Dissolved Oxygen Lesson Plan

Key Understandings:

• What is Dissolved Oxygen?
• Why is it relevant in water quality measurements?
• How oxygen gets in the water
• How it is used up / what things affect its concentration
• The dependence of the solubility of DO on temperature (? and salinity)
• The meaning of the terms "saturated", "unsaturated", "supersaturated"
• How DO is measured / the relevance of various DO values

Time needed:

We suggest taking one lesson to discuss DO and demo the test, and a second lesson to allow the students to perform the laboratory.

Discussion:

• Do fish breathe? Discuss as a whole class and come to the conclusion that there must be oxygen in the water.
• Split into groups. 3-5 minutes for discussion in groups.
    - Groups 1&2: How does oxygen get in the water?
    - Groups 3&4: How can the oxygen in the water get used up?
• Discuss both questions as a class
• As a class: What can happen in a pond/river if the oxygen gets used up?
• Discuss how oxygen solubility can depend on temperature / salinity /pressure. Introduce the concepts of saturation / supersaturation; show saturation table from the CBL manual on overhead.
• Explain and demo the CBL probe test and calibration procedures

Lab:

• Follow the procedures in the CBL handout to perform a probe calibration
• Test tap water and a sample of water brought in from a local body of water. Are either of these saturated? What is the % saturation?
• Record and hand in a copy of the results

Homework:

#1:

• Read the CBL handout on DO (pages 5.1 – 5.7, including data forms)
•Answer: The owner of a small pond hires you as a consultant to help him solve a problem with the pond. He says that all the fish in the pond are dying and the pond is becoming slightly overgrown; yet he knows that there are no pollutants in the pond. What is happening and what would you advise this person to do?

#2

Class data needs to be compiled & given to the students for this assignment

From the compilation of class DO data, answer the following questions:

- Calculate the average DO values for tap water and the lake or river sample used
- Were there significant differences between the two averages? How would you explain these?
- Look at the average water body DO values for each class. Do these differ from class to class? If so, why might this be?

Handouts:

Vernier Software: Water Quality with CBL – Dissolved Oxygen
You can view this handout on the Vernier Software Water Quality website:
http://www.vernier.com/cmat/WQCBL.html

Alternatives to the CBL test, comments and further resources:

• Only a few CBL setups are necessary, as you could also schedule the labs so that you have DO, and TH stations, for example, between which students rotate. Only 1 DO probe per chaperone is needed for the field trip.
• An alternative test is available from the Massachusetts Water Resources Authority (MWRA). The MWRA lends out water quality test kits to schools free of charge. The MWRA DO test is a chemical test and involves a simple procedure with pre-mixed reagents.