

NAME: _____ PERIOD: _____ DATE: _____

LAB PARTNERS: _____ LAB #11

OCEAN ACIDIFICATION

CLAIM:

Bivalve shells are adversely affected by increasing acidification of the ocean water

After completing this lab, you will be able to state **EVIDENCE** and **REASONING** to support this claim.

SEP'S: Throughout this lab, the following SEP's will be touched upon:

1. Asking questions
2. Developing and using models
3. Planning and carrying out an investigation
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Obtaining, evaluating, and communicating information

Phenomena:

1. Watch the following video and explain what the experiment showed
<https://www.exploratorium.edu/video/ocean-acidification-cup-do-experiment> OR THIS CAN BE A DEMONSTRATION BEFORE THE EXPERIMENT (Preferably)



Introduction:

Carbon Dioxide (CO₂) is a colorless, odorless gas that is an important **greenhouse gas** residing in our atmosphere. However, atmospheric levels of CO₂ around the world are increasing dramatically largely due to the burning of fossil fuels and other human-mediated processes. A substantial fraction of the CO₂ released into the atmosphere is absorbed into our oceans, estuaries, rivers, and other lakes and waterways. As CO₂ is absorbed it acts as an **acid**, lowering the pH of the water in a process called **ocean acidification**. The effects of ocean acidification on our ecosystem are vast and threaten a variety of organisms, most notably calcifying creatures such as corals, oysters, snails and other organisms as under increasing acidification pressure it becomes harder for those organisms to build and maintain their structures.

PreLab:

Design an experiment to test how increasing acid (decreasing pH) in water affects the shells of marine organisms. For this lab, you will use vinegar as the acid. **The pH of vinegar is 2.5**

You will set up the lab on day 1 (shells in concentrations of acid). Then, 2-4 days later, you will remove the shells and allow to dry. 2-4 days later, you will weigh your shells.

Materials:

- Digital Scale
- Shells
- Vinegar
- Cups or small beakers
- Tap Water
- graduated cylinders
- pipet

Directions:

1. Write your initial problem (question to test) and hypothesis and have it approved by your teacher. Your hypothesis needs to have the words “increasing” and/or “decreasing” in it.

2. Describe your experiment below (what is in each cup) and have it approved by your teacher. You must use at least 3-4 cups/beakers to test your hypothesis.

3. What are your constants (the things you keep the same for each cup/beaker)?

4. What is your dependent variable? _____

5. What is your independent variable? _____

6. What is your control? _____

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

Label your cups/beakers with the pH, and your group/period.

Rinse out your mixing beaker and graduated cylinders each time you use them to remove any vinegar residue.

Data Collection

Remove shells from cups

Take the pH of your solutions again and record

Empty cups of solution into the sink

Dry your cups and shells (you may need to wait a day for it to dry)

BE CAREFUL NOT TO MIX UP THE SHELLS.

Weigh your shells and calculate percent change.

Collect quantitative data (numbers).

Collect qualitative data (observations).

Record on your data chart

Graph:

On the grid below, use the data you collected to design a graph that represents the relationship between the “mass of shell” vs. the “time”. (this can be a double, triple line graph with each line representing a different pH)

- **Graphs** of your data. Make sure you TITLE (with a sentence), label each axis and include units.
- **Discussion** of data. What happened and why. Include reactions and information about buffering.

Conclusion:

Now that you have completed this lab, go back to the original **CLAIM** that stated:

Claim: **Bivalve shells are adversely affected by increasing acidification of the ocean water**

List **EVIDENCE** to support this claim and describe your **REASONING** as to whether or not this is an accurate claim?

Evidence:

Reasoning:

Sources of error (Be specific and detailed):

QUESTIONS

1. Explain what ocean acidification is and why it is happening
2. How might the exposure to more acidic ocean waters affect the shelves of other marine mollusks?
3. How can we go about reversing ocean acidification?

<https://serc.carleton.edu/eslabs/carbon/7a.html> ←- look through here to add to lab/tweak lab