

**ESS Method 340.2:
Total Suspended Solids, Mass Balance
(Dried at 103-105°C)
Volatile Suspended Solids
(Ignited at 550°C)**

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1.0 Scope and Application

- 1.1 This method is applicable to drinking, surface, and saline waters, domestic and industrial wastes.
- 1.2 The practical range of the determination is 2 mg/L to 20,000 mg/L.
- 1.3 This method was used in the Wisconsin Green Bay Mass Balance Study, and was intended for use in sediment transport/loading work.

2.0 Summary of Method

A well-mixed sample is filtered through a standard GF/F glass fiber filter, and the residue retained on the filter is dried to constant weight at 103-105 °C.

3.0 Definitions

Total Suspended Solids is defined as those solids which are retained by a glass fiber filter and dried to constant weight at 103-105 °C.

4.0 Sample Handling and Preservation

- 4.1 Non-representative particulates such as leaves, sticks, fish, and lumps of fecal mater should be excluded from the sample if it is determined that their inclusion is not desired in the final result.
- 4.2 Preservation of the sample is not practical; analysis should begin as soon as possible. Refrigeration or icing to 4 °C, to minimize microbiological decomposition of solids, is required.

5.0 Interferences

- 5.1 Filtration apparatus, filter material, pre-washing, post-washing, and drying temperature are specified because these variables have been shown to affect the results.
- 5.2 Samples high in Total Dissolved Solids, such as saline waters, brines and some wastes, may be subject to a positive interference. Care must be taken in selecting the filtering apparatus so that washing of the filter and any dissolved solids in the filter minimizes the potential interference.

6.0 Apparatus

- 6.1 Glass microfiber filters discs, 5.5 cm, without organic binder, Whatman type GF/F (0.7 μ m).

- 6.2 Disposable aluminum dishes
- 6.3 Tweezers
- 6.4 Suction flask, 1000 mL
- 6.5 47 mm glass microanalysis filter holder (funnel, clamp, and base)
- 6.6 Drying oven for operation at 103-105°C
- 6.7 Muffle furnace for operation at 550 ± 50°C
- 6.8 Desiccator
- 6.9 Analytical balance, capable of weighing to 0.1 mg, an RS232C interface and a personal computer
- 6.10 Milli-Q reagent grade water (ASTM Type I water), Millipore Corp, Bedford, MA

7.0 Procedure for Total Suspended Solids

- 7.1 Preparation of the glass fiber filter disk: Insert the filter disk onto the base and clamp on funnel. While vacuum is applied, wash the disk with three successive 20 mL volumes of Milli-Q water. Remove all traces of water by continuing to apply vacuum after water has passed through. Remove funnel from base and place filter in the aluminum dish and ignite in the muffle furnace at 550°C ± 50°C for 30 minutes. Rewash the filter with an additional three successive 20 mL volumes of Milli-Q water, and dry in an oven at 103-105°C for one hour. When needed, remove dish from the oven, desiccate, and weigh.
- 7.2 Select a sample volume (max. of 200 mL) that will yield no more than 200 mg of total suspended solids.
- 7.3 Place the filter on the base and clamp on funnel and apply vacuum. Wet the filter with a small volume of Milli-Q water to seal the filter against the base.
- 7.4 Shake the sample vigorously and quantitatively transfer the sample to the filter using a large orifice, volumetric pipet. Remove all traces of water by continuing to apply vacuum after sample has passed through.
- 7.5 Rinse the pipet and funnel onto the filter with small volume of Milli-Q water. Remove all traces of water by continuing to apply vacuum after water has passed through.
- 7.6 Carefully remove the and filter from the base. Dry at least one hour at 103-105°C. Cool in a desiccator and weigh.
- 7.7 Retain the sample in the dish for subsequent ignition at 550°C if volatile suspended solids is desired.

8.0 Calculation of Total Suspended Solids

Calculate Total Suspended Solids as follows:

$$\text{Total Suspended Solids, mg/L} = (A-B) \times 1,000/C$$

Where: *A* = weight of filter and dish + residue in mg

B = weight of filter and dish in mg

C = volume of sample filtered in mL

9.0 Procedure for Volatile Suspended Solids

9.1 After determining the final weight in the total suspended solids analysis (7.6), place the filter and dish in the muffle furnace and ignite at $550^{\circ}\text{C} \pm 50^{\circ}\text{C}$ for 30 minutes.

9.2 Allow to partially air cool, desiccate and weigh.

10.0 Calculation of Volatile Suspended Solids

$$\text{Volatile Suspended Solids, mg/L} = (A-B) \times 1,000/C$$

Where: *A* = weight of residue + filter and crucible in mg from Total Suspended Solids test (7.7)

B = weight of residue + filter and crucible in mg after ignition (9.2)

C = volume of sample filtered in mL

11.0 Precision and Accuracy

Precision data are available in the Inorganic Chemistry Quality Assurance Manual.

12.0 References

- 12.1 Methods for the Chemical Analysis of Water and Waster, U.S. Environmental Protection Agency, EPA 600/4-79-020, p. 160.2, (1979).
- 12.2 Standard Methods for the Examination of Water and Wastewater, 16th Edition, p. 96, Method 209C. (1985).

