



BUREAU OF ANALYSED SAMPLES LTD

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BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF ANALYSIS BCS-CRM No. 526 SODA ASH SGT SODA ASH 1

Prepared under rigorous laboratory conditions and, AFTER CERTIFICATION ANALYSIS IN GREAT BRITAIN, FRANCE, GERMANY, JAPAN, TURKEY AND THE UNITED STATES OF AMERICA, issued by the Bureau of Analysed Samples Ltd and the Society of Glass Technology

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ANALYSES

Mean of 4 values - mass content in %. All results relate to the dried (230°C for 2 hours) sample.

Analyst No.	Na ₂ CO ₃	NaCl	Fe ₂ O ₃	Na ₂ SO ₄	Insoluble Residue
1	99.9585	...	0.0005	...	...
2	...	0.1390	...	0.0095	...
3	99.7702	0.1342	...	0.0077	0.0033
4	99.8577	0.1179	0.0006	0.0100	<0.02
5	99.8250	0.1288	0.0005	0.0077	0.0024
6	99.6150	0.1103	0.0004	0.0051	0.0123
7	...	...	0.0002	...	...
8	99.8950	0.1303	0.0005	...	<0.01
9	99.6692	0.1227	0.0004	...	0.0005
10	99.6375	...	...	...	...
11	99.4750	0.1220	0.0005	...	0.0017
M_M	99.7448	0.1257	0.0005	0.0080	
<i>s_M</i>	0.1561	0.0093	0.0002	0.0020	
<i>s_w</i>	0.0737	0.0066	0.0001	0.0008	

M_M: Mean of the intralaboratory means. s_M: standard deviation of the intralaboratory means. s_w: intralaboratory standard deviation.
Values given in italics are for information only.

CERTIFIED VALUES (Cv)

mass content in %

	Na ₂ CO ₃	NaCl	Fe ₂ O ₃	Na ₂ SO ₄
Cv	99.74	0.126	0.0005	0.008
C(95%)	0.13	0.008	0.0002	0.003

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.

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NOTES ON METHODS USED

SODIUM CARBONATE

All Analysts determined sodium carbonate volumetrically as the carbonate anion and calculated the equivalent sodium carbonate.

Analysts Nos. 1, 3, 4, 5, 10 and 11 titrated with HCl; Nos. 1 and 5 followed the standard method BS 6070 part 1: 1981 (ISO 740:1976), No. 3 dissolved 2g of sample in water and titrated directly, No. 4 followed the standard method BS 3674: 1963 No. 10 followed the standard method ASTM E359-00 whilst No 11 followed the standard method JIS K1201-3:2000.

Analyst No. 8 determined CO_3^{2-} by titration with H_2SO_4 whilst Analyst No. 9 used an acid base titration.

SODIUM CHLORIDE

All Analysts determined sodium chloride as the chloride anion and calculated the equivalent sodium chloride.

Analyst No. 2 dissolved the sample in water and used ion chromatography.

Analyst No. 3 used a volumetric method, titrating with $\text{Hg}(\text{NO}_3)_2$.

The remaining Analysts titrated with AgNO_3 ; No. 4 followed BS 3674:1963, titrating with in the presence of $\text{K}_2\text{CrO}_4/\text{K}_2\text{Cr}_2\text{O}_7$; Nos. 5 and 6 used a potentiometric titration with a silver electrode, No. 8 carried out an equivalence point titration using AgNO_3 and NaCl and No. 11 used the potentiometric titration described in the standard method JISK 1201-4:2000.

Analyst No. 7 also determined Cl by X-Ray Fluorescence Spectrometry (XRF) and reported a value of 0.088% NaCl.

FERRIC OXIDE

Analyst Nos. 1, 4, 5, 7, 8 and 9 determined ferric oxide photometrically. Nos. 1, 4, 7 and 8 used 1:10 phenanthroline, No. 4 following the standard method BS 3674:1963 whilst No. 5 used bipyridyl and followed the standard method ISO/R 744:1968.

Analysts Nos. 6 and 11 used Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES), No. 11 following the standard method JISK 1201-5:2000.

Analyst No. 7 also determined ferric oxide by XRF and reported a value of 0.002%.

SODIUM SULPHATE

All Analysts determined sodium sulphate as the sulphate anion and calculated the equivalent sodium sulphate.

Analyst No 2 dissolved the sample in water and used ion chromatography.

Analysts Nos. 3 and 5 determined sulphate gravimetrically as barium sulphate, No 5 according to the standard method ISO 743:1976.

Analysts Nos. 4 and 6 determined sulphate using ICP-OES.

Analyst No. 6 also determined sodium sulphate after reduction to sulphide and titration with 2-hydroxymercuribenzoic acid and reported a value of 0.0041%.

Analyst No. 7 determined sodium sulphate volumetrically and by XRF and reported values of <0.015% in both cases..

Insoluble Residue

All Analysts determined insoluble residue gravimetrically after filtration and drying. No. 5 used an in-house variation of BS 6070 part 4:1901

DESCRIPTION OF SAMPLE

Bottles of 100g of white granular material for chemical analysis.

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 cool 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 this CRM 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 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.

Five 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 soda ash. 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 34:2009 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. The Society of Glass Technology has acted as a collaborator, as defined in ISO Guide 34:2009 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.

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Preliminary Edition



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