Equipment

Materials may be purchased online or at a local pet store or large retail store. Prices were checked January 2025.

- 95 GPH 5W small submersible water pump – $10 (large local retailer)
- TDS (total dissolved solids) PPM meter – $4 (large local retailer)
- 3/4 inch polyethylene (or vinyl) tubing, 4-5 feet – $20 for 10 feet or $9 for 5 feet (large local retailer or big box store)
- Two 5-gallon buckets – $10 for two at large local retailer; $2.77 each at big box store
- Noniodized table salt – $2 (grocery store)
- Red food coloring gel (optional) – $2 (large local retailer or grocery store)

Flow Rate Lab

You will measure the effect of flow rate on chemical concentrations in a tank, using food instead of chemicals for safety and visibility.

- Bucket 1: This is your contaminated bucket.
  - » Place the tank on the floor.
  - » Place the pump in the tank.
  - » Add 4 gallons of tap water.
  - » Stir in 1 teaspoon of table salt.
  - » Optional: Add a few drops of food coloring.
- Bucket 2: This is your freshwater bucket.
  - » Place on another bucket or chair so it's higher than bucket 1.
  - » Add water to just under the overflow hole.
- Attach the tubing:
  - » From the water pump in bucket 1 to bucket 2. You may need to secure the tube so the water flows into the bucket.
  - » From the overflow fitting in the freshwater tank to the saltwater tank.
- Set the pump flow rate to low.
- Check that the pump is fully immersed in the saltwater.

Trial 1

1. Take total dissolved solid (TDS) readings in the freshwater tank (bucket 2), and record on the worksheet before you start your pump (0 minutes).
2. Note the time and start the pump.
3. Measure and record the TDS level in the freshwater tank (bucket 1) every five minutes until there is little/no change in values.
4. Record TDS level in the worksheet
5. Stop when the TDS values level off.

Trial 2

1. Empty and rinse both buckets and the vinyl tubing.
2. Refill both buckets as in trial 1
3. Set the pump flow rate to high.
4. Repeat steps 1-5 from trial 1.

Complete the worksheet:

- Graph your TDS readings for both trials.
- Calculate the TDS changing rate: (TDS2 – TDS1)/(t2 – t1)
  - » TDS – Total Dissolved Solids
  - » t – time
- Answer the four questions about this experiment.