

Freshwater Ecosystems

Investigation Data Sheet



How Do Oxygen Levels Impact Life in Freshwater Ecosystems?

One of the most important abiotic components of freshwater ecosystems is the dissolved oxygen present in the water. Most natural water systems require 5-6 parts per million of dissolved oxygen to support a diverse population. If oxygen levels are too low, some fish and other organisms may not be able to survive.

Objective

Determine if a pond and a stream contain different amounts of dissolved oxygen by collecting samples, performing chemical tests and recording and analyzing data.

Materials

- protective gloves and goggles
- thermometer
- a dissolved oxygen test kit which includes:
 - collection bottles
 - test chemicals (usually in tablet form)
 - dissolved oxygen color chart — ppm

Safety Notice: All applicable laboratory safety rules must be followed. Students should not perform any experimental activity without the teacher's supervision and express permission. Students must follow safety guidelines and wear appropriate protective gear.

Procedure

Experiment 1: Still Water Analysis

Temperature

1. Measure the temperature of the water in the pond with the thermometer. Lower the thermometer four inches below the surface of the water.
2. Keep the thermometer in the water until it reaches equilibrium (approximately two minutes).
3. In the data table, record the temperature in degrees centigrade.
4. Repeat the test in the same location and record your results.

Sample Collection

1. Follow the instructions provided with the test kit. Wearing protective gloves, remember to rinse the sampling bottle several times with the sample to be tested. Be sure to sample the water away from the bank and well below the water's surface.
2. Replace the top on the empty sampling bottle and submerge it in the pond.
3. After submerging the sampling bottle, remove the top under the water and fill the bottle while tapping the sides to release the air bubbles. Replace the top while the bottle is submerged. Be sure to completely fill the bottle with water. An air bubble will result in an inaccurate dissolved oxygen reading.

Sample Testing

1. Perform the chemical test immediately. Biological activity in the sample and exposure to air can quickly change the dissolved oxygen level.

2. Follow the instructions provided with the test kit. The sample bottle should be filled to the top without any air bubbles. Remove the top of the full, capped bottle.
3. Add the chemical tablets and put the cap back on the bottle. Mix the solution by turning the tube over and over until the tablets are dissolved. The chemicals in the tablets react with the dissolved oxygen and change the color of the solution.
4. Wait five minutes for the color to develop.
5. Hold the bottle upright against the color chart and compare the color of the sample to the color chart to determine the concentration of oxygen in each sample.
6. Record the results in the data table in parts per million dissolved oxygen.
7. Repeat the test and record your results in the data table.

Experiment 2: Flowing Water Analysis

1. Repeat these same instructions for the stream water samples. Record your results in the data table. Find the average of the trial results and record in the data table.

Data Table

	Temperature (°C)	Dissolved Oxygen (ppm)
Pond		
Trial 1		
Trial 2		
Average		
Stream		
Trial 1		
Trial 2		
Average		

Conclusions

Which body of water contained more dissolved oxygen? What conclusions can you reach based on your data?

How does temperature affect oxygen levels?

Continued on next page.

How does dissolved oxygen get in the water?

Other than dissolved oxygen, what are three abiotic factors that impact the plants and animals of freshwater ecosystems?

How could you design an experiment to test how increases or decreases in dissolved oxygen levels affect plants and animals?
