

OCEAN ACIDIFICATION EXPERIMENT GUIDELINES

Objectives

- Conduct laboratory work in compliance with guidelines for personal lab safety and responsible management of chemical waste; this includes appropriate use of personal protective equipment and interpretation of Globally Harmonized System for Hazard Communication (GHS) labels.
- Measure quantities such as mass, volume, temperature, and absorbance with proper technique, and record the results of measurements with the appropriate number of significant figures and units.
- Record observations of chemical processes (such as precipitate formation, gas evolution, etc.) and write chemical reactions consistent with their observations.
- Demonstrate proper techniques for laboratory procedures, such as titration, filtration, solution preparation, spectrophotometric measurements, etc.
- Demonstrate proper use of glassware and equipment, including beakers, Erlenmeyer flasks, volumetric pipets, burets, volumetric flasks, watch glasses, graduated cylinders, filtration apparatus, single-beam spectrophotometer, pH meter, balances.
- Communicate lab procedures, observations, and results in a laboratory notebook, written reports, and verbal presentations effectively.
- Interpret and analyze qualitative observations and quantitative results, incorporating graphs and tables as appropriate.
- Identify errors and explain their effect on experimental data.
- Design an experimental procedure.
- Apply knowledge of scientific theories to problem-solving applications.
- Develop a hypothesis for a scientific experiment.
- Identify the control, independent, and dependent variables for an experiment.
- Predict the next steps for a scientific study using collected data.
- Draw conclusions based on experimental data.
- Calculate pH and hydronium concentration of a solution.
- Create solutions with a specific pH.
- Discuss the results of an experiment in oral and written formats, including predictions, graphs, and calculations.
- Research and complete an analysis of scientific findings on a current topic in chemistry.

Experimental Purpose

The purpose of the lab is to observe the impact of increasing acidity on sea shells over time.

Experiment Outline

Design a lab to test the effect of acidity on sea shells. You will need to have five samples, one of which has a neutral pH, the others with decreasing acidity. You will need to decide on the pH of each solution (need to vary each sample by at least a pH of 0.5), calculate how much acid or base to add to each solution to reach that pH, and design and complete the experimental procedure. You will be provided the experimental supplies provided below.

NOTE: You may not need to use all of these supplies. That is ok. You may find you need additional supplies to complete the experiment. If you need additional supplies beyond this list, please talk with your instructor to obtain these supplies.

You will not be given any additional chemicals beyond the ones included in the list below.

Experimental Supplies

Glassware in your drawer	DI water	Sea Shells
4 100-mL volumetric flasks	pH meter	Plastic Pipets
1M Hydrochloric Acid	pH paper	Label Tape
1M Sodium Hydroxide	Digital Balance	Sharpe Marker

Assignment

Before leaving lab today, you need to:

- Write your hypothesis for this experiment.
- Identify the control, dependent, and independent variables.
- Identify the control sample.
- What qualitative and quantitative data are you collecting in this lab? (Hint, you should have both forms of data.) List the data you will be collecting at the start, during, and at the end of the lab.
- A list of the specific materials you need for the experiment.
- Write your experimental procedure. Please type your experimental procedure. Then, you and your partner can print it and paste it into your lab notebooks.
- Please email all of the above information to your instructor so she can review it, offer you notes, and help you make sure your procedure will address the purpose of the experiment appropriately. CC your lab partner(s) when you send the email. Your instructor will *reply all* with her feedback.

Before Next Week's Lab:

- Copy/paste your experimental procedure in your lab notebook.
- Draw a table in your experimental notebook to collect your data.
- Calculate the amount of acid or base that will need to be added to water to reach the appropriate pH. Include your calculations for making your solutions in your lab manual.

Post lab Data Analysis:

- Graph your lab data for each of your samples. You want to graph your dependent variable vs. time for each sample. Your graph should have a total of 5 lines. Include the R^2 value and equation for each line. Title your graph and label the axes and samples. Paste this in your lab notebook.
- Write up your discussion and conclusion in your lab notebook. Be sure to note if you reject or accept your hypothesis and why.
- Submit your data table and a minimum 200-word typed summary of your observation/findings and if you accept/reject your hypothesis and why to your lab instructor at the start of the following lab period. This table/summary is how you earn your 25 points for this lab.

Ensure you have all of your information for this experiment in your lab notebook. You will include this data in your OA project submission.