

LESSON 1: WHAT IS OCEAN ACIDIFICATION?

All lesson resources can be found at: encounteredu.com/teachers/lessons/frozen-oceans-science-14-16-lesson-1

Summary

An introduction to the issue of ocean acidification, this lesson uses a combination of video, theory and practical demonstrations to develop students' understanding of the 'other carbon problem'.

Learning Objectives

- Recall that the release of CO₂ by burning fossil fuels increases the level of atmospheric CO₂
- Understand the process of ocean acidification and that the oceans act as a 'carbon sink' for atmospheric CO₂
- Investigate the impact of increased levels of atmospheric CO₂ on ocean chemistry

Preparation

- Identify appropriate video starter
- Use Subject Update - Ocean acidification process for background
- Download the Lesson 1 'Ocean acidification process' slideshow
- Print out enough copies of:
 - Subject Update - Ocean acidification process (if using)
 - Student Sheet 1a - Ocean acidification in a cup *or* Student Sheet 1b - Do you like your oceans still or sparkling?
 - Student Sheet 1c - Reflect and connect
- Liaise with the science technicians to prepare for any ocean acidification practicals if necessary

Notes

LESSON PLAN

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Aims / Objectives	Activities	Resources	Outcomes
STARTER: THE HIDDEN PROBLEM	<p>Ask students if they know what the other carbon problem is</p> <p>Show the Acid Test 3 minute video</p> <p>Questions for classroom discussion:</p> <p>How does carbon enter the atmosphere?</p> <p>What happens when carbon dioxide is absorbed into the oceans?</p> <p>How much has ocean acidity increased since the Industrial Revolution?</p> <p>What effect does ocean acidification have on marine organisms?</p> <p>How can the impact of ocean acidification be lessened?</p>	<p>Acid Test 3 minute video: youtu.be/aG3n1fAa7vk</p> <p>Point out that carbon enters the atmosphere through other processes such as respiration</p> <p><i>Alternative:</i></p> <p>Use the full Acid Test video (22 minutes) youtu.be/5cqCvcX7buo</p> <p>Plus a simpler practical demonstration (see below)</p>	Basic understanding of ocean acidification
HOW DOES OCEAN ACIDIFICATION HAPPEN?	Show students relevant slides from slideshow on the process of acidification	<p>Slideshow – Ocean acidification process</p> <p>Subject Update – Ocean acidification process</p>	Understand the process of ocean acidification
WHY ARE THE OCEANS BECOMING MORE ACIDIC?	<p>Demonstration of the effects of increased atmospheric carbon dioxide</p> <p>Use the slideshow to remind students of the pH scale before the experiment</p> <p>Students will look at the difference between the pH of seawater and freshwater as more carbon dioxide is added</p> <p>Science technicians may be able to help with relevant equipment, including pH indicator solution or pH meter</p> <p>Discussion questions can be used as the basis for whole class discussion or for students to answer individually</p>	<p>Student Sheet 1a – Ocean acidification in a cup</p> <p><i>or</i></p> <p>Student Sheet 1b – Do you like your oceans still or sparkling?</p>	Demonstrate how increased carbon dioxide increases acidity in water
PLENARY	Use the 'Reflect and Connect' sheet for students to review their learning and to make connections to prior learning in both science and geography	Student Sheet 1c – Reflect and connect	Understanding that the world is cross-curricular