Course Number : CE 332
Course Name : Environmental Engineering Lab
Course Credit : 1.50

Experiment No. 4
DETERMINATION OF TOTAL SOLIDS, DISSOLVED SOLIDS AND SUSPENDED SOLIDS

INTRODUCTION

Total Solids (TS) refer to the matter that remains as residue upon evaporation and drying at 103 to 105°C. Total solids (TS) includes total suspended solids (TSS) - the portion of total solids retained by a filter, and total dissolved solids (TDS) - the portion that passes through the filter. Solids are incorporated in water from its source (e.g., minerals with which it has been in contact). In potable water, most of the solids remain in dissolved form and consists of inorganic salts, small amounts of organic matter, and dissolved gases. The total dissolved solids content of potable water usually ranges from 20 to 1000 mg/L. Groundwater usually has higher dissolved solids.

ENVIRONMENTAL SIGMFICANCE

To determine whether water is suitable for domestic purpose, it is required to know how much solid it contains. According to Bangladesh Environment Preservation Act (1997), potable water should not contain more than 1000 mg/l of total dissolved solids (TDS). Water with high dissolved solids generally is of inferior palatability and may induce unfavourable physiological reaction in the user. Water high in suspended solids may be aesthetically unsatisfactory for such purposes as bathing.

THEORY

Water has a boiling point of 100°C. It may rise by a few degrees due to the presence of impurities. When water with solids is kept at 103 to 105°C for 24 hours, the water gets evaporated and the solids either in dissolved state or in suspended state remain as residue.

APPARATTUS

1. Beaker (150 mL)	2pcs.
2. Measuring cylinder (100 mL)	1 pc.
3. Funnel	1 pc.
4. Dropper	lpc.
5. Filter paper	2 pcs.

PROCEDURE

Total Solids:

(1) Take a clear dry glass beaker (which was kept at 103°C in an oven for 1 hour) of 150 ml. capacity and put appropriate identification mark on it. Weigh the beaker and note the weight.

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(2) Pour 100 ml. of the thoroughly mixed sample, measured by the measuring cylinder, in the beaker.

(3) Place the beaker in an oven maintained at 103 ^{0}C for 24 hours. After 24 hours, cool the beaker and weigh. Find out the weight of solids in the beaker by subtracting the weight of the clean beaker determined in step (1).

(4) Calculate total solids (TS) as follows:

Total solids, TS (mg/l) = mg of solids in the beaker x 1000 / (volume of sample)

Dissolved Solids:

(1) Same as above (step 1 of total solids).

(2) Take a 100 ml. of sample and filter it through a double layered filter paper and collect the filtrate in a beaker.

(3) Then repeat the same procedure as in steps (3) and (4) of the *total solids* determination and determine the dissolved solids content as follows:

Total Dissolved Solids, TDS (mg/l) = mg of solids in the beaker x 1000 / (volume of sample)

Suspended Solids:

Total Suspended Solids, TSS (mg/l) = TS (mg/L) - TDS (mg/L)

ASSIGNMENT QUESTIONS

1. Discuss environmental significance of solid content in water.
2. How dissolved solids concentration can be estimated from measurement of specific conductance?
3. Explain why groundwater typically contains high total solids compared to surface water. Why is the situation reverse for suspended solids?

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