

Name: _____

Partners: _____

Universal lesson: Electric Current in Aqueous Solutions

- 1) What do you think will happen to the following things when a light bulb is placed in each?
 - a. Table salt:
 - b. Tap water:
 - c. Deionized water:
 - d. Table salt in water:
- 2) What did happen when the light bulb was placed in each solution, be specific.
 - a. Table salt:
 - b. Tap water:
 - c. Deionized water:
 - d. Table salt in water:
- 3) What do you hypothesize to be the reason for these differences?
- 4) What do you think the importance of rinsing the light bulb electrodes between each test?
- 5) Why do you think it is important to not swim during a lightning storm?

Universal Lab: Response of a Multi-meter to an Electrochemically Active Solution

Electrochemistry is a technique used in science to detect the transfer of electrons. In order for a chemical to be electrochemically active it must be able to dissolve (break apart) in a solvent and form charged ions. When an electrode is placed into a solution and a voltage is applied across the solution the ions present in the solution allow electrons to move creating a current which is measured using a multi-meter.

Materials

Multi-meter
NaCl

3 Beakers
Tap water

Graduated cylinder
Pure water

How to use the multi-meter

Procedure

Part 1

- 1) Prepare and label a beaker with tap water
- 2) Prepare and label a beaker with pure water
- 3) Place the multi-meter into each solution and record the resultant current in the table provided
 - a. Repeat two more times
 - b. Be sure to rinse the multi-meter electrodes with pure water between each run
 - c. Show your calculations for the average current

Solution	Current Run 1	Current Run 2	Current Run 3	Average Current
Tap water				
Pure water				

- 4) What solution do you want to prepare your NaCl solution in and why? This solution is referred to as your background electrolyte.

Part 2

- 1) Measure out 1 g of table salt (sodium chloride, NaCl) and add to 100 mL of your chosen background electrolyte.
 - a. Record in table provided
- 2) Place the multi-meter into each solution and record the resultant current in the table provided
 - a. Repeat two more times for each solution
 - b. Be sure to rinse the multi-meter electrodes with pure water between each run
- 3) Prepare increasing concentrations of table salt in water by adding 1 g of table salt to your beaker

Mass NaCl (g)	Concentration (M)	Current Run 1 (mA)	Current Run 2 (mA)	Current Run 3 (mA)	Average Current (A)
2					
4					
6					
8					
10					

- 4) In your final calculations subtract the average background electrolyte current from the current obtained from each of your individual tests of your NaCl solution.

Concentration (M)	Corrected Current Run 1 (mA)	Corrected Current Run 2 (mA)	Corrected Current Run 3 (mA)	Average Corrected Current (A)	Standard Deviation (From Excel)

- 5) What is the importance of subtracting the background electrolyte current?
- 6) Plot the concentration versus current in the graph provided
- Be sure to give the graph a descriptive title
 - Be sure to label the x and y axis with a title and units

Part 3

- When finished enter all your data into the excel file provided.
- Use excel to find the standard deviation.
- Use excel to plot the concentration versus the current
- List five or more possible sources of error in your experiment, not including human error.