

The Hong Kong Polytechnic University
Department of Civil and Environmental Engineering
Water and Waste Laboratories

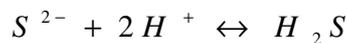
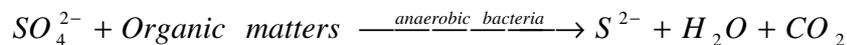
Laboratory Worksheet C9 : **Sulfate**.

by *KJ THUNG*

Objective : To determine the sulfate content in water and wastewater samples by turbidimetric method.

Introduction :

Sulfates are important in both public and industrial water supplies because of the tendency of water containing appreciable amount to form hard scales in boilers and heat exchangers. Sulfates are of considerable concern because they are indirectly responsible for two serious problems often associated with the handling and treatment of wastewater. They are odour and sewer corrosion problems resulting from the reduction of sulfates to hydrogen sulfide under anaerobic conditions, as shown in the following equations :



Apparatus :

- Magnetic stirrer.
- Spectrophotometer.
- 10 mm plastic or glass absorption cells.
- Conical flasks.
- Stop watch.
- Standard sulfate solution.
- Buffer solution A for normal measurement.
- Buffer solution B for sulfate concentration less than 10 mg/L.
- Barium chloride solid.

Procedure :

Calibration

1. Prepare 100 mL each of the following sulfate standards : 0 mg/L, 5 mg/L, 10 mg/L, 15 mg/L, 20 mg/L, 30 mg/L and 40 mg/L.
2. Transfer 100 mL of each standards to a 250 mL conical flask.
3. Add 20 mL of appropriate buffer solution.
4. Mix in a magnetic stirrer.
5. While stirring, add a spoonful of BaCl₂ crystals and begin timing.
6. Stir for 60 seconds at constant speed.
7. After stirring period has ended, pour solution into absorption cell.
8. Measure absorbance at 420 nm at 5 ± 0.5 min.
9. Plot calibration curve.

Measurement

1. Measure and transfer 100 mL of sample to a 250 mL conical flask.
2. Add 20 mL of appropriate buffer solution.
3. Mix in a magnetic stirrer.
4. While stirring, add a spoonful of BaCl₂ crystals and begin timing.
5. Stir for 60 seconds at constant speed.
6. After stirring period has ended, pour solution into absorption cell.
7. Measure absorbance at 420 nm at 5 ± 0.5 min.
8. Estimate sulfate concentration in sample by comparing absorbance with the calibration curve.

Questions :

1. What is the significance of high sulfate concentration in water supplies and in wastewater disposal ?
2. List three conditions which must occur more or less simultaneously for “crown” corrosion of a sewer to take place.
3. What are the two purposes for the buffer solution used in the turbidimetric determination of sulfate concentration ?