Name: Date:

HANDS-ON LAB

Winter Water Chemistry

Seasonal changes in temperature cause changes in lake ecosystems and the organisms that live there. Chemical cycles can vary from winter to summer, and the presence of ice on the surface of a lake also can alter oxygen levels. In this lab, you will design an experiment that models the conditions of lake water in the summer and in the winter. You will collect data from both models to determine how a layer of surface ice can affect lake water chemistry.

PREDICT

How do you think the chemistry of a lake changes from summer to winter? How might variables such as pH and dissolved oxygen be affected by changes in seasonal conditions?

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MATERIALS

- beaker, 500 mL
- bowl, plastic (2)
- cold water bath
- dissolved oxygen kits or probes
- *Elodea* leaves
- pH strips
- plastic food wrap
- rubber band, large
- sample water and sediment
- thermometer (2)
- warm water bath
- wax paper

PROCEDURE

1. Using the materials listed, design an experiment to determine differences between lake water chemistry in winter conditions and in summer conditions. Keep in mind that dissolved oxygen and pH are two variables that are influenced by lake surface ice.
2. Write a procedure to explain how you will set up your experiment, and which variable you will test. Identify a control group and experimental group, the data you will collect, and how often you will collect it.
3. Have your experimental design approved by your teacher.
4. Design a data table in your Evidence Notebook to organize your results.
5. Conduct your experiment.

ANALYZE AND CONCLUDE

1. Determine the best way to present your data. Determine whether you should draw a line graph or a bar graph, and then construct that type of graph in your Evidence Notebook.

2. Summarize your results. What differences were there between the two set-ups?

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3. In the space below, draw a model to show how the cycling of matter and energy account for the differences you observed in the "winter" and "summer" models. In your model, illustrate how sunlight, water, and the oxygen cycle interact in both sets of conditions, and show how seasonal changes affect these interactions.

4. According to your model, how would seasonal changes in the chemistry of the water affect aquatic organisms? Provide specific examples to support your claim.

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EXTEND

Design an experiment in which you would track another variable related to the cycling of matter and energy in an aquatic ecosystem. What variable would you change, how would you change it, and how do you think this would affect the cycling of matter and energy in the ecosystem? Write or draw your experimental design in your Evidence Notebook.