

EDUCATION



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

Materials

- 1 Water filled Balloon
- 1 Balloon filled with Air
- Lighter (long-necked)

Preparation (prior to activity):

Fill one balloon with air and the other with tap water, so that they are close to equal in size and place within reach, along with 1 longneck light in a place where the student can see you clearly.



Figure 1: Module 1 Materials

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

Module 1

Our Ocean: The Giant Sponge

The aim is for students to understand the difference between uncontrolled and regular carbon dioxide through inquiry and examples. This demonstration will use one water balloon to represent our ocean and one balloon (filled with air) to represent our atmosphere. The lighter will be used to represent uncontrolled carbon dioxide being released from the burning of fossil fuels. Holding the lighter under each balloon will show how our ocean works like a 'giant sponge' that absorbs uncontrolled carbon dioxide. Our 'atmosphere' balloon will pop and our 'ocean' balloon will not, because our ocean balloon absorbs the heat faster than the rubber can melt.

Increased uncontrolled carbon dioxide in our atmosphere means increased carbon dioxide absorbed by our ocean drives ocean acidification (OA).

This is like a chain reaction:

- ↑ increased use of fossil fuels
- ↑ increases atmospheric carbon dioxide
- ↻ absorbed by our ocean
- ↑ increased carbon dioxide in our ocean = ocean acidification

Learning Objectives

- Identify differences between uncontrolled and regular carbon dioxide
- Understand that the ocean absorbs carbon dioxide from the atmosphere
- Understand that more uncontrolled carbon dioxide results in increased absorption of carbon dioxide into our ocean
- Increased carbon dioxide from the burning of fossil fuels is the primary cause of ocean acidification
- Importance of a healthy ocean and action-based solutions

Value: Protection

It's important that we protect people and places from harm. We can do this by solving the issues facing our environment. This means stepping in to ensure people's safety and well-being to the best of our ability and safeguarding the places we depend on. We also need to take measures to eliminate or reduce risks, making sure that people are able to go about their lives freely. Concern for the welfare of others and vigilance in preserving our habitats are the hallmarks of a protective approach. Simply put, we have a duty to protect our surroundings. Protection is the right thing for us to do.

Instructions

- 1. Have students take a deep breath in and out, explain our breath as a form of regular carbon dioxide. As you ignite the lighter, describing the flame as an example of the burning of fossil fuel (the butane in the lighter) that releases uncontrolled carbon dioxide.**

Discussion Points

- Define burning of fossil fuels as a human activity
- Explain *Uncontrolled* carbon dioxide vs. *Regular* carbon dioxide
- Explain that our ocean absorbs carbon dioxide like a ‘giant sponge’ from our atmosphere just like the balloon is absorbing the heat from the flame. Here, the heat represents human-caused carbon dioxide. Use chain reaction illustration above as an example.

Supporting Questions

- What is carbon dioxide? Where does it come from?
- Is our breathing ‘regular’ or ‘uncontrolled’ carbon dioxide?
- What do you think can happen if the ocean keeps absorbing more and more carbon dioxide?
- What are some things that use/burn fossil fuels?

- 2. Ignite the lighter and hold it to the bottom of the balloon filled with air. This balloon will pop. Encourage students to cover ears if they are sensitive to sound, use noise-canceling headphones if available.**

Supporting Questions

- What do you think will happen when I hold the lighter, as it burns a fossil fuel, up to the balloon filled with air? Will it pop? Why do you think it will pop?
- Why did it pop?
(A: The burning of the fossil fuel melted the rubber from the balloon)
- Do you think the air inside the balloon was able to absorb the fossil fuel well?
(A: Air doesn’t absorb things as well as water in our ocean)

- 3. Ignite the lighter and hold it up to the bottom balloon filled with water. This balloon will not pop.**

Discussion Points

- Just like the balloon is absorbing the heat from the flame, our ocean is like a giant sponge with a great capacity to absorb carbon dioxide better from the air.

Supporting Questions

- Why didn’t our ocean balloon pop, while the air balloon popped immediately?
- What will happen if there is more carbon dioxide from fossil fuels in our atmosphere? Will our ocean soak up more, the same amount of, or less carbon dioxide?

Definitions

Uncontrolled carbon dioxide:

Carbon dioxide released in large amounts, very quickly from the human activities like burning of fossil fuels

Regular carbon dioxide

Carbon dioxide released from and normal life processes, like breathing and decomposing, It can also refer to natural processes that take up carbon dioxide like photosynthesis

4. Explain the effects of uncontrolled carbon dioxide on our ocean.

Discussion Points

- Importance of a healthy ocean and the resources it provides for us.
- Our ocean is soaking up a lot of uncontrolled carbon dioxide which is causing a change to happen called ocean acidification. Use chain reaction example:
 - ↑ increased use of fossil fuels
 - ↑ increases atmospheric carbon dioxide
 - ↪ absorbed by our ocean
 - ↑ increased carbon dioxide in our ocean = ocean acidification
- Ocean acidification affects our ocean and the living conditions for marine creatures and ecosystems to which we are connected

Supporting Questions

- What are some things that our ocean provides us with?
- What change is happening in our ocean because of uncontrolled carbon dioxide?
- What are some ways we can lessen the amount of uncontrolled carbon dioxide in our ocean?

Introduce Pledge or Script for Examples