भारतीय मानक **IS 3025 (Part 10) : 2023**

Indian Standard

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

भाग 10 टर्बिडिटी

(दूसरा पुनरीक्षण)

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

Part 10 Turbidity

(Second Revision)

ICS 13.060.50

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May 2023 **Price Group 4**

Water Quality Sectional Committee, CHD 36

FOREWORD

‘This Indian Standard (Part 10) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Water Quality Sectional Committee had been approved by the Chemical Division Council’.

The turbidity of sample is the reduction of transparency due to the presence of particulate matter such as clay or silt, finely divided organic matter, plankton or other microscopic organisms. These cause light to be scattered and absorbed rather than transmitted in straight lines through the sample. Higher values may be obtained by dilution of the sample. The values are expressed in nephelometric turbidity units (NTU).

The Technical Committee responsible for formulation of IS 3025 : 1964 ‘Methods of sampling and test (physical and chemical) for water used in industry’ decided to revise the standard and publish it in separate parts. This standard superseded **6** of IS 3025 : 1964 'Methods of sampling and test (physical and chemical) for water used in industry' and was one among the different parts published under IS 3025 series of standards. The first revision of this standard was published in 1984.

In this second revision the following modification have been made:

The nephelometric method has been updated.

In the preparation of this standard, considerable assistance has been derived from the method No. 2130 B of ― Standard Methods for the Examination of Water and Wastewater, published by the American Public Health Association, Washington, USA, 23rd Edition, 2017.

The composition of the committee responsible for the formulation of this standard is given at 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*)’.

Indian Standard

METHODS OF SAMPLING AND TEST (PHYSICAL AND CHEMICAL) FOR WATER AND WASTEWATER

PART 10 TURBIDITY

(Second Revision)

1 SCOPE

This standard (Part 10) prescribes nephelometric method for the measurement of turbidity of water. This method is applicable to all types of water.

2 REFERENCES

The standards listed 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 editions of the standards indicated below:

IS No.	*Title*
7022 (Part 1) : 1973	Glossary of terms relating to water, sewage and industrial effluents, Part 1
7022 (Part 2) : 1979	Glossary of terms relating to water, sewage and industrial effluents, Part 2

3 TERMINOLOGY

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

4 SAMPLING HANDLING AND PRESERVATION

Collect samples in glass or plastics bottles and carry out the determinations, as soon as possible after collection. If storage is unavoidable, store the samples in a cool, dark room but for not longer than 24 h. If the samples have been stored under cool conditions, allow them to come to room temperature before measurement. Prevent contact between the sample and air and avoid unnecessary changes in the temperature of the sample.

5 PRINCIPLE

Measurement of turbidity is based on comparison of the intensity of light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. The higher the intensity of scattered light, the higher is the turbidity. Formazin polymer is generally used as turbidity standard because it is more reproducible than other types of standards used previously. Turbidities measured using nephelometers are presented as nephelometric turbidity units (NTU).

6 INTERFERENCES

Coloured solutes cause low turbidity values. Dirty glassware and air bubbles can interfere with the measurements. The water should be free of debris and rapidly settling coarse sediments otherwise they will interfere.

7 APPARTUS

7.1 Sample Tubes

The sample tubes should be of clear, colourless and scratch free glass.

7.2 Nephelometer

The Nephelometer shall consist of a light source for illuminating the sample and one or more photoelectric detectors with a readout device to indicate the intensity of light scattered at right angles (90°) to the path of the incident light. The Nephelometer should be so designed that little stray light reaches the detector in the absence of turbidity and should be free from significant drift after a short warm-up period. The best spectral peak response is around 400 nm to 600 nm.

8 REAGENTS

8.1 Turbidity-Free Water

Pass distilled water through membrane filter having a pore size not greater than 0.45 µm, if such filtered water shows a lower turbidity than the distilled

water. Discard the first 200 ml collected. Otherwise use distilled water.

8.2 Hexamethylene Tetramine Solution

Dissolve 10.0 g hexamethylene tetramine in demineralised water and dilute to 100 ml.

8.3 Hydrazine Sulphate Solution

Dissolve 1 000 g hydrazine sulphate (NH_2-$NH_2.H_2SO_4$) in demineralised water and dilute to 100 ml.

8.4 Turbidity Standard Suspension I (Formazin)

In a 100 ml volumetric flask mix 5 ml hydrazine sulphate solution with 5 ml haxamethylene tetramine solution. After 24 h standing at 25 °C ± 3 °C, dilute to 100 ml with demineralised water and mix well. Prepare fresh monthly. This is equal to 400 NTU provided stores in dark amber colour bottle as stock solution.

8.5 Turbidity Standard Suspension II

Dilute 10 ml turbidity standard suspension I to 100 ml with demineralised water. Prepare fresh weekly. This suspension may be diluted as required to prepare more dilute turbidity standards.

8.6 Commercial Suspensions of Turbidity Standards

Suspensions with 4 000 NTU are commercially available from numerous sources. Possible health hazards arising from the toxicity and carcinogenicity of hydrazine sulphate used for preparing the turbidity standard on the bench can be avoided when commercial suspensions are used. These commercially available suspensions may be stable for up to one year if stored under cool temperatures and in the dark. The manufacturer's recommendations regarding preparation, usage, and storage have to be considered in this respect.

9 PROCEDURES

9.1 Nephelometer Calibration

Follow the manufacturer's operating instructions. Measure the standards on nephelometer that cover the range of interest. If the instrument is already calibrated in standard turbidity units, this procedure will check the accuracy of calibration.

9.2 Turbidity Less Than 40 Units

Shake the sample to disperse the solids. Wait until air bubbles disappear. Pour sample into tube and read turbidity directly from the instrument scale or from calibration curve.

9.3 Turbidity Greater Than 40 Units

In case turbidity values are greater than 40 units, dilute the sample with turbidity-free water to bring the values within the calibration range. Take readings of diluted sample. Compute the turbidity of the original sample by multiplying the turbidity of the diluted sample and the dilution used.

9.3.1 *Calculation*

Calculate the turbidity of diluted samples, using the following equation :

$$\text{Turbidity units (NTU)} = \frac{A \times (B+C)}{C}$$

where

A = turbidity units found in diluted sample, in NTU;

B = volume of dilution water used, in ml; and

C = volume of sample taken for dilution, in ml.

10 REPORTS

Report the turbidity as specified in Table 1.

Table 1 Report the Turbidity
(*Clause 10*)

Sl No.	Turbidity Range (NTU)	Report to the Nearest NTU
(1)	(2)	(3)
i)	0-1	0.05
ii)	1-10	0.1
iii)	10-40	1

Table 1 (*Concluded*)

Sl No.	Turbidity Range (NTU)	Report to the Nearest NTU
(1)	(2)	(3)
iv)	40-100	5
v)	100-400	10
vi)	400-1000	50
vii)	Greater than 1000	100

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*)
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BIS Directorate General	SHRI AJAY KUMAR LAL, SCIENTIST 'E'/DIRECTOR AND HEAD (CHEMICAL) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

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

Bureau of Indian Standards

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