Environmental Science Lab

DETERMINATION OF LOCAL WATER QUALITY

OVERVIEW

Water covers over 71% of the earth's surface. All living organisms require water in order to live. In fact, they are mostly comprised of water. Freshwater comprises only about 3% of the earth's total water supply. Most freshwater is actually locked up in frozen glaciers or deep groundwater where it is not useable by most living organisms. Only a tiny fraction of the earth's total water supply is therefore usable freshwater. Still, the available amount of freshwater is sufficient due to the natural water cycle. The water cycle constantly collects, purifies and redistributes the available water supply to living organisms. Unfortunately, human activities threaten to overload the natural water cycle and degrade the quality of available water. Water can be polluted at any stage of the natural cycle. Polluted water negatively impacts living organisms, including humans. People rely on a source of clean water, not only for drinking, but for other household uses, industrial uses and agricultural uses. Therefore, it is important to protect and preserve our water resources. In this lab activity you will determine the overall quality of a water sample from a local natural source.

1. You will first collect a water sample from a local, natural source. The sample should be freshly collected for the dissolved oxygen test.

2. Next, you will use a commercial water monitoring kit to perform six tests on the water sample: dissolved oxygen test, nitrates test, phosphates test, temperature test, pH test, and sedimentation/turbidity test.

3. You will compare the results from your water tests with values for an ideal, unpolluted water sample.

4. Finally, you will suggest possible causes for any deviations of your water test results from the ideal values and explain the possible effects of those deviant values on living organisms.

TIME REQUIREMENTS

This lab activity requires 2-3 50-minute class periods for completing all of the tests.

LAB EQUIPMENT AND MATERIALS

A list of equipment and materials needed to complete this activity is given below.

Equipment	**Amount Needed**
Water Monitoring Kit (LaMotte, GREEN)	1
Materials	**Amount Needed**
Plastic gloves	2 pair
Plastic bottle (500 mL or larger)	1
Marker pen (permanent, black)	1

LAB PROCEDURE

Hints for a successful lab:

⇒ Follow the instructions for water collection closely. The technique used to collect the water sample can affect the results, especially for dissolved oxygen.

⇒ Do not try to cut corners when performing the tests or your results may be affected.

⇒ Be careful when handling the water sample because it may contain harmful bacteria or pollutants. Wear your plastic gloves.

⇒ The water sample should be freshly collected for the dissolved oxygen test in order to obtain the most accurate results.

Collect water sample

1. Go to a nearby natural water source (e.g. pond, stream, etc.) with your plastic bottle and a pair of plastic gloves.

2. Put on the plastic gloves before performing the water sampling.

3. Collect a water sample with your plastic bottle.

4. Label the plastic bottle with the location and source of the water using a permanent black marker pen.

5. Return to the classroom with the water sample.

Follow monitoring kit procedures

1. Read the instruction manuals provided with the water testing kit. The instructions are very explicit.

2. Wear plastic gloves when handling the water sample.

3. Follow the lab procedures in the manual for each test.

4. Perform six tests on your water sample: dissolved oxygen test, nitrates test, phosphates test, temperature test, pH test, and the sedimentation/turbidity test.

5. Record your measured test results on the data worksheet, along with ideal water sample values provided.

6. Complete the "causes" and "effects" sections of the worksheet after comparing your measured test results with the ideal values.

Cleanup lab

1. Properly dispose of water sample when all test are completed.

2. Place plastic bottle and gloves in the recycling bin (or trash).

3. Return monitoring kit materials to your teacher.

LAB REPORT / ANALYSIS QUESTIONS

Provide answers to the following questions using complete sentences.

1. Describe the best way to collect a water sample that is typical of the whole source.

2. The test for dissolved oxygen first yields results in ppm. What does ppm mean?

3. The dissolved oxygen ppm is then converted to percent saturation. What does percent saturation mean? What other measurement is taken into consideration when determining the percent saturation?

4. What is the effect of increased phosphates and nitrates on aquatic ecosystems?

5. How is the pH scale defined? What are considered acidic, basic and neutral on pH scale?

6. What type of suspended material causes an increase in turbidity or sedimentation in aquatic ecosystems?

7. What is one effect of increased sedimentation on filter feeders and other aquatic organisms found in an aquatic ecosystem?

8. What are some possible sources of error in this experiment?

9. Write a comprehensive summary and conclusion of your results.

END OF LAB

DATA WORKSHEET		
Test Name	**Measure**	**Ideal Value**
Dissolved Oxygen		
Nitrates		
Phosphates		
Temperature		
pH		
Sedimentation/Turbidity		

	Cause of Deviation	**Effect of Deviation on Living Organisms**
Dissolved Oxygen		
Nitrates		
Phosphates		
Temperature		
pH		
Sedimentation/Turbidity		