

Name: _____

Period: _____

Ocean acidification lab

Objective: Explain how ocean acidification affects marine life

Introduction: Since the beginning of the Industrial Revolution, the release of carbon dioxide (CO₂) from humankind's industrial and agricultural activities has increased the amount of CO₂ in the atmosphere. The ocean absorbs about 25% of the CO₂ we release into the atmosphere every year, so as atmospheric CO₂ levels increase, so do the levels in the ocean. Initially, many scientists focused on the benefits of the ocean removing this greenhouse gas from the atmosphere. However, decades of ocean observations now show that there is also a downside — the CO₂ absorbed by the ocean is changing the chemistry of the seawater, a process called **ocean acidification**. Billions of plants and animals live in these increasingly acidic waters. The purpose of this lab is to see if the acidity has an effect on marine animals with shells.



Hypothesis: If we submerge a seashell in an acidic substance, then...

(describe what will happen to the shell)

Pre-lab questions:

1. How do organisms make their shells?
2. What are shells made of?
3. List 5 sources of carbon dioxide that can have an affect ocean on pH.
 - a.
 - b.
 - c.
 - d.
 - e.

Materials:

- 3 seashells, approximately the same size
- 3 beakers or cups
- water
- salt
- vinegar (acid)
- masking tape

Procedure:

1. Gather the 3 seashells and 3 beakers. Place each seashell in its own beaker.
2. Put a piece of tape on each beaker. Label the beakers as (1) water, (2) salt water, and (3) vinegar. Also, write your group name(s) on the label.
3. Carefully fill each of the beakers with water, salt water, or vinegar, according to its label. Fill it just enough to cover the entire shell.

4. Observe and record any observations in your data table. Include a sketch and a sentence or two describing what you see.
5. Repeat step 4 on days 2 and 3.
6. On the third day, clean up all supplies. Pour liquids down the sink. Return the seashells to their designated area, and rinse out and return beakers. Take off any tape left on the beakers.

Procedure extention:

1. Remove a small volume of the vinegar solution and pipet this into a small cup.
2. Add a few drops of bromothymol blue (BTB) to your vinegar solution. **If the solution turns yellow, this indicates the presence of CO₂.**

Did your vinegar solution contain CO₂? _____

How do you know? _____

Data:

Record observations of your shells. Include sketches as well as words to describe what you see.

Day 1	Mass	Observations
Water		
Vinegar		
Salt water		
Day 2	Mass	Observations
Water		
Vinegar		
Salt water		

Loss of mass

Day	Mass (shell in water)	Mass (shell in vinegar)	Mass (shell in salt water)	% Loss
1				
2				

$$\% \text{ loss} = \frac{\text{starting mass} - \text{today's mass}}{\text{starting mass}} \times 100$$

Analysis and Conclusion:

1. When you immersed the shells in vinegar, how did you know that a reaction was happening?
2. What type of gas is being produced by this reaction and what does it do to pH?
3. How did observing the shells in vinegar relate to how animals are affected by a lower pH of ocean water?
4. What are the primary functions of shells for these animals?
5. What was your hypothesis? Restate it.
6. Was your hypothesis correct or incorrect? What actually happened to the seashell in the vinegar?
7. Why did we also put shells in water and salt water?
8. An increase in global temperatures causes the ocean's waters to become more acidic, like vinegar. Why do you think this is a concern for scientists?