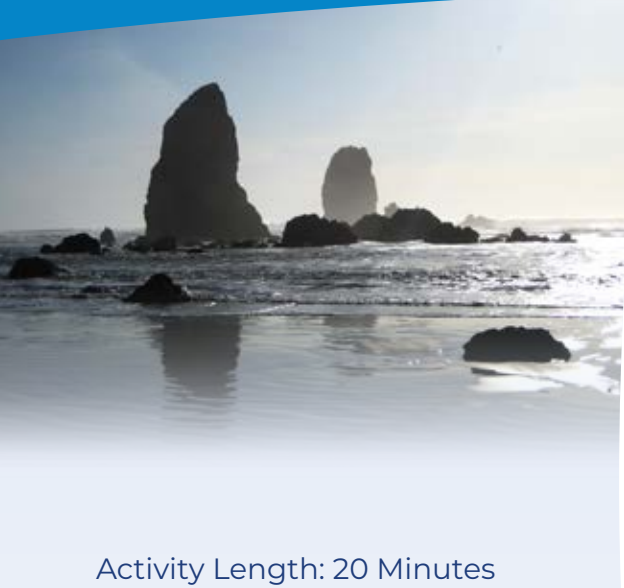


EDUCATION



Activity Length: 20 Minutes
(15 min activity time, 5 min prep time)

Materials

- 2 Labeled Containers (Past, Present)
- Blue food coloring or [Bromothymol Blue](#) Indicator (Optional)
- Soda Water
- Spring Water
- Stir Spoons
- Small Cups

Preparation (prior to activity):

1. Materials needed for one demonstration:
 - 1 plastic container labeled 'present' and one labeled 'past' to represent our present and past ocean conditions
 - 1 gallon of spring water, 1 gallon of lemon flavored soda water
2. Fill small cups or ramekins (1 per student) with lemon soda water and place at their seats or where they can reach for them
3. Set up the present and past plastic containers with the 'present' on to the students' left and 'past' container on their right, next to one another, with the labels facing the group. Placing both spring and soda water set up within arm's reach.

Hey! What's All That Commotion In Our Ocean? An Ocean Acidification Education Toolkit

Module II Our Changing Ocean

This demonstration assists with explaining how ocean acidification has changed our ocean over time. Using containers labeled 'Past' and 'Present' to represent our ocean, and soda water to represent 'uncontrolled carbon dioxide', this module will show how our ocean is absorbing more uncontrolled carbon dioxide from fossil fuels than it has in the past. The 'Past' container will be filled with uncarbonated water and the 'Present' container will be filled with water and soda water combined. Increased carbon dioxide can be seen by observing the bubbles of soda water and/or with the bromothymol blue pH indicator. Students sampling soda water can help explain how carbon dioxide increases the acidity of the water.

Learning Objectives

- *Uncontrolled* carbon dioxide from human activities like burning fossil fuels is causing ocean acidification now
- Identify the current increased acidity of our ocean, as compared to the past
- The future of our ocean depends on the choices we make now

Value: Responsible Management

It's important that we take responsible steps to manage the issues facing our environment. This means thinking carefully about problems and focusing on the best ways to deal with the problems we face. We also need to keep future generations in mind while we look for the best solutions. Open-mindedness and long-term planning are the hallmarks of responsible management. Simply put, we should take a practical, step-by-step approach that relies on common sense and uses all the evidence we have to take care of our surroundings. Managing challenges responsibly is the right thing for us to do.



Figure 1: Module 2 Materials

Instructions

1. As you fill the 'Past' container with drinking water you can discuss the points below

Optional: Add food coloring to mimic ocean water or Bromothymol Blue Indicator to show the pH or acidity levels of the two different containers representing our ocean.

Discussion Points

- 150 years ago our ocean was soaking up less carbon dioxide from our air. This could be called 'regular' carbon dioxide that comes from natural processes like respiration and photosynthesis.

Supporting Questions

- Why was our ocean soaking up less carbon dioxide 150 years ago?
- What is an example of 'regular' carbon dioxide?

2. Pass out a sample of soda water to each student, encourage them to taste it

Discussion Points

- The bubbles in soda are carbon dioxide
- Think of carbon dioxide like a lemon. It is naturally acidic. While the ocean is not acidic, carbon dioxide in our ocean increases its acidity. This is called ocean acidification.

Supporting Questions

- Can you describe the taste of the soda water? Is it bitter?
- Take a poll to see who likes the taste and who does not.

3. As you fill the 'Past' container with soda water.

Optional: Add food coloring to mimic ocean water or Bromothymol Blue Indicator to show the pH or acidity levels of the two different containers

Discussion Points

- Our present day ocean has more carbon dioxide than it has in a very long time
- There is more uncontrolled carbon dioxide being absorbed by our ocean today which is increasing its acidity.
- 150 years ago during the Industrial Revolution innovations were created like electricity and cars that burned fossil fuels
- Increased acidity is changing ocean conditions. Some sea creatures are having a negative response to or challenged by this change. *Optional: Discuss why the bromothymol blue indicator is different colors in the two containers.*

Supporting Questions

- Do you know what makes soda water bubbly?
- Why was there more carbon dioxide (soda water) added to our 'Present' ocean than in our 'Past' ocean?
- What has happened over the past 150 years that is releasing so much carbon dioxide into our air?
- Which ocean has more acidity, our 'Past' or 'Present' ocean? Why?

Solutions

- How can we get more people to make choices that lessen ocean acidification?
- What are some innovations that we have created that reduce the use of fossil fuels and the amount of carbon dioxide in our ocean?
- What steps can we take together to make a difference as a community?

See Pledge or Script for examples