

*Indian Standard***METHODS OF SAMPLING AND TEST (PHYSICAL AND CHEMICAL) FOR WATER AND WASTE WATER****PART 17 NON-FILTERABLE RESIDUE (TOTAL SUSPENDED SOLIDS)***(First Revision)*

(Incorporating Amendment No. 1)

1. Scope — Prescribes a gravimetric method for the determination of non-filterable residue. This method is applicable to all types of water and waste water.

2. Principle — Non-filterable residue is determined by passing the sample through a weighed filter and drying the filter at 103-105°C or 179-181°C. Non-filterable residue is calculated from the increase in mass of the filter.

3. Apparatus

3.1 Filters — One of following may be used.

3.1.1 Gooch crucible — 30 ml capacity with 2.1, 2.4 or 5.5 cm diameter (pore size 1.2 μm) glass fibre filter disc. (Whatman GF/C or equivalent.)

3.1.2 Crucible — Porous-bottom silica, sintered glass, porcelain, stainless steel or Alundum crucible with a maximum pore size of 5 μm .

3.1.3 Glass fibre filter disc — (Whatman GF/C or equivalent) 2.1 to 5.5 cm in diameter, pore size 1.2 μm .

3.2 Filtering Apparatus — Depending on type of filter used.

3.3 Drying Oven — With a thermostatic control for maintaining temperature up to $180 \pm 2^\circ\text{C}$.

3.4 Desiccator — Provided with a colour indicating desiccant.

3.5 Analytical Balance — 200 g capacity and capable of weighing to nearest 0.1 mg.

3.6 Magnetic Stirrer — With teflon coated stirring bars.

4. Procedure

4.1 Preparation of Glass Fibre Filter Disc — Place the glass fibre filter on the membrane filter apparatus or insert into bottom of a suitable Gooch crucible with wrinkled surface up. While vacuum is applied, wash the dish with three successive 20 ml volumes of distilled water. Remove all traces of water by continuing to apply vacuum after water has passed through. Remove filter from membrane filter apparatus (or both crucible and filter, if Gooch crucible is used) and dry in an oven at 103-105°C for 1 hour. Transfer to a desiccator and weigh after half an hour. Repeat the drying cycle until a constant mass is obtained (mass loss is less than 0.5 mg in successive weighings). Weigh immediately before use. After weighing, handle the filter or crucible filter with forceps or tongs only.

4.1.1 If determinations are to be carried out at 180°C then the filter or crucible/filter shall be dried at 180°C.

Note — If fixed non-filterable residue is to be determined subsequently then silica, Alundum or porcelain filters should be used. These should be heated to 550°C in the furnace for at least 30 minutes, cooled in the desiccator and weighed.

4.2 Sample Volume — In potable waters non-filterable residue is usually small. Relatively large volume of water is passed through filter so as to obtain at least 2.5 mg residue. For deciding volume to be taken, turbidity values may be taken into consideration. If turbidity values of a sample is less than 50 units, filter 1 litre sample and if turbidity value exceeds 50 units, filter sufficient sample so that non-filterable residue is 50 to 100 mg.

4.3 Stir volume of sample with a magnetic stirrer or shake it vigorously. Assemble the filtering apparatus and begin suction. Wet the filter with a small volume of distilled water to seat it against the fitted support.

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4.4 Shake the sample vigorously and quantitatively transfer the predetermined sample volume selected according to **4.2** to the filter using a graduated cylinder. Remove all traces of water by continuing to apply vacuum after sample has passed through.

4.5 With suction on, wash the graduated cylinder, filter non-filterable residue with portions of distilled water allowing complete drainage between washings. Remove all traces of water by continuing to apply vacuum after the wash water has passed through.

4.6 After filtration, transfer the filter along with contents to an oven maintained at either 103-105°C or 179-181°C for at least 1 hour. Cool in a desiccator and weigh. Repeat the drying cycle till constant mass is obtained. Alternatively, remove crucible and filter from crucible adapter, wipe dry from outside with filter paper and dry at 103-105°C or 179-181°C in an oven. Cool in a desiccator and weigh. Repeat the drying cycle to constant mass till the difference in the successive mass is less than 0.5 mg.

5. Calculation — Calculate the non-filterable residue from the following equation:

$$\text{Non-filterable residue, mg/l} = \frac{1\ 000\ M}{V}$$

where

M = mass in mg of non-filterable residue, and

V = volume in ml of the sample.

6. Report — Report in whole numbers for less than 100 mg/l and to three significant figures for higher values. Report the temperature of determination.

7. Precision and Accuracy — Precision of the method is about 5 percent. Accuracy cannot be estimated because the non-filterable residue as determined by this method is a quantity defined by the procedure followed.

EXPLANATORY NOTE

This method supersedes clause **7** of IS : 2488 (Part 1)-1966 'Methods of sampling and test for industrial effluents: Part 1' clause **12.1** of IS : 3025-1964 'Methods of sampling and test (physical and chemical) for water used in industry' and clause **4** of IS : 4733-1972 'Methods of sampling and test for sewage effluents (*first revision*)'.

This edition 2.1 incorporates Amendment No. 1 (December 1999). Side bar indicates modification of the text as the result of incorporation of the amendment.