BRITISH STANDARD

BS 3984:1982

Specification for

Sodium silicates

Confirmed
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Cooperating organizations

The Chemicals Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

Association of Fatty Acid Distillers
British Tar Industry Association
Chemical Industries Association*
Chemical Society, Analytical Division
Consumer Standards Advisory Committee of BSI
Department of Health and Social Security
Department of Industry (Laboratory of the Government Chemist)
Fertiliser Manufacturers' Association Ltd.
Ministry of Agriculture, Fisheries and Food
Ministry of Defence*
National Sulphuric Acid Association
Paintmakers' Association of Great Britain Ltd.
Royal Institute of Public Health and Hygiene
Soap and Detergent Industry Association*
Standardization of Tar Products Tests Committee

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this British Standard:

British Man-made Fibres Federation
British Textile Employers' Association
Fabric Care Research Association
Society of Glass Technology

This British Standard, having been prepared under the direction of the Chemicals Standards Committee, was published under the authority of the Board of BSI and comes into effect on 26 February 1982

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The following BSI references relate to the work on this standard:
Committee reference CIC/22
Draft for comment 80/53295 DC

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Amendments issued since publication

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Contents

Foreword

This British Standard, prepared under the direction of the Chemicals Standards Committee, revises the 1966 edition which is therefore withdrawn.

Two specifications are given for sodium metasilicate pentahydrate. One covers a product suitable for general industrial use and is designated as sodium metasilicate pentahydrate (n); the other includes additional requirements for material of selected quality in respect of chloride and sulphate contents, suitable for British Government Services use, and is designated as sodium metasilicate pentahydrate (s)[1)].

A specification of a more general nature is given for sodium silicate solutions which takes into account variability of composition. Sodium silicate glass is manufactured by fusing together sand and sodium carbonate. Its chemical composition is not fixed but can vary according to the proportions of silica and alkali used. In consequence, the sodium silicate solutions made by dissolving the glass can vary both in chemical composition and in concentration, so that the number of different solutions which could be made and which would come within the general scope of this specification is very large. For this reason no attempt is made to specify individually the composition of the many grades of solution at present available but methods of classifying such solutions by the ratio of the mass of SiO_2 to the mass of Na_2O, and by the density are specified instead.

The standard has been revised in the light of current requirements and differs from the 1966 edition in the following respects.

a) The test methods are not appended to this revision but are published as Parts of BS 6092. In preparing BS 6092, the opportunity has been taken to implement those test methods prepared by Technical Committee 47, Chemistry, of the International Organization for Standardization (ISO) which have been prepared as a result of international collaboration in which the United Kingdom has participated.

b) The units for the specification values have been altered, where necessary, to conform with the expression of results in the associated revised test methods.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 4, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

[1)] Any questions relating to the supply of sodium metasilicate pentahydrate (s) for British Government Service should be addressed to the Ministry of Defence, Directorate of Standardization, First Avenue House, High Holborn, London, WC1.

Section 1. General

1 Scope

This British Standard specifies requirements for the following materials of technical quality.

a) Sodium metasilicate pentahydrate (n) suitable for general industrial use

b) Sodium metasilicate pentahydrate (s) of selected quality, in respect of chloride and sulphate contents, which will meet British Government Services requirements.

c) Sodium silicate solutions suitable for general industrial use.

The last specification comprises a method of classification for sodium silicate solutions, together with the permitted tolerances on the properties specified when ordering.

2 References

The titles of the publications referred to in this standard are listed on the inside back cover.

Section 2. Sodium metasilicate pentahydrate (n)

3 Description

The material shall be in the form of colourless, free-flowing crystals and shall consist essentially of sodium metasilicate pentahydrate ($Na_2SiO_3 \cdot 5H_2O$).

NOTE The metasilicate content may be calculated by the method described in Appendix A of this standard.

4 Sampling and size of sample

Sampling shall be in accordance with BS 6092-0. A sample of not less than 500 g is required for the purpose of examination in accordance with this specification.

5 Material requirements

The material shall comply with the requirements of Table 1. Testing for compliance shall be carried out using the test methods specified therein, with modifications, as shown in the right-hand column of the table.

6 Packaging and marking

The material shall be supplied in sound, clean and dry, moisture-resistant packages. Identification and marking shall be in accordance with current legislation.

Section 3. Sodium metasilicate pentahydrate (s)

7 Special requirements

This section details those special requirements, which will meet British Government Services requirements, that are not covered in section 2.

This specification is the same as that for sodium metasilicate pentahydrate (n) (section 2) in all respects except that the material shall also comply with the special requirements of Table 2 when tested by the test methods specified in the right-hand column of the table.

Table 1 — Sodium metasilicate pentahydrate (n): material requirements

Property	max.	min.	Test method BS 6092:Part:	Particular requirements in carrying out the determination
Total alkali content, as Na_2O % by mass	30.0	28.5	5	Take 50.0 ml of the test solution (see **6.2** of Part 5:1981) for the titration
Silica content, as SiO_2 % by mass	29.2	27.3	7	Take as test portion about 7 g of the laboratory sample weighed to the nearest 0.1 mg
Matter insoluble in water % by mass	0.2	Not specified	10	—
Iron content, as Fe mg/kg	500	Not specified	9	1. Take as test portion about 8.5 g of the laboratory sample, weighed to the nearest 0.01 g 2. Take 10.0 ml of the test solution (**6.4.1**) for colour development (see **6.4.2** of Part 9:1981)

Table 2 — Sodium metasilicate pentahydrate (s): special requirements

Property	% by mass, max.	Test method BS 6092:Part:
Chloride, as NaCl	0.25	11
Sulphate, as Na_2SO_4	0.21	12

Section 4. Sodium silicate solutions

8 Sampling and size of sample

Sampling shall be in accordance with BS 6092-0. A sample of not less than 500 ml is required for the purpose of examination in accordance with this specification.

9 Classification

The composition of sodium silicate solutions shall be classified by the ratio of the mass of SiO_2 to the mass of Na_2O, and the concentration shall be classified by the density.

NOTE The sodium silicate solutions available commercially vary from the more alkaline materials of ratio about 1.5, with concentrations ranging up to 55 % solids (density about 1.75 g/ml), to the highly siliceous materials of ratio about 4.0, with concentrations ranging up to 25 % solids (density about 1.25 g/ml).

10 Properties to be specified

The purchaser shall specify the following properties of the sodium silicate solution:

a) the ratio of the mass of SiO_2 to the mass of Na_2O;

b) the density at 20 °C.

NOTE By agreement between the purchaser and the supplier, an upper and lower limit for viscosity, determined by the method described in section 3 of BS 188:1977, may also be specified.

11 Compliance with the standard

The sodium silicate solution supplied shall be deemed to comply with the requirements of this standard if its composition and concentration are within the following limits of those properties specified in clause **10**:

a) *Ratio*. The ratio of the mass of SiO_2 to the mass of Na_2O, calculated from values obtained using the methods specified in BS 6092-7 and BS 6092-5 respectively, shall lie within ± 0.05 of the ratio specified by the purchaser. If the viscosity is specified, the tolerances for the ratio may be increased and shall be subject to agreement between the purchaser and the supplier.

b) *Density*. The density at 20 °C shall lie within ± 0.01 of the figure specified by the purchaser when determined by the method specified in BS 6092-1. If the viscosity is specified, the tolerances may be increased and shall be subject to agreement between purchaser and supplier.

c) *Purity*. The combined mass of SiO_2 and Na_2O shall be not less than 97.5 % of the total mass of solids present, determined by the method specified in BS 6092-2.

12 Packaging and marking

The material shall be supplied in sound, clean packages.

NOTE Attention is drawn to the need to comply with current legislation with reference to identification and marking.

Appendix A Calculation of metasilicate content of sodium metasilicate pentahydrate (n)

The metasilicate content, expressed as a percentage by mass of sodium silicate pentahydrate ($Na_2 SiO_3 \cdot 5H_2O$), is given by the formula:

3.53 Y (if the ratio $Y : Z$ is less than 0.969)

or

3.42 Z (if the ratio $Y : Z$ is greater than 0.969)

where

Y is the percentage by mass of silica, SiO_2, determined by the test method specified in BS 6092-7;

Z is the percentage by mass of total alkali, calculated as sodium oxide, Na_2O, determined by the method specified in BS 6092-5.

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Publications referred to

BS 188, *Methods for determination of the viscosity of liquids.*
BS 6092, *Methods of sampling and test for sodium and potassium silicates for industrial use.*
BS 6092-0, *General introduction.*
BS 6092-1, *Determination of solution density at 20 °C.*
BS 6092-2, *Determination of total solids content.*
BS 6092-5, *Determination of total alkali content.*
BS 6092-7, *Determination of silica content (titrimetric method).*
BS 6092-9, *Determination of iron content.*
BS 6092-10, *Determination of matter insoluble in water.*
BS 6092-11, *Determination of chloride content of sodium metasilicate.*
BS 6092-12, *Limit test for sulphate content of sodium metasilicate.*

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