Free Standard provided by BIS via BSB Edge Private Limited to EDUCATIONAL INSTITUTE - Surat(stbs.envaudit08@gmail.com) 59.184.152.124.

भारतीय मानक **IS 3025 (Part 15) : 2023**

Indian Standard

जल एवं अपशिष्ट जल के नमूने लेने और परीक्षण (भौतिक एवं रसायन) की पद्धतियाँ

भाग 15 कुल अवशेष (भंग और निलंबित ठोस)

(दूसरा पुनरीक्षण)

Methods of Sampling and Test (Physical and Chemical) for Water and Wastewater

Part 15 Total Residue (Dissolved and Suspended Solids)

(Second Revision)

ICS 13.060.60

© BIS 2023

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

December 2023 **Price Group 4**

Free Standard provided by BIS via BSB Edge Private Limited to EDUCATIONAL INSTITUTE - Surat(stbs.envaudit08@gmail.com) 59.184.152.124.

Water Quality Sectional Committee, CHD 36

FOREWORD

This Indian Standard (Part 15) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Water Quality Sectional Committee and approved by the Chemical Division Council.

Total residue is the term applied to the material left in the vessel after evaporation of a sample of water and its subsequent drying in an oven at a definite temperature. Total residue includes non-filterable residue (the portion of the total residue retained by a filter), and filterable residue (the portion of the total residue which passes through the filter).

The Committee responsible for the formulation of IS 3025 : 1964 ‘Methods of sampling and test (physical and chemical) for water used in industry’ had decided to revise the standard and publish it in separate parts. This standard is one of the different parts under IS 3025 series of standards and superseded clause **1** of IS 3025. The first revision was published in 1984.

In the second revision the following modification have been incorporated:

a) Amendment has been incorporated;

b) References, and ICS No. have been updated; and

c) Other editorial changes have been done to bring the standard in the latest style and format of Indian Standards.

The composition of the Committee responsible for formulation of this standard is given in Annex A.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’.

Free Standard provided by BIS via BSB Edge Private Limited to EDUCATIONAL INSTITUTE - Surat(stbs.envaudit08@gmail.com) 59.184.152.124.

Indian Standard

Methods of Sampling and Test (Physical and Chemical) for Water and Wastewater

Part 15 Total Residue (Dissolved and Suspended Solids)

(Second Revision)

1 SCOPE

This standard (Part 15) prescribes method of test to estimate the total residue in water and waste water by gravimetric method.

NOTE — Water and wastewater implies other than water meant for therapeutic and medicinal use (For example, water for injection, sterilised water for formulations, dialysis water).

2 REFERENCES

The standards given below contain provisions which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards:

IS No.	*Title*
IS 7022 (Part 1) : 1973	Glossary of terms relating to water, sewage and industrial effluents: Part 1
IS 7022 (Part 2) : 1979	Glossary of terms relating to water, sewage and industrial effluents: Part 2
IS 17614	Water quality — Sampling:
(Part 1) : 2021/ ISO 5667-1 : 2020	Guidance on the design of sampling programmes and sampling techniques
(Part 3) : 2021/ ISO 5667-3 : 2018	Preservation and handling of water samples

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 7022 (Part 1) and IS 7022 (Part 2) shall apply.

4 SAMPLING AND PRESERVATION

Preservation of the samples is not very practical however, refrigeration of sample at 4 °C to minimize microbiological decomposition of solids is recommended. It is always better to start analysis immediately after collection of sample. Sampling and sample preservation shall be done as prescribed in IS 17614 (Part 1) and IS 17614 (Part 3).

5 PRINCIPLE

An estimated volume of well-mixed water or waste water sample is evaporated in a weighed evaporating dish on a steam-bath and is dried to a constant mass in an oven at 179 °C to 181 °C. Total residue is estimated from increase in mass.

NOTE — In general, by evaporating and drying water or waste water samples at 179 °C to 181 °C generate values which conform more closely to those obtained by summation of individually determined mineral salts.

6 INTERFERENCES

6.1 Highly mineralized waters containing significant concentration of calcium, magnesium, chloride and/or sulphate may be hygroscopic. These may require prolonged drying, desiccation and rapid weighing. However, prolonged drying may also cause loss of constituents, particularly nitrates and chlorides.

6.2 A large amount of residue in the evaporating dish may crust over and entrap water preventing its evaporation during drying. For this reason, the volume of the sample should be adjusted so that the residue left after drying should be about 100 mg to 200 mg.

7 APPARATUS

7.1 *Evaporating Dish*

Dish of 90 mm diametre, 150 ml capacity, made of platinum, nickel, porcelain, silica or borosilicate glass can be used. Platinum-made dish is suitable for all types of materials and tests. Nickel dish is satisfactory if residue is not to be ignited. Porcelain, silica and glass dish may be used for samples with a *p*H value less than 9.0.

7.2 *Pipette or Measuring Cylinder*

7.3 *Steam-Bath*

7.4 *Drying Oven*

Oven with thermostatic control for maintaining temperature up to 180 °C ± 2 °C can be used.

Free Standard provided by BIS via BSB Edge Private Limited to EDUCATIONAL INSTITUTE - Surat(stbs.envaudit08@gmail.com) 59.184.152.124.

7.5 *Desiccator*

Provided with a colour indicating desiccant.

7.6 *Analytical Balance*

Balance with 200 g capacity with a precision of ± 0.1 mg can be used.

7.7 Magnetic stirrer with teflon coated stirring bars.

8 PROCEDURE

8.1 Heat the clean evaporating dish at 180 °C for 1 h. Cool, desiccate, and store in desiccator until ready for use.

8.2 Weight the empty evaporating dish and note the weight.

8.3 Select volume of the sample which has residue between 25 mg and 250 mg, preferably between 100 mg and 200 mg. This volume may be estimated from values of specific conductance. To obtain a measurable residue; if necessary, add successive sample portions to the same dish after evaporation.

8.4 Stir volume of sample with a magnetic stirrer or shake it vigorously. The sample is to be filtered through 0.45 micron filter and filtrate only to be taken for evaporation. Pipette out this volume of water or waste water samples quantitatively to a weighed evaporating dish placed on a steam-bath. Evaporation may also be performed in a drying oven. The temperature should be maintained at approximately 98 °C to prevent boiling and splattering of the sample. After complete evaporation of water, transfer the dish containing residue to an oven at 179 °C to 181 °C and dry to constant mass, that is, till the difference in the successive weighing is less than 0.5 mg. Drying for a long duration (usually 1 h to 2 h) is done to eliminate necessity of checking for constant mass. The time for drying to constant mass with a given type of sample should be determined by trial.

8.5 Weigh the dish along with residue as soon as it has cooled avoiding residue to stay for long time as some residues are hygroscopic and may absorb water from desiccant which may not be absolutely dry.

9 CALCULATION

Calculate the total residue using the following equation:

$$\text{Total residue, mg/l} = \frac{(W_2 - W_1)}{V} \times 1\,000$$

where

W_1 = mass of empty dish, in mg;

W_2 = total mass of dish with residue, in mg; and

V = volume of the sample, in ml.

10 REPORT

Report in whole numbers for less than 100 mg/l and above 100 mg/l to three significant figures. Report the temperature of determination also.

11 PRECISION AND ACCURACY

The precision of this method for solid residue in water is about 5 percent. Accuracy cannot be estimated for total residue as determined by this method as it is a quantity defined by the procedure followed.

Free Standard provided by BIS via BSB Edge Private Limited to EDUCATIONAL INSTITUTE - Surat(stbs.envaudit08@gmail.com) 59.184.152.124.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Water Quality Sectional Committee, CHD 36

Organization	*Representative(s)*
Chief Scientist, EPTRI, Hyderabad	SHRI N. RAVEENDHAR **(*Chairperson*)**
Andhra Pradesh Pollution Control Board, Vijaywada	SHRIMATI M. SREERANJANI SHRIMATI A. SRI SAMYUKTHA (*Alternate*)
Bhabha Atomic Research Centre, Mumbai	DR S. K. SAHU SHRI I. V. SARADHI (*Alternate*)
Central Institute of Mining and Fuel Research, Dhanbad	DR ABHAY KUMAR SINGH
Central Pollution Control Board, New Delhi	SHRI P. K. MISHRA SHRI VISHAL GANDHI (*Alternate*)
Confederation of Indian Industry, New Delhi	DR KAPIL K. NARULA DR SIPIKA CHAUHAN (*Alternate*)
Envirocare Laboratories Pvt Ltd, Thane	DR PRITI AMRITKAR SHRI NILESH AMRITKAR (*Alternate*)
FAD 14, Bureau of Indian Standards, New Delhi	MS NITASHA DOGER
Gujarat Pollution Control Board, Gandhinagar	DR D. N. VANSADIA SHRI K. B. VAGHELA (*Alternate*)
Haryana State Pollution Control Board, Panchkula	SHRI JATINDER PAL SINGH
Himachal Pradesh State Pollution Control Board, Government of Himachal Pradesh, Shimla	ER PRAVEEN GUPTA SHRI PRAVEEN SHARMA (*Alternate*)
Indian Agricultural Research Institute – Water Technology Centre, New Delhi	DR KHAJANCHI LAL DR RAVINDER KAUR (*Alternate*)
Indian Chemical Council, Mumbai	SHRI J. I. SEVAK DR MRITUNJAY CHAUBEY (*Alternate* I) DR N. D. GANGAL (*Alternate* II)
Indian Institute of Chemical Technology, Hyderabad	DR SUNDERGOPAL SRIDHAR DR NIVEDITA SAHU (*Alternate*)
Indian Institute of Toxicology Research, Lucknow	DR S. C. BARMAN DR SATYAKAM PATNAIK (*Alternate*)
Indian Water Works Association, New Delhi	SHRI VIJAY CHARHATE
Karnataka State Pollution Control Board, Bengaluru	DR H. RUPADEVI MS GOURI GOLSANGI (*Alternate*)
Maharashtra State Pollution Control Board, Mumbai	DR V. R. THAKUR SHRI AMAR SUPATE(*Alternate*)

Free Standard provided by BIS via BSB Edge Private Limited to EDUCATIONAL INSTITUTE - Surat(stbs.envaudit08@gmail.com) 59.184.152.124.

Organization	*Representative(s)*
Ministry of Environment and Forest & Climate Change, New Delhi	DR SONU SINGH
Ministry of Jal Shakti Department of Drinking Water and Sanitation, New Delhi	SHRI D. A. RAJASEKHAR SHRI SUMIT PRIYADARSHI (*Alternate*)
National Environmental Engineering Research Institute, Nagpur	DR NOOR A. KHAN
National Institute of Oceanography, Vishakhapatnam	DR V. V. S. S. SARMA DR DURBAR RAY (*Alternate*)
NTPC Ltd, New Delhi	DR VIJAY PRAKASH SHRI HARIKRISHNA SURARAPU (*Alternate*)
Shriram Institute for Industrial Research, New Delhi	DR VIVEK NARAYAN SINGH DR JAGDISH KUMAR (*Alternate*)
Telangana State Pollution Control Board, Hyderabad	DR M. S. SATYANARAYANA RAO
Uttar Pradesh Pollution Control Board, Lucknow	DR ARUNIMA BAJPAI
In Personal Capacity (*1221, Mahatma Gandhi Road, P. O. - Haridevpur, Kolkata - 700082*)	SHRI SANJIB KUMAR GOSWAMI
In Personal Capacity (*S-168 A- Uppal Sothend, Sector 49, Sohna Road, Gurugram - 122018*)	SHRI RAKESH MALHOTRA
In Personal Capacity (*H. No. 1-78/2/S/121/1, Sathi Reddy nagar colony, Boduppal, Hyderabad - 500092*)	SHRI N. MURALI MOHAN
In Personal Capacity (*Z-7, 1st Floor, Sector 12, Noida - 201301*)	SHRI S. N. A. RIZVI
BIS Directorate General	SHRI AJAY KUMAR LAL, SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (CHEMICAL) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
MS SHUBHANJALI UMRAO
SCIENTIST 'B'/ASSISTANT DIRECTOR
(CHEMICAL), BIS

Free Standard provided by BIS via BSB Edge Private Limited to EDUCATIONAL INSTITUTE - Surat(stbs.envaudit08@gmail.com) 59.184.152.124.

This Page has been Intentionally left blank

Free Standard provided by BIS via BSB Edge Private Limited to EDUCATIONAL INSTITUTE - Surat(stbs.envaudit08@gmail.com) 59.184.152.124.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.:CHD 36 (21248).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices: *Telephones*

Central : 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002 { 2323 7617

Eastern : 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091 { 2367 0012 2320 9474

Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019 { 265 9930

Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113 { 2254 1442 2254 1216

Western : Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093 { 2821 8093

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.

Published by BIS, New Delhi