# Coral Reef Skeletons and Climate Change

Science Film Festival Knowledge Through Entertainment

For protection and support, hard corals build skeletons made of calcium carbonate. To do this, a coral polyp secretes layer upon layer of calcium carbonate underneath its body. As time goes by, the skeleton grows larger and larger, and the polyp lives on its outside edge. As long as a polyp can get the right building material from the water, it can build a strong skeleton.

Hard corals are often called the reef builders because their skeletons provide support for other corals and other organisms. Soft corals do not build calcium carbonate skeletons. Instead they have spines that support them. They are not considered reef-builders. When hundreds or thousands of coral polyps build their skeletons close together, they create a calcium carbonate structure that provides habitat and food for a variety of organisms. This is known as a coral reef.

Understanding the biology of a coral and the form and function of the coral will help students understand how a skeleton is excreted and why corals do this to survive. Reviewing what a coral is (animal that has a special partner called a symbiont) will help students understand the process.

This lesson helps students understand what climate change is and how it is impacting coral reef ecosystems around the world. Students will experiment with sodium bicarbonate and calcium carbonate to simulate how algae in coral polyps react with seawater to assist the coral polyps in forming skeleton as reef rock.

As the ocean becomes warmer and more acidic, the ability for corals to collect the proper "ingredients" of calcium carbonate and sodium bicarbonate becomes harder. This inability to create a skeleton prevents the growth of corals.

Students can also think about the relationship between coral growth and sea level rise. If there are unable to grow taller and larger and the ocean continues to rise, then corals won't be able to survive and will eventually die.

## TIME REQUIRED

**30 minutes for preparation with students, overnight incubation time and 1 hour for finishing steps**

## QUESTIONS

- **What does a coral skeleton look like?**
- **Where does hard coral reef material come from?**
- **How does a coral organism build its skeleton?**
- **Why is it important for corals to have a hard skeleton?**
- **How is global warming affecting coral skeleton formation?**

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## MATERIALS AND EQUIPMENT

- **Pieces of chalk (calcium carbonate)**
  Note: Not all modern chalk is actually made with Calcium Carbonate. You can use eggshells instead, which will provide the needed Calcium carbonate
- **Paper bag**
- **Hammer**
- **Vinegar**
- **16-oz. cups**
- **8-oz. cups**
- **Water**
- **Baking Soda**

## PROCEDURE

1. Pose the question, "Where does hard coral reef material come from". Write down possible answers from students on the board.
2. Have students break a piece of chalk (calcium carbonate) inside a paper bag with a hammer.
3. Dissolve the chalk in 250 ml of vinegar (a weak acetic acid). Label the container. Let the mixture stand overnight.
4. The next day, have the students observe their glass of vinegar and chalk and write down what they see.
5. Label 2 of the clear cups as follows: 1 16-oz. cup, "Dissolved Limestone," and the 8 oz. cup, "dissolved baking soda."
6. Pour off the clear liquid from the chalk mixture into the "Dissolved Limestone" (calcium carbonate) cup.
7. Place 8 oz. of water in the second 16 oz. cup. Add 6 teaspoons of baking soda (sodium bicarbonate) to the water. Stir and let stand
8. Pour off the clear liquid in the baking soda cup into the 8 oz. cup labelled "Dissolved Baking Soda."
9. Pour the baking soda solution from the 8 oz. cup into the "Limestone" cup. Have students carefully observe what happens.

**Explain that this is similar to what happens when seawater comes in contact with the algae in the coral polyps. The polyps secrete the calcium carbonate downward as skeleton. Skeleton is laid down in specific crystal structures by each type of coral.**

**Authors/Source**
http://osu-wams-blogs-uploads.s3.amazonaws.com/blogs.dir/252/files/2015/02/Coral-Skeletons.pdf