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Indian Standard

SPECIFICATION FOR ARTIFICIAL SEA WATER FOR LABORATORY USE

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

SPECIFICATION FOR ARTIFICIAL SEA WATER FOR LABORATORY USE

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Indian Standard

SPECIFICATION FOR ARTIFICIAL SEA WATER FOR LABORATORY USE

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 25 April 1978, after the draft finalized by the Chemical Standards Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard is intended to achieve uniformity and avoid unnecessary variations in the details of the composition of artificial sea water for conducting laboratory tests as given in different Indian Standards.

0.3 Artificial sea water is used for laboratory testing such as evaluating the deleterious effects on metallic, wooden and concrete surfaces and structures, electronic components, test for oil contamination and detergency evaluation and for oceanographic, biochemical and forensic purposes, etc, where a reproducible solution simulating sea water is required. The effect of marine flora and fauna are excluded.

0.3.1 The sea water composition required for the salt mist test for electronic and electrical equipment has also been given in this standard for guidance.

0.4 The lack of organic matter, suspended matter, and marine life in this solution does not permit unqualified acceptance of test results as representing performance in actual sea water.

0.5 Since the concentration of sea water varies with the sampling location, the gross concentration employed herein is the average of many reliable individual analysis of sea water along the Indian coast line.

0.6 In the preparation of this standard assistance has been derived from ASTM D 1141-52 (reapproved 1971) Standard specification for substitute ocean water, issued by the American Society for Testing and Materials, USA.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard specifies the composition and the method of preparation of artificial sea water for conducting tests in the laboratory.

2. CHEMICAL COMPOSITION

2.1 The artificial sea water for laboratory use shall conform to the chemical composition given in Table 1 when prepared by the method given in 5.2.

TABLE 1 CHEMICAL COMPOSITION OF ARTIFICIAL SEA WATER

SL No.	COMPOUND (ANHYDROUS)	CONCENTRATION, g/l
(1)	(2)	(3)
i)	Sodium chloride	23.5
ii)	Magnesium chloride	5.0
iii)	Sodium sulphate	3.9
iv)	Calcium chloride	1.1
v)	Potassium chloride	0.66
vi)	Sodium bicarbonate	0.20
vii)	Potassium bromide	0.10
viii)	Boric acid	0.026
ix)	Strontium chloride	0.024
x)	Sodium fluoride	0.003

NOTE — Chlorinity of this artificial sea water is 18.57. Chlorinity as used in this standard is an oceanographic term and is a measure of total halides in sea water which are precipitated by silver nitrate. It is numerically defined as the mass of silver required to completely precipitate the halogens in 0.328 5 kg of sea water.

2.2 The composition of artificial sea water required for the salt mist test for electronic and electrical equipment is given in Appendix A for guidance.

3. QUALITY OF REAGENTS

3.1 Unless specified otherwise, pure chemicals and distilled water (see IS: 1070-1977*) shall be employed in the preparation of the required solution.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

*Specification for water for general laboratory use (second revision).

4. REAGENTS

- 4.1 Sodium Chloride — See IS : 4408-1967*.
 4.2 Magnesium Chloride — See IS : 254-1973†.
 4.3 Sodium Sulphate
 4.4 Calcium Chloride — See IS : 1314-1967‡.
 4.5 Potassium Chloride — See IS : 7223-1973§.
 4.6 Sodium Bicarbonate — See IS : 2124-1962||.
 4.7 Potassium Bromide — See IS : 2797-1964¶.
 4.8 Boric Acid
 4.9 Strontium Chloride
 4.10 Sodium Fluoride
 4.11 Standard Sodium Carbonate Solution — 0.1 N.

5. METHOD OF PREPARATION

5.1 Preparation of Solution

5.1.1 *Stock Solution A* — Dissolve the indicated amounts of the following salts in water and dilute to a total volume of 10 litres. Store in well-stoppered glass container:

Magnesium chloride ($MgCl_2 \cdot 6H_2O$)	5 335.0 g
Calcium chloride, anhydrous ($CaCl_2$)	550.0 g
Strontium chloride ($SrCl_2 \cdot 6H_2O$)	21.0 g

5.1.2 *Stock Solution B* — Dissolve the indicated amounts of the following salts in water and dilute to a total volume of 10 litres. Store in well-stoppered glass container:

Potassium chloride (KCl)	660.0 g
Sodium bicarbonate ($NaHCO_3$)	200.0 g
Potassium bromide (KBr)	100.0 g
Boric acid (H_3BO_3)	26.0 g
Sodium fluoride (NaF)	3.0 g

*Specification for sodium chloride, analytical reagent.

†Specification for magnesium chloride (*second revision*).

‡Specification for calcium chloride (*first revision*).

§Specification for potassium chloride, analytical reagent.

||Specification for sodium bicarbonate.

¶Specification for potassium bromide.

5.2 Preparation of Artificial Sea Water — Dissolve 235.0 g of sodium chloride and 39.0 g of anhydrous sodium sulphate in 8 to 9 litres of water. Add slowly with vigorous stirring 200 ml of stock solution A and then 100 ml of stock solution B. Dilute to 10 litres. Adjust the pH to 7.8 to 8.2 with sodium carbonate solution. Only a few millilitres of sodium carbonate should be required.

NOTE — The solution should be mixed and the pH adjusted immediately before use.

APPENDIX A

(Clause 2.2)

COMPOSITION OF ARTIFICIAL SEA WATER FOR SALT MIST TEST FOR ELECTRONIC AND ELECTRICAL EQUIPMENT

A-1. The composition of artificial sea water required for the salt mist test is given in Table 2.

**TABLE 2 CHEMICAL COMPOSITION OF ARTIFICIAL SEA WATER
FOR SALT MIST TEST FOR ELECTRONIC AND
ELECTRICAL EQUIPMENT**

SL No.	COMPOUND (ANHYDROUS)	CONCENTRATION, g/l
(1)	(2)	(3)
i)	Sodium chloride	26.5
ii)	Magnesium sulphate	3.3
iii)	Magnesium chloride	2.4
iv)	Calcium chloride	1.1
v)	Potassium chloride	0.73
vi)	Sodium bromide	0.28
vii)	Sodium bicarbonate	0.20

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ON

GENERAL METHODS OF CHEMICAL ANALYSIS

IS:

2000-1971	Methods for determination of arsenic (<i>first revision</i>)
2263-1962	Methods of preparation of indicator solutions for volumetric analysis
2316-1968	Methods of preparation of standard solutions for colorimetric and volumetric analysis (<i>first revision</i>)
2317-1975	Method for gravimetric determination of sulphates (<i>first revision</i>)
2362-1973	Determination of water by Karl Fischer method (<i>first revision</i>)
3225-1965	Methods for preparation of buffer solutions
4016-1966	Density-composition tables for aqueous solutions of sodium hydroxide
4048-1966	Density-composition tables for aqueous solutions of sulphuric acid
4284-1967	Method for volumetric determination of iron
4285-1967	Method for volumetric determination of calcium
4542-1968	Colorimetric methods for determination of iron
4730-1968	Method for determination of density of liquids
5194-1969	Method for determination of nitrogen — Kjeldahl method
5290-1969	Method for determination of distillation range and distillation yield
5305-1969	Method for volumetric determination of phosphorus
5741-1970	Methods for determination of pH
5762-1970	Methods for determination of melting point and melting range
5813-1970	Methods for determination of crystallizing point
5949-1970	Methods for volumetric determination of calcium and magnesium using EDTA
6361-1971	Methods for colorimetric determination of phosphorus
7017-1973	Method for colorimetric determination of traces of heavy metals by dithizone
7212-1974	Methods of determination of copper

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