

CE 326 Principles of Environmental Engineering
Laboratory Assignment
BOD and Suspended Solids Analysis

Objective: To determine the biochemical oxygen demand (BOD) and suspended solids (SS) concentration of wastewater at various points in a wastewater treatment plant. See pages 297-300 for a description of the laboratory measurement of BOD.

Apparatus and Materials:

BOD test: BOD bottles (300 mL), DO meter and probe, nutrient water, nanopure water, pipettes
SS test: Glass fiber filters, filtration apparatus, tweezers, pipettes, aluminum dishes, oven (105°C) and muffle furnace (550°C).

Procedure:

BOD test:

1. Prepare the following dilutions of wastewater from the Boone Wastewater Treatment Plant. Add the desired amount of sample in the BOD bottle, add 2 mL of seed (supernatant from the influent sample), add 100 mL of nutrient water, and fill the remainder of the bottle with nanopure water. If the sample volume is greater than 200 mL, fill the remaining volume with the seed and nutrient water.

Raw influent	300:4, 300:8, 300:12
Final effluent	300:200, 300:250, 300:280

2. Label the BOD bottle appropriately.
3. Insert DO probe and record the initial DO in the diluted sample. Cap and seal bottle making sure to prevent any headspace (air) in the bottle.
4. Incubate the samples for 7 days at 20°C.
5. After the 7-day incubation period, measure the DO in each bottle.

Suspended Solids Test:

1. Mark four clean aluminum weighing dishes.
2. Weigh each dish with a glass fiber filter. Record the weight.

3. Use tweezers to transfer the filter paper to the filtration apparatus. Turn on vacuum pump and filter the appropriate amount of sample through each filter paper:

Raw influent	50 mL
Mixed liquor	20 mL
Final effluent	500 mL
Blank	50 mL distilled water

4. Using tweezers, remove the filter paper from the filtration apparatus and place on the aluminum dish.
5. Place the dishes and filters in the 105°C oven for at least one hour. Cool the dishes in a desiccator, and after cooling, weigh and record weight.
6. After weighing, place the dishes in the 550°C oven for one cycle (30 minutes). (Observe schedule on furnace door). Cool the dishes in a desiccator, and after cooling, weigh and record weight.

Report:

Prepare a brief report containing the following information:

Introduction. Explain the BOD and suspended solids measurements and why they are important to environmental engineers.

Procedure. Describe the procedures used in each test. Use narrative format.

Results. Tabulate the results from the tests. Include in your table the raw data used in the calculations. Also include sample calculations.

Discussion. Provide a discussion of the observed results and their significance. Calculate the removal efficiencies in terms of BOD and suspended solids for the Boone Wastewater Treatment Plant. How would you characterize the operation of the plant in terms of removal efficiency? What is the significance of the suspended and volatile suspended solids concentrations of the mixed liquor?