

Water Quality Monitoring (Dissolved Oxygen)

Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topic: Record keeping and sampling of abiotic factors within an ecosystem.

Summary: Students will use The Winkler test to explore the Dissolved Oxygen of water quality to gain a better understanding of the dynamics of the abiotic factors influencing freshwater systems and the inhabitants that reside in this ecosystem.

Objective(s): After completing the field lab, students will be able to:

1. Use water quality equipment properly and record data using proper units of measurement
2. Explain the relationship Dissolved Oxygen has in the ecosystem.

Ecosystem(s): Lakes/Rivers/Springs

Equipment:

- Armored thermometer
- GPS unit
- 2 D.O. test kits
- 2 Safety Glasses
- 2 sets gloves
- Data sheets
- Clipboards
- 2 LaMotte samplers

Background:

- **Vocabulary:** Dissolved Oxygen, Winkler Test, Titration, Water Quality, Parameters, Abiotic factors, Biotic factors, Eutrophication, Stagnant, Anthropogenic, Springshed
- **Reference Material:** Healthy Water Healthy People;
<http://bcn.boulder.co.us/basin/data/BACT/info/DO.html>;
<http://fcit.usf.edu/florida/lessons/tallahassee/tallahassee.htm>;
http://score.dnr.sc.gov/ktmlpro10/files/uploads/elearning/Understanding_DO.pdf
- **Equipment Training:** D.O. Test kit, GPS units

Procedures (Engage; Explore; Explain; Elaborate; Evaluate):

1. Engage the students by asking a specific question that gets to the heart of the activity. Do fish breathe? Do any of the students have a fish tank with an aerator? Discuss as a whole group and come to the conclusion that there must be oxygen in the water.
2. Use the students' answers to ascertain what they already know, clarify any misconceptions, and then ask them to formulate their own hypothesis relating to their own expectations of the outcome of the lab.
3. Explore the concentration of D.O by following the procedures corresponding to the Winkler test.
4. After completing the lab, Elaborate on the concepts by having the students answer the discussion questions as a group and explain their answers relating them to the concepts, processes and skills associated with the activity. Students should record their answers individually. At this time, facilitators can introduce/explain the specific concepts and explanations in a formal manner.

Sunshine State Standards:

Science: SC.7.N.1.1; SC.7.L.17.3; SC.7.E.6.6; **Language Arts:** LA.7.4.2.1,2; LA.7.1.6.1; **Mathematics:** MA.7.S.6.1; MA.7.P.7.1; **Social Studies:** SS.B.2.3.9; SS.B.1.3.1

Water Quality Monitoring (Dissolved Oxygen)

Student Data Sheet

General Information

Full Name:		Science Teacher:	
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Student Hypothesis and Rationale

If high levels of dissolved oxygen levels are related to cooler, fast moving water with healthy aquatic vegetation, then there should be higher oxygen levels at (choose one Suwannee River, Ichetucknee Springs, or Alligator Lake), because . . . _____

Field Observations/Measurements/Data

	Alligator Lake	Ichetucknee Springs	Suwannee River
Date (Time)			
Latitude:			
Longitude:			
Water Temperature (°C)			
Dissolved Oxygen (mg/L):			
pH			
Weather conditions (previous day)			

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Assessment

1. What was your Dissolved Oxygen reading for your location?

2. Look at the Dissolved Oxygen chart for a healthy water body reading. Would you rate this water as: excellent, good or poor?

3. Was your hypothesis supported by your data? Explain your results and what you can infer from your observations, measurements, and results.

4. Explain why you would expect the Dissolved Oxygen to be higher or lower when the water level is lower. What are some other abiotic factors that influence Dissolved Oxygen levels?

5. Are there many anthropogenic (human-made) activities that can decrease Dissolved Oxygen levels? List some of the activities and how they can either worsen or improve D.O. levels.

6. Think about the observations you have just made. Did the activity raise new questions? Write a short question (start with “What, Why, Where, When, or How”) about something you want to learn more about.

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Reference Chart

More than 10 mg/L	Excellent
4 – 10 mg/L	Good
Less than 4 mg/L	Poor

Dissolved Oxygen Dissolved Oxygen's presence in water is a positive sign, but low levels are a sign of severe pollution. Water with consistently high levels of Dissolved Oxygen are considered healthy and capable of supporting many different kinds of aquatic organisms. In order for a water body to sustain warm water fish like bluegill, bass, and pike, the Dissolved Oxygen level must be at least 4 milligrams per liter (mg/L). Dissolved Oxygen in water generally comes from one of two sources. Most Dissolved Oxygen comes from the atmosphere as waves and tumbling water mix atmospheric oxygen. Another source of Dissolved Oxygen comes from plants as they conduct photosynthesis.