

Name _____

Ocean Acidification Lab

Lab Objectives:

- Learn that corals and other marine animals need a certain pH range to thrive
- Learn that increased amounts of CO₂ in the atmosphere from the burning of fossil fuels are changing the pH of the ocean
- Investigate whether increased amounts of CO₂ in the atmosphere are making our oceans more basic or more acidic
- Learn how a change in oceanic pH is impacting coral reefs

Background

The world's oceans play a vital role in keeping the Earth's carbon cycle (See "Carbon Through the Seasons" lesson plan) in balance. As people add more greenhouse gases to the atmosphere by burning fossil fuels, the oceans respond by absorbing more CO₂. When CO₂ is absorbed by seawater, chemical reactions occur that reduce the pH of seawater, causing the water to become more acidic. These chemical reactions are called "ocean acidification."

Over the last few decades, the amount of CO₂ dissolved in the ocean has increased all over the world, and so has ocean acidity. Increasing acidity is a problem because it reduces the availability of chemicals needed to make calcium carbonate, which corals, shellfish, some types of plankton, and other creatures rely on to produce their hard skeletons and shells.

Coral reefs are created in shallow tropical waters by millions of tiny animals called corals. Each coral makes a skeleton for itself, and over time these skeletons build up to create coral reefs. Protecting coral reefs is very important because they provide food and habitat for many kinds of fish and marine animals, serve as natural breakwaters against storms and hurricanes, and provide fishing and recreational opportunities for millions of people.

Pre-lab

Watch the Ocean Acidification video and answer the following questions.

1. How much CO₂ has the ocean absorbed?

2. What nickname do we give oceans because of their ability to absorb CO₂?

3. As oceans warm, what happens to their ability to absorb CO₂?

4. How many people rely on seafood for a major source of protein?

5. How many people would go hungry if they did not have the ocean as a food source?

6. What does the rise in acidity of ocean do to calcifiers or animals that make shells.

7. How does Acidification affect fish?

8. How acidic has the ocean become since the industrial revolution?

9. What could eventually happen to calcifiers if acidification is not controlled?

10. By 2100 the acidity of the ocean will be the same as what time period?

Lab Part 1

Answer the following questions after the class demonstration.

1. Why is cabbage juice used in the lab?

2. What happens when vinegar is added to the cabbage juice? Why?

3. What happens when baking soda is added to cabbage juice? Why?

4. _____

Lab Part 2

Directions: Take turns by blowing into the cabbage juice using the straws. After 6 minutes make observations and answer the following questions.

Hypothesis:

Will the increased carbon dioxide from my breath make the cabbage juice more acidic (pinkish) or more basic (greenish)?

Results:

1. What happened to the cabbage juice in the control jar?

2. What happened to the cabbage juice in the experimental jar?

3. Has the pH of the cabbage juice in the experimental jar changed?

4. What gas was added to the juice? How was it added?

5. Describe how burning fossil fuels affects coral reefs.

6. Why are coral reefs important to the health of the ocean?
