**Salinization Lab: Environmental Science AP**

**Purpose :** The purpose of this lab experiment is to involve students in a real world investigation in which you design an experiment to explore the influence of various salt solutions on seed growth or germination rate.

**Background:** Farmers in the Central Valley of California, as well as farmers in many other areas around the globe, have become increasingly concerned about the build-up of salt(s) in the soil. Salinization refers to a buildup of salts in soil, eventually to toxic levels for plants. (3,000 - 6,000 ppm results in trouble for most cultivated plants.) Salt in soils decreases the osmotic potential of the soil so that plants can't take up water from it. When soils are salty, the soil has greater concentrations of solute than does the root, so plants can't get water from soil. (Remember osmosis -- water "tries" to accomplish dilution -- it moves from areas with lower concentration of dissolved substances to areas with higher concentration?) The salts can also be directly toxic, but plant troubles usually result primarily from inability to take up water from salty soils.

**Materials :** NaCl, water, 10 petri dishes, graduated cylinders, beakers or flasks, Seeds (green beans), paper towels or filter papers, forceps, stirring rod, hand lens, electronic balance, your mind.

**Procedure:** Design a controlled experiment which will quantitatively display the relationship between salt concentration and seed growth. Your group will decide which NaCl concentrations you will make, how many dishes you will use for each concentration, the volume of solution that you will place in each dish, etc. You need to include a hypothesis, your experimental design or procedure, including control and variables, data collection, analysis and results. Also include whether or not you accept or reject your hypothesis.

* All 10 petri dishes will contain 10 green beans.
* The concentrations are your choice, keeping sound experimental design in mind.
* The volume of NaCl solution placed in the petri dishes is your choice (again, keeping sound experimental design in mind.)

**Monitoring and Recording:** This lab will run for 4 days; observations are to be made daily; taking measurements, making sketches, and recording any other information that your group thinks will be helpful. You will have only the first or last 10 minutes of class to do so.

**Graphing Data:** You will produce one or more graphs illustrating the results of your experiment. .

**Analysis Questions:**

1. What relationship is there between the number of seeds that germinated and the salt concentration?
2. What errors may have occurred in your experiment? How could they be corrected in future experiments?
3. Did your experiment support your hypothesis? Elaborate, more than a yes or no.

4. Are your results applicable to real life? How? Be specific.

\*Please follow standard lab write-up instructions for this lab (should be typed).

\*\* **Lab Area Clean-Up: Thank you in advance for doing a thorough job of cleaning up your lab area - - lab counter, sink area, the floor, and anywhere else you might have been. -------Thank you.**

**A.P.E.S. – A FORMAL LAB REPORT FORMAT**

**Setup:**

• The lab report must be **typed**, in 12 point font, preferably Times New Roman or similar.

• White paper must be used.

• No graphics as decoration

**General language:**

• Avoid the use of “I, me, you, he, she, we, us, they” or any such terms.

• Avoid slang (“compressed” instead of “squished”).

**Title page:**

• Experiment title, lab partners (Please put student author first, use full names), due date

• No graphics as decoration

**Introduction:** summarizes the **purpose** of the experiment, **background information**, relevant formulas, and **key findings/major conclusions**.

**Hypothesis:**  A statement predicting the results of your experiment or study.

* Make sure this possible solution is a complete sentence.
* Make sure the statement is testable, an if-then statement is recommended to illustrate what criteria will support your hypothesis (and what data would not support the hypothesis).

**Materials:** complete list of what YOU used.

**Procedure:**

• Detailed steps in order

• **use passive voice**:

Correct: “The beaker was filled with water.”

Incorrect: “Fill the beaker with water.” or “We filled the beaker with water.”

\*\*If the procedure was changed from the original lab sheet, write what was done by the students, not what was originally written.

**Data:** graphs, tables, etc.

• Graphs must have a title and have each axis clearly labeled.

• Tables and diagrams must be clearly labeled.

• When using colors, display a color key.

• Use a ruler for any lines drawn.

• Anecdotal logs (descriptive data) should have dates for entries.

* If applicable, Calculations:watch and units; clearly label all calculations

**Discussion/Conclusion:** interpretation and analysis

* Accept or reject your hypothesis.
* EXPLAIN why you accepted or rejected your hypothesis using data from the lab.
* Include a summary of the data - averages, highest, lowest...etc to help the reader understand your results. Try not to copy your data here, you should summarize and reference KEY information.
* List one thing you learned and describe how it applies to a real-life situation.
* Discuss possible errors that could have occurred in the collection of the data (experimental errors).
* Short statement of what is known as a result of the lab

**References (If used):** Use proper citation format

**Questions:** Include any pre-lab or follow up questions and answers. Answers should be in complete sentences.