Total Solids (TS)

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Sources of Solids in Wat

1. Erosion of water through components of the Earth's crust is the main cause.

2. Domestic and industrial wastewater.

Chemical Composition of Solids Depends on

1. The nature of the land and its chemical composition through which the water passes.

2. The nature of wastes and their chemical composition discharged into the water.

Chemical Classification of Solids

1. Volatile solids (organic in nature).

2. Non-volatile solids (inorganic in nature).

Forms of Solids in Water

1 .Dissolved solids

2. Suspended solids

3. Settleable solids

Negative Effects of Solids in Water

1 .Their accumulation affects food sources of aquatic organisms and their breeding areas.

2. They reduce light penetration into water, thus decreasing **photosynthesis in aquatic plants.**

3. Make water unsuitable for domestic and industrial uses.

4. Increase the cost of water treatment processes.

DETERMINATION OF TOTAL SOLIDS



(T.S)

Principle of the Work:

The total solids are determined by removing the accompanying water from the sample. After that, the remaining weight of the sample is calculated, which represents the total solids (dissolved and suspended). This measurement is used to determine the total concentration of solids and to assess the purity or degree of water pollution, as well as to evaluate the efficiency and performance of water treatment plants.

Method (Procedure):

1. A porcelain crucible is prepared by burning it in a furnace at 550°C for one hour.

2. The crucible is cooled in a glass desiccator until it reaches room temperature, then it is weighed using a sensitive balance and kept in the desiccator until use.

3. 25 mL of the well-mixed sample is placed in the crucible (capacity 50 mL). The measuring cylinder is rinsed with a small amount of distilled water, and the washing water is added to the sample in the crucible.

4. The sample is evaporated over a water bath, then the drying is completed in an oven at 103–105°C.

5. The crucible and its contents are cooled in a glass desiccator and then weighed.

6. Drying and weighing of the crucible are repeated several times until a constant weight is obtained.

الحسابات:

$$\text{المواد الصلبة الكلية (T.S)} = \frac{(\text{أ} - \text{ب}) \times 10^6}{\text{حجم النموذج بالملليتر}}$$

ملغرام/لتر

حيث:

أ = وزن الجفنة والراسب بالغرام.

ب = وزن الجفنة بالغرام.

تقدير المواد الصلبة المتطايرة

VOLATILE SOLID V.S

والمواد الصلبة الغير متطايرة

NON-VOLATILE SOLID

Principle of Work:

Total solids burn at a temperature of 550°C. At this temperature, organic substances volatilize, while inorganic substances remain as ash.

This measurement is used to determine the efficiency of wastewater treatment plants.

Procedure:

1. The previously prepared dry residue from the previous step with a known weight (total solids) is placed in a muffle furnace at 550°C for one hour.

2. The crucible is then cooled in a glass desiccator and weighed.

الحسابات:

$$\text{المواد الصلبة المتطايرة (V.S)} = (\text{أ} - \text{ج}) \times 10^6$$

ملغرام/

المواد الصلبة الغير متطايرة = المواد الصلبة الكلية – المواد الصلبة المتطايرة

حيث:

أ= وزن الجفنة والمواد الصلبة الكلية بالغرام.

ج= وزن الجفنة والمواد الصلبة الغير متطايرة بالغرام.

تقدير المواد الصلبة العالقة

SUSPENDED SOLID (T.S.S)

و تقدير المواد الصلبة الذائبة

DISSOLVED SOLID (T.D.S)

Principle of the Method

Dissolved Solids: These are substances that pass through the filter paper and are separated from the filtrate after evaporation at 105°C.

Suspended Solids: These are substances that remain on the filter paper after the sample passes through it.

They are calculated after drying the filter paper and measuring the difference in weight of the filter paper before and after filtration.

This measurement helps determine the efficiency of treatment stages in water treatment plants.

Procedure

1.Weigh the dry filter paper.

2.Place 25 mL of a well-mixed sample onto the filter paper. The measuring cylinder is rinsed with a small amount of distilled water, and the washing water is added to the filter paper. After filtration is completed, the dissolved substances pass through the filter paper.

3.For estimating suspended solids, dry the filter paper in an oven at 105°C to remove moisture, then weigh it again after filtration.

وتحسب من المعادلة التالية:

المواد الصلبة العالقة ملغرام/لتر= (أ – ب) ×10^6

حيث: أ = وزن ورق الترشيح والمواد الصلبة العالقة بالغرام.

ب= وزن ورق الترشيح بالغرام.

عند تقدير المواد الذائبة فيوضع الراشح في جفنة معلومة الوزن ويتم تبخيرها باستخدام حمام مائي ثم يكمل التجفيف في فرن درجة حرارته (105) م وتوزن الجفنة بعد عملية التجفيف.

ولايجاد تركيز المواد الصلبة الذائبة نطبق المعادلة التالية:

$$\text{المواد الصلبة الذائبة ملغرام/لتر} = \frac{(\text{أ} - \text{ب}) \times 10^6}{\text{حجم النموذج بالمللتر}}$$

حيث: أ = وزن الجفنة والمواد الذائبة بالغرام

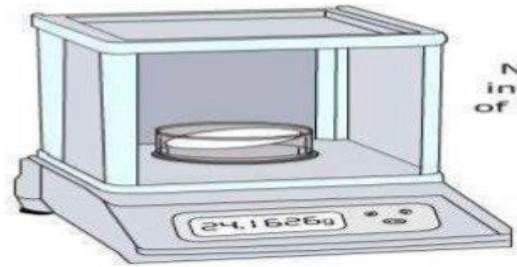
ب= وزن الجفنة بالغرام

PROCEDURE CHART



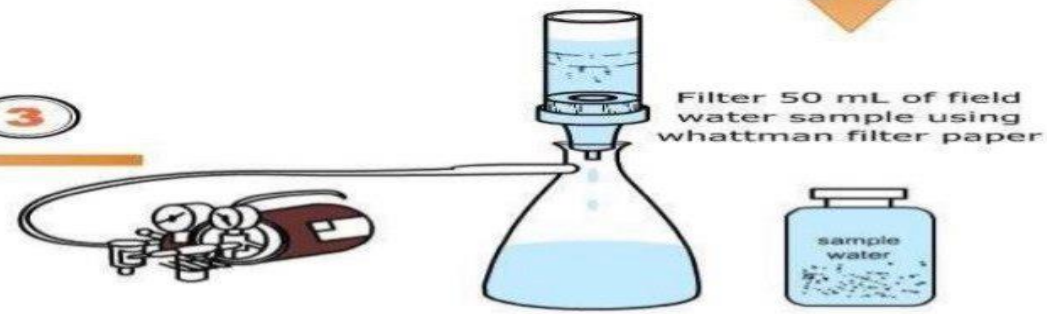
Switch on the balance (Atleast 30 min before the test)

1



Note down the intial dry weight of the filter paper

2



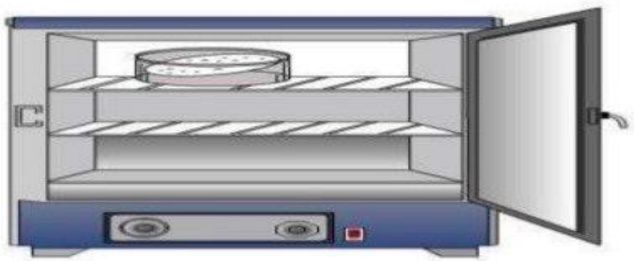
Filter 50 mL of field water sample using whattman filter paper

3

Take the filter paper and place it on the evapourating dish

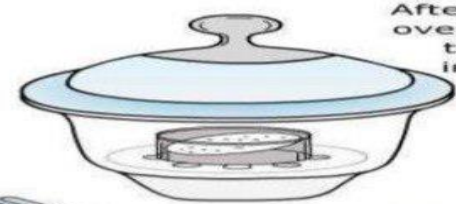


4



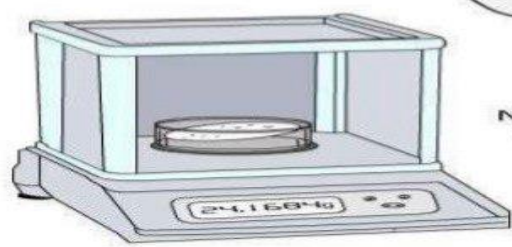
Place the evapourating dish inside the oven at 103°C

5



After drying in the oven cool to room temperature in dessicator

6



Note down the final dry weight of the filter paper

تقدير المواد الصلبة المترسبة

SETTLE -ABLE SOLID



Settled (Sedimentable) Solids

Settled solids are materials that can settle rapidly and remain stable at the bottom.

Calculation Method:

They are calculated by measuring the amount that settles at the bottom of a glass Imhoff cone, expressed in mL/L (milliliters per liter) or mg/L (milligrams per liter).

This measurement is used to determine the settling ability of suspended solids in wastewater treatment plants.

A. Calculation of Settled Solids (mL/L)

1.Fill a graduated Imhoff cone with a capacity of 1 liter with a well-mixed sample.

2.Measure the sediment formed at the bottom of the graduated cone in milliliters, while recording the time change for one hour.

3.Draw a curve between time intervals and the volume of sediment (mL) within one hour.

The final value represents the amount of settled solids in mL/L after one hour.

B. Calculation of Settled Solids (mg/L)

1.Measure the total suspended solids (TSS) in the sample.

2.Leave one liter of the sample to settle for one hour.

3.Take a specific volume from the middle of the clear (decanted) part using a pipette and measure the concentration of suspended solids in it.

4.The difference between the two measurements represents the settleable solids during one hour, expressed in mg/L.


Alum
Fe2(SO4)3
FeCl3
PACl
MgCl2