

Lab 3 - Building a Reef

Introduction



Image courtesy of [Photos.com](https://www.photos.com) via NASA.

Coral reefs are made of aragonite, a type of calcium carbonate (**limestone**) crystal that is secreted by coral polyps. The corals and zooxanthellae work together to extract materials out of seawater to form the hard exoskeletons that form reef structures.

During this lab, you will learn about the life cycle of corals, including how they grow and reproduce. You will also consider the chemistry of seawater and demonstrate how calcium carbonate **precipitates** to form skeletal reef material.

After completing this investigation, you should be able to:

- explain the process by which corals extract reef-building material from seawater;
- describe how corals grow, reproduce, and form reef structures; and
- build physical models of coral growth, reproduction, and reef formation.

Part A: Building a Skeleton

In Lab 2, you learned that **coral polyps get nutrition from the zooxanthellae algae** that live in their stomach tissue. The coral polyps use the oxygen and sugars produced by zooxanthellae photosynthesis for growth and energy, and release heat, waste, and carbon dioxide—a process called respiration (the same process humans use in breathing).

A coral polyp has a cylinder-shaped body. At one end is a mouth surrounded by tiny tentacles. The other end attaches to the limestone skeletons of dead polyps. Most coral polyps live together in colonies. The stony corals attach themselves to each other with a flat sheet of tissue that connects to the middle of each body. Half of the coral polyp extends above the sheet and half below.

Coral polyps build their limestone skeletons by taking calcium out of the seawater.

Then they deposit calcium carbonate (limestone) around the lower half of the body. As new polyps grow, the limestone formation becomes larger and larger. Coral polyps feed mainly on tiny swimming animals, such as the larvae of many kinds of shellfish. Reef corals cannot live without special, single-celled algae that live in the polyp's own tissue. The polyps use food manufactured and released by the algae. The algae also help the coral animals secrete their limestone skeletons. Coral reefs grow only in water with enough light for photosynthesis to occur in the algae.

In fact, you can use your own exhaled breath to simulate the role of respiration in coral reef growth.

1. Gather the following materials:
 - clear plastic cup partially filled with lime water
 - empty clear plastic cup
 - two drinking straws
 - small (#2) coffee filter
 - water
 - white vinegar
 - eyedropper
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2. Examine the lime water and **describe** its appearance. Lime water is the common name for saturated calcium hydroxide solution, $\text{Ca}(\text{OH})_2$.

3. Describe - look, smell, color?

4. Place one of the drinking straws into the lime water and blow gently into the liquid. DO NOT INHALE OR BLOW TOO HARD. Continue exhaling through the straw until a white precipitate (solid) forms.

5. Place the coffee filter over the empty flask. Carefully pour the lime water into the flask through the filter to separate the precipitate from the liquid.

6. Take the filter paper out of the funnel and put it on a paper towel -allow the white precipitate to dry and solidify. As you are waiting for it to dry - complete #7

7. Now place a drinking straw into a cup of regular water (instead of lime water) and blow gently. Observe what happens. Record your observation.

ANSWER THIS:

Describe how lime water and regular water react differently when carbon dioxide gas is added to each.

NOT ANSWERED???

Calcium carbonate, the substance that makes up coral skeletons, reacts with weak acid (such as vinegar).

#8 - To prove that the substance you filtered out of the lime water is indeed calcium carbonate, use the eyedropper to add a small amount of white vinegar to the precipitate on the filter paper.

If it is CaCO_3 , there should be a fizzing reaction from the release of carbon dioxide.

Did it fizz? Why?

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Stop and Think

1: Based on what you observed in the lab, explain where do you think the raw materials for coral skeletons come from?

What role the biological processes of coral polyps and zooxanthellae play in the formation of coral reefs? Read back over the introduction to today's activity.

READ THIS ARTICLE AND WRITE 5 FACTS:

[How Do Stony Corals Grow?](#)

FACTS

- 1.
- 2.
- 3.
- 4.
- 5.

Answer these summary questions.

- Describe the process by which coral polyps grow upward.

- Besides contributing to the growth of the polyp, what other purpose does the coral skeleton serve?