BUREAU OF ANALYSED SAMPLES LTD

BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF ANALYSIS

BCS-CRM No. 532

SWEDISH FELDSPAR

Prepared under rigorous laboratory conditions and, AFTER CERTIFICATION ANALYSIS IN GREAT BRITAIN, BELGIUM, FRANCE, GERMANY, ITALY, JAPAN, AND TURKEY, issued by the Bureau of Analysed Samples Ltd and the Society of Glass Technology.

ANALYSES

Mean of 4 values - mass content in %.

Dried at 105°C

Analyst	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	Na_2O	K_2O	LOI	*TiO_2*	*BaO*
1	77.1463	...	0.1823	0.2218	…	4.2600	3.7833	0.6353	...	...
2	…	…	…	…	…	…	…	0.5300	...	...
3	…	…	0.1760	0.2023	0.1648	4.1750	…	0.5200	...	...
4	76.9800	13.6090	0.1828	0.2113	0.1738	4.3700	3.8083	0.5503	*0.0233*	...
5	77.1425	13.4675	0.1771	0.2180	0.1723	4.4623	3.8405	0.5653	...	...
6	76.9725	13.4925	0.1838	0.2133	0.1383	4.4460	3.7710	0.5775	...	...
7	76.9800	13.5921	0.1770	0.1958	…	4.4541	3.8604	…	...	...
8	76.9066	13.3402	0.1832	0.2260	0.1608	4.3614	3.7931	0.6201	...	...
9	77.0250	13.5750	0.1875	0.2200	0.1575	4.4275	3.7500	0.5600	...	...
10	76.9950	13.5198	0.1838	0.2233	0.1793	4.4285	3.7718	0.4755	*0.0188*	*0.0105*
11	77.1475	13.3975	0.1800	0.2075	0.1500	4.2450	3.7400	0.5725	*0.0200*	*0.0200*
12	…	13.3925	0.1803	0.1950	…	…	…	0.6050	...	...
13	77.4200	13.2525	…	…	0.1303	4.1950	3.8875	…	*0.0130*	...
M_M	77.0715	13.4639	0.1813	0.2122	0.1586	4.3477	3.8006	0.5647	*0.019*	*0.015*
s_M	0.1490	0.1171	0.0036	0.0109	0.0166	0.1092	0.0484	0.0462		
s_w	0.1466	0.0617	0.0026	0.0058	0.0059	0.0266	0.0251	0.0116		

M_M: Mean of the laboratory mean values. **s_M**: standard deviation of the laboratory mean values.. **s_W**: average within laboratory standard deviation.

Additional Information: Analyst No. 10 determined Cr_2O_3 by XRF and found 0.002%.

CERTIFIED VALUES (Cv)

mass content in %

Dried at 105°C

	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	Na_2O	K_2O	LOI
Cv	**77.07**	**13.46**	**0.1813**	**0.212**	**0.159**	**4.35**	**3.80**	**0.56**
C(95%)	0.11	0.09	0.0024	0.008	0.013	0.08	0.04	0.04
Minimum weight (g)	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.6

The half width confidence interval, C(95%), is an expression of the uncertainty of the certified value. $C(95\%) = \frac{t \times s_M}{\sqrt{n}}$ 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.

NB: Although widely accepted within the industry "mass content in %" is neither an SI nor an IUPAC supported quantity. Multiplication of the certified value (Cv) by 10^4 will yield the value in µg/g.

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(The current edition is available at www.basrid.co.uk)

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NOTES ON METHODS USED

SILICA

Analysts Nos. 1, 4, 6, 7, 10, 11 and 13 determined silica using X-Ray Fluorescence Spectroscopy (XRF), Nos. 4, 6 and 10 according to EN ISO 12677 and No. 11 following ASTM C146-94 A. The remaining Analysts determined silica gravimetrically, No. 5 following JIS M8853 and using Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES) to determine the soluble portion, No. 8 following the method in Bennett & Reed p53[1].

ALUMINA

Analysts Nos. 4, 6, 7, 9, 10, 11 and 13 determined alumina using XRF, Nos.4, 6 and 10 according to EN ISO 12677 M8852 and No. 11 EPA 6010C (2000). Analyst No. 12 used Flame Atomic Absorption Spectrometry (FAAS). The other Analysts all used ICP-OES, No. 5 following JIS M8853.

FERRIC OXIDE

Analysts Nos. 1, 4, 6, 7, 9, 10 and 11 determined ferric oxide using XRF, Nos. 4, 6 and 10 according to EN ISO 12677 and No. 11 EPA 6010C (2000). No. 12 followed Glass Technology Vol. 14 No. 1 1973 p.5. The remaining Analysts all used ICP-OES, No 5 following JIS M8853.

CALCIUM OXIDE

Analyst Nos. 3, 5 and 8 determined calcium oxide using ICP-OES. Analysts No. 9 and 12 used FAAS. The other Analysts all used XRF, Nos. 4, 6 and 10 according to EN ISO 12677 and No.11 following EPA 7000B (2007).

MAGNESIUM OXIDE

Analysts Nos. 4, 9, 10, 11 and 13 determined magnesium oxide using XRF, Nos. 4, and 10 according to EN ISO 12677 and No. 11 EPA 7000B (2007). The remaining Analysts used ICP-OES.

SODIUM OXIDE

With the exception of Analysts Nos. 3 and 5, who used ICP-OES and No. 8 who used FAAS, all Analysts determined sodium oxide using XRF, Nos. 4, 6 and 10 according to EN ISO 12677.

POTASSIUM OXIDE

With the exception of Analyst No 5, who used ICP-OES and No. 8 who used FAAS, all Analysts determined potassium oxide using XRF, Nos. 4, 6 and 10 according to EN ISO 12677 and No. 11 EPA 7000B (2007).

LOSS ON INGNITION

All of the Analysts determined Loss On Ignition at 1000±25°C.

TITANIUM DIOXIDE

All Analysts determined titanium dioxide using XRF, Nos. 4 and 10 following EN ISO 12677 and No. 11 EPA 6010C (2014).

BARIUM OXIDE

Both Analysts determined barium oxide using XRF, No. 10 following EN ISO 12677 and No. 11 according to EPA 6010C (2014).

[1]H.Bennett, R.A. Reed, Chemical Methods of Silicate Analysis-A Handbook, British Ceramic Research Association, Academic Press, 1971

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CO-OPERATING ANALYSTS

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2	SCHNELLER, S.,	Ardagh Central Laboratory, Nienburg, Germany.
3, 13	CARPENTIER, J-M.,	INISMa-CRIBC, Mons, Belgium.
4	SHAW, D.,	Lucideon, Stoke-on-Trent.
5	UCHIYAMA, K.,	Nippon Sheet Glass Co. Ltd., Itami, Japan.
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9	VERA, F.,	St Gobain Recherche, Aubervilliers, France.
10	HAMAEKERS, H.,	Sibelco, Dessel, Belgium.
11	SCARPA, M.,	Stazione Sperimentale Del Vetro S.C.P.A. - The Glass Research Centre, Murano, Venezia, Italy.
12	YORUR, A	Research Centre, Turkiye Sis eve Cam Fabrikalari AS, Is Kuleleri Kule, Turkey.

DESCRIPTION OF SAMPLE

British Chemical Standard BCS-CRM 532 is sold in the form of a powder passing a nominal 250 µm aperture sieve. It is supplied in bottles containing 100g.

The preparation of representative samples for chemical analysis and the certification by co-operative analysis was undertaken by Bureau of Analysed Samples Ltd.

Bureau of Analysed Samples Ltd is a United Kingdom Accreditation Service (UKAS) Accredited Reference Material Producer, No 4004, and, as the Producer of BCS-CRM 532 as defined in BS EN ISO 17034, is fully responsible for assigning the certified values and their uncertainties in accordance with BS EN ISO 17034 and ISO Guide 35.

INTENDED USE

BCS-CRM 532 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.

In order to ensure that a fully representative sample is taken users should take not less than the minimum weight stated on the certificate for that element, this being the lowest sample mass used by any of the Co-operating Analysts contributing to the certified value. Users of this material should be aware that the use of a smaller sub-sample size may invalidate the certified values and the associated 95% confidence limits.

The sample should be mixed thoroughly before each use.

STABILITY

BCS-CRM 532 will remain stable provided that the bottle remains sealed and is stored in a dry atmosphere. Once the bottle has been opened the lid should be secured immediately after use.

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 of the analytical methods used in the characterisation of this CRM 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.

MEASUREMENT UNCERTAINTY

The uncertainty of each of the certified values of BCS-CRM 532 has been established by multiplying the standard error arising from the chemical analysis by the appropriate two sided Student's t value at the 95% confidence level for the number of results. Homogeneity has been assessed on representative samples taken from the batch and found to be acceptable. Homogeneity has not, therefore, been included in the calculated measurement uncertainty. The stability of this CRM and its transportation also make negligible contributions to the overall uncertainty of the certified values.

COMMUTABILTY

BCS-CRM 532 is intended to be used in the same physical form as that used by the participating analysts and therefore commutability is not of relevance in respect of this CRM.

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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