PRELIMINARY ACTIVITY FOR

Long Term Water Monitoring

Water sample collection and analysis and the long-term study of a local system or environmental problem are important components of an Environmental Science course. You will experience both in this experiment.

In the Preliminary Activity, you will gain experience using a Dissolved Oxygen Probe while measuring the concentration of dissolved oxygen (DO) in a water sample provided by your teacher. You will also gain experience using a Temperature Probe, a Conductivity Probe, a Turbidity Sensor, and a pH Sensor. You may or may not choose to use all five of the sensors as you subsequently research your chosen question.

After completing the Preliminary Activity, you will first use reference sources to find out more about water issues before you choose and investigate a researchable question that involves long-term data collection. Some topics to consider in your reference search are:

- water
- water resources
- water pollution
- eutrophication
- dissolved oxygen (DO)
- pH
- turbidity
- total dissolved solids

PROCEDURE

1. Connect the Dissolved Oxygen Probe to the interface and start the data-collection program. Allow the probe to stay in distilled water for 10 minutes as the probe warms up.
2. Collect DO data.
   a. Place the tip of the probe into the water sample being tested. Submerge the probe tip to a depth of 4–6 cm.
   b. Start data collection. Gently stir the probe in the water sample. **Note:** It is important to keep stirring until you have finished collecting data.
   c. Continue stirring and data collection until the readings have been relatively stable (stable to the nearest 0.2 mg/L) for about 30 seconds, then stop data collection.
   d. Select the stable region of your graph, then display Statistics for that region. Note and record the mean value for that region as the DO of the water sample (in mg/L).
3. Measure and record the temperature of the water sample. Record the value (in ºC).
4. Use a Conductivity Probe to obtain the total dissolved solid (TDS) value for the water sample. Have the switch on the Conductivity Probe box set to 0–2000 µS/com (2000 µS/cm = 1000 mg/L TDS). Record the value (in mg/L).
5. Use a pH Sensor to measure the pH of the water sample. Record the value.

6. Collect turbidity data.
   a. Connect a Turbidity Sensor to the interface. Allow the powered Turbidity Sensor to warm up for five minutes.
   b. Calibrate the sensor or manually enter calibration values following instructions from your teacher.
   c. Obtain a portion of slightly turbid water from your teacher. Fill your turbidity cuvette until the bottom of the meniscus is *exactly* at the top of the line on the cuvette. This sample level is critical to obtaining correct turbidity values.
   d. Measure the turbidity of the water sample. Record the value (in NTU).

QUESTIONS

1. What was the DO of the water sample you tested in the Preliminary Activity?

2. Water with a pH of 7 is considered neutral. If the pH is below 7, it is classified as acidic, while water with a pH greater than 7 is said to be alkaline. The pH of tap water in the U.S. is usually between 6.5 and 8.5. What was the pH of the water you tested in the Preliminary Activity? What pH values do you expect to obtain when you study local waters? Justify your prediction.

3. The turbidity of surface water is usually between 1 NTU and 50 NTU. Water is visibly turbid at levels above 5 NTU. The standard for drinking water is 0.5 NTU to 1.0 NTU. What turbidity values do you expect to obtain when you study local waters? Justify your prediction.

4. TDS values in lakes and streams are typically found to be in the range of 50 to 250 mg/L. In areas of especially hard water or high salinity, TDS values may be as high as 500 mg/L. Drinking water will tend to be 25 to 500 mg/L TDS. United States Drinking Water Standards, established by the 1986 Amendments to the Safe Drinking Water Act, include a recommendation that TDS in drinking water should not exceed 500 mg/L TDS. Freshly distilled water, by comparison, will usually have a conductivity of 0.5 to 1.5 mg/L TDS. What TDS values do you expect to obtain when you study local waters? Justify your prediction.

5. List at least one researchable question for this experiment.