

## Lesson Five

### CONDUCTIVITY

Salt water is more conductive of electricity than freshwater because it contains more ions. Conductivity in water is the measurement of ions or “stuff” in solution. It does not differentiate the ions, it only gives a reading of how much is there. It measures the conductivity by the strength of the charge moving through the water. Overlap with base cation determination is expected in simple quantification of waters. It is more accurate when this measurement is coupled with turbidity.

#### VOCABULARY

**Conductivity**-The ability/power to conduct or transmit heat, electricity, or sound.

**Ion**- An atom or a group of atoms that has acquired a net electric charge by gaining or losing one or more electrons.

**Cation**- An ion or group of ions having a positive charge

**Anion**- A negatively charged ion

**Base cation**-

**Turbidity**- Having sediment or foreign particles stirred up or suspended; muddy: *turbid water*.

#### ACTIVITY #1

Freezer space	salt
Hot plate	bottled water
500 mL Beakers (2 to 4)	
If possible, use glass beakers for boiling and plastic for freezing*	
stop watch	scientific thermometer
stirrer	

*Try adding different concentrations of salt to each group's beakers so they can compare results as a class.*

Expected Outcome: Salt water freezes at a lower temperature and boils at a higher temperature than fresh water because the salt particles allow for absorption of heat.

Dissolve several different concentrations of salt (i.e., 1-2 g of table salt to salt saturation level) in two (or more) separate beakers with 250 mL of water. Fill a final beaker with fresh water (no salt). Boil and then freeze both fresh water and salt water (allow glass beaker to reach room temperature before freezing to avoid breakage). Measure the temperatures at which both types of water freeze and boil. Also measure the amount of time it takes for both to reach its new physical state of matter (may be difficult to exact freeze time).

\*glass jars and plastic soda bottles (cut tops off) can be substituted if necessary

## ACTIVITY #2

Per Group:

1 D size battery

250-500mL of de-ionized H<sub>2</sub>O per beaker

2 beakers

NaCl (table salt)

4 electrical wires with connector ends

electrical tape

galvanometer

*Try adding different concentrations of salt to each group's beakers so they can compare results as a class.*

Dissolve salt in one of the beakers of de-ionized water. Connect 2 wires to the galvanometer. Connect 2 different wires to the battery. Use the beakers of water to close the circuits and measure the amount of conductance moving through the waters based on amperes measured by the galvanometer.

## HOME WORK

Repeat the temperature experiment at home! See if bottled water has different physical properties than your tap water! More ions in your tap water could affect the temperature and time of both freezing and boiling! (A candy thermometer can be used for boiling)

**DO NOT USE BODY THERMOMETER!!!! IT WILL BREAK!**