

The background of the entire page is a close-up photograph of chocolate-making ingredients. In the foreground, there is a mound of fine, light brown cocoa powder. Behind it, several dark brown chocolate bars are visible, some broken into pieces. In the background, there are several whole cacao beans with their characteristic papery husks. The lighting is warm and focused on the textures of the ingredients.

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How is Chocolate Made?

Key Concepts

We use and enjoy many products that come from rainforests.

When humans are mindful of—and work to reduce—our impact on key ecosystems like rainforests, we preserve our own access to the valuable resources they contain (like chocolate).

Ingredient Substitutions

- To avoid gluten, you may simply use gluten-free flour mix.
- To avoid eggs, substitute 2 tablespoons cooking oil and one tablespoon water.
- If you regularly bake with sugar substitutes, your usual substitutions should work fine here, too.

Materials

- 3 tablespoons chocolate chips
- a small amount of baking chocolate or dark chocolate for tasting
- 1 microwave-safe coffee mug
- 1/4 cup all-purpose flour
- 1/4 cup white sugar
- 2 tablespoons unsweetened cocoa powder
- 1 egg
- small bowl
- fork & knife
- 3 tablespoons milk
- 3 tablespoons cooking oil
- 1/4 teaspoon vanilla extract

Introduction

Rainforests provide a wealth of resources. Every day we use many products made from ingredients that grow in rainforests. How many rainforest products do we use at home? (Read through the list on the side of the page.)

One favorite rainforest product is **cacao** (ka KOW), which is used to make cocoa and chocolate!

Cacao trees grow cacao beans in pods. Workers **ferment** the pods—which means to use a bacteria or yeast to help break them down—and then dry, clean, and roast them.

1. Pods grow on cacao trees 2. Beans are harvested



3. Beans are Fermented



4. Beans are dried



Rainforest Products:

- avocado
- coconuts
- cashews
- Brazil nuts
- vanilla and sugar
- coffee and tea
- medicines to help treat cancers
- rubber
- citrus fruits like lemons and grapefruit
- bananas, guavas, pineapples, mangoes, tomatoes
- spices like cayenne, cinnamon, cloves, ginger, tumeric

After roasting, workers remove the shell to expose the cacao nibs. These nibs are then ground into cocoa mass (that looks like a solid chocolate bar—but doesn't taste like it!), which workers then heat. When the mass melts, it becomes chocolate liquor—an unsweetened chocolate paste, which is used to make cocoa solids and cocoa butter.

Baking chocolate contains both cocoa solids and cocoa butter in various proportions, but does not contain any added sugar, so it tastes bitter. We add sugar to chocolate so it tastes sweet. In this experiment we're going to use unsweetened cocoa powder to make a chocolate mug cake.

5. Beans are Roasted



6. The shells are removed



7. Sugar is added



8. The chocolate is poured into molds

Make a Prediction

If baking cocoa doesn't contain sugar, do you think you will like how it tastes?

Investigate

Sample Some Chocolate

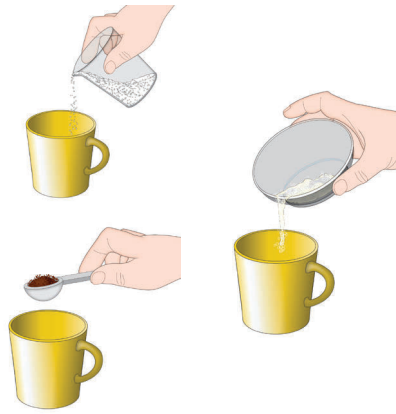
1. Taste a little pinch of the baking cocoa, and then try a chocolate chip. Which do you prefer?



Mix the Cake

1. In the coffee mug, mix the dry ingredients:

- 1/4 cup all-purpose flour
- 1/4 cup white sugar
- 2 tablespoons unsweetened cocoa powder



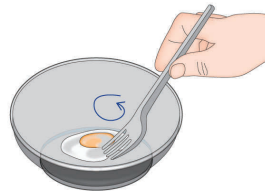
Tip: As you measure, compare the amount of cocoa you add to the amount of sugar.

2. Next, crack the egg over the bowl. (Remove any shell pieces.) Blend the egg.



3. Add the egg and other wet ingredients to the mug. Blend until smooth.

- 3 tablespoons milk
- 3 tablespoons cooking oil
- 1/4 teaspoon vanilla extract

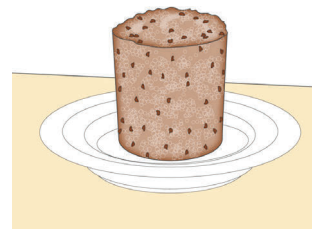


4. **Optional:** mix in the chocolate chips.

- 3 tablespoons chocolate chips



5. Cook in the microwave on high for 1 min 30 seconds to 1 min 45 seconds, until the cake is done in the middle. Allow to cool a little. Use a butter knife to free the cake from the mug.



Talk About It

Raw chocolate when it is first made is not sweet. We say it tastes **bitter**.



How does our chocolate mug cake taste? Bitter or sweet?
(sweet)



What ingredient helped our chocolate cake taste sweet?
(sugar—which we also get from rainforests)

In our recipe, we added 1/4 cup of white sugar to 2 tablespoons of cocoa powder. Let's look at the tools we used to measure those amounts again. You see, it takes quite a bit more sugar to make the cocoa taste like the chocolate we're used to.



If raw chocolate isn't sweet, do you think you would like chewing on cocoa pods straight off of the tree in a rainforest? Why? (Not likely, they don't taste like what we're used to until they've been processed.)

Draw Conclusions

In this experiment we made a chocolate cake. Chocolate is made from a plant called **cacao** that grows in the rainforest.

In recent years, many rainforests have been cleared away to make room for farming and growing other products.



Do you think it costs us anything if we have fewer rainforests? If so, what? (Fewer rainforests means there is less room to grow many of the products we use and enjoy. There may also be other helpful medicines growing there we have yet to discover.)

Rainforest trees help to clean the air we breathe and the life that grows there provides many valuable resources for us. A **steward** is someone who manages and takes care of someone else's property. If we consider that each person only lives on Earth a short time and that our children and their children will want to live here after we're gone, we could say we should be stewards of the Earth's resources.



What would it look like for us to be good stewards of the rainforests? (Use only the things we need; make sure the rainforests can keep growing even as we use things it produces.)

Takeaway

Rainforests are an important resource and an important ecosystem for many reasons. Many products we use and enjoy come from rainforests. When humans work to preserve important environments like rainforests, we ensure we will be able to continue to enjoy the resources they provide—like chocolate!

Go Further



Try tasting other types of chocolate: white chocolate, milk or dark chocolate, or chocolate with flavors, like orange, cherry or raspberry. Which is your favorite?



Rainforest product scavenger hunt: What products from the rainforest do you have in your home? Use the list we provide on the first page of this activity to see how many you can identify.

