

2007

Winning Lesson Plan  
from Cayey, Puerto Rico

*Measuring Conductivity*

by Julio De Jesús  
Colegio Radians

Subject: Earth Sciences

Grade Level: 9

Duration: One period (1  
hour 45 minutes) or two  
periods (1 hour each)

## Overview

### Summary

Students will investigate changes in the conductivity of freshwater as its temperature dropped into freezing. The above is relevant when studying the interrelation between physical and biological parameters in areas where lakes freezes seasonally.

### Driving Question

How does conductivity would change as a lake freezes?

### National Science Standards Addressed

#### A. *Science as Inquiry*

- As a result of activities in grades K–12, all students should develop
  - Abilities necessary to do scientific inquiry.
  - Understanding about scientific inquiry.

#### H. *Unifying Concepts and Processes*

- As a result of activities in grades K–12, all students should develop understanding and abilities aligned with the following concepts and processes
  - Systems, order, and organization
  - Evidence, models, and explanation
  - Constancy, change, and measurement
  - Form and function

### Objectives

Students will develop specific skills in:

- Preparing stock solutions
- Conduct serial dilutions
- Using the CBL
- Using graphic a calculator
- Constructing graphs

## Overview (Cont'd)

### Introduction

Conduct a Web Quest to answer the following guiding questions:

- What is conductivity?
- Which factors would influence conductivity?
- Which relationship exists between conductivity and water density?

### Materials Needed

- Sea salt
- Distilled water
- 250 ml beakers
- Erlenmeyer's flasks
- Balance
- Stirring rods
- Sharpie markers
- Microwave oven
- Refrigerator with freezer

### Pre-Lesson Statement

After completing the Web Quest, write a statement on which would be the answer for the lesson's driving question? Return it to the teacher at the end of the period.

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periods (1 hour each)**Procedure**

1. Prepare a 10 ppt salt stock solution by dissolving 9.20 grams of sea salt into 1 liter of distilled water.
2. Using serial dilutions prepare 4 samples, each containing 2.5 ppt salt concentration.
3. While preparing the solutions, have a group member to prepare the CBL with the conductivity sensor calibrated and connected to the graphic calculator.
4. Measure the temperature and conductivity of one of the samples at room temperature.
5. Place another sample in the microwave oven for 20 seconds, remove and measure temperature and conductivity.
6. Place a third sample in the refrigerator for 20 minutes, remove and measure temperature and conductivity.
7. Place the last sample in the freezer until ice crystals appears, then removes and measure temperature and conductivity.
8. Record the data on an excel sheet and plot then into a scatter diagram.
9. Prepare a PowerPoint presentation for the class, including a discussion of the results and the implications, your answer for the driving question and how it is different from your pre lesson statement.

**Evaluation**

A total of 60 points will be assessed using the Web Quest evaluation rubric (20 points), the Laboratory Exercise evaluation rubric (20 points) and the Oral Presentation rubric (20 points).

**Extended Impact**

The following positive results will last long after the lesson ended:

1. Students will be able to integrate the knowledge and process the information for environmental problem solving and understanding of environmental phenomena.
2. Students will increase the awareness toward environmental sciences.
3. Students will engage afterward in research projects that integrate interdisciplinary concepts and laboratory experiences using scientific instrumentation.