAMPLE

Bottles of 100g of finely divided material for chemical analysis passing a nominal 250 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.

TRACEABILITY

The traceability of BCS-CRM 376/1 has been established in accordance with principles of ISO Guides 30 – 35 and the International Vocabulary of Basic and General Terms in Metrology.
The characterisation of this material has been achieved by 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.
Six of the participating laboratories were accredited to ISO/IEC 17025 at the time of the analysis, although not necessarily for all of the constituents determined and not necessarily for the analysis of potash feldspar. It has been established statistically that there is no difference between the results of the accredited and the non-accredited laboratories.
Bureau Of Analysed Samples Ltd is the reference material producer as defined in ISO Guide 34:2000 section 3.1 and is fully responsible for assigning the certified values and their uncertainties in accordance with ISO Guides 31:2000 and 35:2006. The Society of Glass Technology has acted as a collaborator, as defined in ISO Guide 34:2000 section 3.1 and provided substantial advice during the certification of this material.

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 and the Society of Glass Technology may be obtained from the addresses below.

For BUREAU OF ANALYSED SAMPLES LTD.
NEWHAM HALL
NEWBY
MIDDLESBROUGH
ENGLAND
TS8 9EA

Email: enquiries@basrid.co.uk
Website: www.basrid.co.uk

R P MEERES,
Managing Director

UKAS REFERENCE MATERIALS
4004

For THE SOCIETY OF GLASS TECHNOLOGY
12 O'CLOCK COURT
21 ATTERCLIFFE ROAD
SHEFFIELD
ENGLAND
S4 7WW

Email: info@sgt.org
Website: www.sgt.org

D MARTLEW
President

Preliminary Edition …. June 2007