

Lab Skills Water Quality Testing

BACKGROUND

In this lab activity you will be testing water from a local lake for levels of Coliform Bacteria, Dissolved Oxygen, Biochemical Oxygen Demand (BOD), Nitrate, Phosphate, and pH. The procedures that you will use are similar to the soil testing lab activity.

MATERIALS

Large test tube for coliform test	Small test tube for BOD test.
Medium test tube for O, N, P, and pH tests	Chemical tablets
Color chart	Thermometer
Notebook to record data.	

COLIFORM BACTERIA TESTING - This test will be done as a class.

Coliform bacteria are found in the intestinal tracts of humans and other animals. Clean water should contain no traces of Coliform Bacteria. Presence of Coliform indicates that water has been polluted with sewage or other fecal contamination. Coliform itself is not harmful, but when ingested they do carry pathogens that are dangerous to human health.

PROCEDURES

1. Pour 10mL of lake water from the 5 gallon bucket into the large test tubes that already contain a tablet.
2. Cap the test tube.
3. Stand the tube upright with tablet flat on the bottom of the tube. Do not shake.
4. We will store these three test tubes on the back counter for at least two days.
5. Your teacher will dispose of these tests. Do not flush them down the drain.

DISSOLVED OXYGEN TESTING

All aquatic life need oxygen to survive. Natural waters with high levels of dissolved oxygen are most the healthy and stable environments. Dissolved Oxygen is an important measure of water quality. Low levels may result from bacterial pollution from sewage, rotting plants or other human pollutants. Low levels of oxygen indicate poor water quality.

PROCEDURES

1. Record the temperature of the water using a thermometer.
2. Submerge your medium sized test tube completely in the water sample.
3. Bring the test tube out of the water, but make sure it is completely full.
4. Drop two Dissolved Oxygen TesTabs into the tube. Excess water should spill over.
5. Screw the cap on the tube. Excess water should spill over. Be sure there are no air bubbles.
6. Shake to dissolve the tablets. This could take several minutes.
7. Wait 5 minutes for color to develop.
8. Compare the color of your sample to the color on the chart. Record your observations.

BIOCHEMICAL OXYGEN DEMAND (BOD) TESTING

BOD is a measure of the quantity of dissolved Oxygen used by bacteria as they break down organic waste. In slow moving or polluted waters, much of the available oxygen is consumed by bacteria, robbing other aquatic life of the dissolved oxygen needed to live. A higher concentration of BOD levels indicates clean, healthy water.

PROCEDURES

1. Submerge the small test tube in the water sample making sure it's full to the top.
2. Wrap the tube in aluminum foil.
3. Write your names on the foil.
4. The tubes will be stored for five days in a dark place chosen by your teacher.
5. After 5 days, unwrap the test tube.
6. Add two Dissolved Oxygen TesTabs.
7. Cap the tube making sure there are no air bubbles. Shake until tablets are dissolved.
8. Compare the color of your sample to the color on the chart. Record your observations.

NITRATE TESTING

Nitrates are needed by all aquatic life to build protein. The decomposition of organic materials and the excretions of living animals release nitrates into the aquatic system. Excess nutrients, like Nitrates promote plant growth, bacterial decomposition, and therefore, decrease the amount of oxygen in the water. Low (or no) levels of Nitrates indicate healthy water. Sewage and fertilizer run-off are the major contributors of Nitrates to ecosystems.

PROCEDURES:

1. Fill the medium sized test tube (the one you used for the dissolved oxygen test) to the 5mL line with the water sample.
2. Add one Nitrate Wide Range CTA TestTab.
3. Cap and shake to dissolve the tablet.
4. Wait 5 minutes for the color to develop.
5. Compare the color of your sample to the color on the chart. Record your observations.

pH TESTING

pH is a measure of the acidic or basic quality in water. The pH scale ranges from 0 (very acidic) to 14 (very basic) with 7 being neutral. The pH of natural water is usually between 6.5 and 8.2. Most aquatic organisms are adapted to a specific pH level and may die if the pH level changes even slightly. pH is most often affected by agricultural or industrial runoff.

PROCEDURES

1. Fill the medium sized test tube to the 10mL line with the water sample.
2. Add one pH Wide Range TesTab.
3. Cap and shake to dissolve tablet.
4. Wait 5 minutes for the color to develop.
5. Compare the color of your sample to the color on the chart. Record your observations.

PHOSPHATE TESTING

Phosphate is a nutrient needed for plant and animal growth and is also a fundamental element in digestive reactions. High levels of this nutrient can lead to overgrowth of plants, increased bacterial activity, and decreased levels of oxygen. Low (or no) levels of phosphate indicate healthy water. Phosphate levels can be increased by human and animal waste, industrial pollution, and agricultural runoff.

PROCEDURES

- Use the same procedures as you did for the pH test, but replace the pH tablet with the Phosphorus tablet.

QUESTIONS – the answers should be included in your lab report.

1. Were there any tests that indicated poor water quality? If so, which ones? Provide data to back up your answer.

2. As a whole, was the water sample a healthy sample? Why or Why not?

3. Knowing that the water sample was taken from a local lake where children swim; does this increase your confidence in the health of our local waters? Why or Why not?