

PEARLY WHITES

Background Information for Activity Leaders

Overview

Children will learn to identify minerals in products they use at home and at school, and become aware of the importance of minerals.

Key Concepts

- **Minerals** can be found in nature, in rivers, soil, rocks, lakes and oceans. About 4,000 different types of minerals have been identified; each type of mineral is unique, forming a definite crystalline shape. A mineral's molecules are arranged in regular patterns.
- Minerals may have the same chemical formula, but have the molecules arranged in a different pattern. For example, diamond and graphite are both composed of pure carbon, but their molecules are arranged differently. As a result, graphite is very soft, while diamonds are very hard.
- Minerals are used to make many of the things we use every day. They are used to make everything from car tires to electrical wires to toothpaste.
- **Sodium bicarbonate** is a mineral called Nahcolite. It is more commonly known as baking soda. We use it for cooking and as an antacid.
- **Calcium carbonate** is a mineral called Calcite. Calcite is the most common mineral on Earth; it makes up 4% of the Earth's crust. It occurs naturally as chalk, limestone and marble. It is used in a wide variety of manufactured products, including commercial chalk and medicines. Calcium carbonate is also the active ingredient in antacids like Tums®, Maalox® Antacid Caplets and Mylanta® lozenges.
- Toothpaste uses minerals in several ways. One formula for toothpaste uses sodium bicarbonate and calcium carbonate. Sodium bicarbonate (baking soda) helps to gently remove stains, whiten teeth, and freshen breath. Calcium carbonate is often used as an abrasive in toothpaste. Abrasives remove stains and plaque, as well as polish teeth. Toothpaste should be abrasive enough to remove plaque and stains, yet not damage tooth enamel.

What to Expect

- Younger children need help measuring the ingredients in the toothpaste formula.
- Children tend to use too much food coloring and flavorings. Remind them that they are concentrated, and a little goes a long way.
- Children may have been told never to taste anything in the science lab because it may make them sick. Point out to the children that nothing made in the science lab should ever be tasted. This activity requires analyzing the taste of the toothpaste, so it is an exception.

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Common Misconceptions

- *Children may think: "Rocks and minerals are the same thing."*

Rocks and minerals are not the same thing. All minerals are rocks, but not all rocks are minerals. A mineral will generally have the same appearance both on the interior and exterior of the sample. The properties of color and texture generally do not vary sharply. Rocks are made up of a variety of different minerals, and this results in sharp variations in the colors and textures in rocks.

PEARLY WHITES

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Data Collection Sheet

Name: _____

Date: _____

WONDER What do you think toothpaste is made of?

RECORD Notice how the physical appearance of the minerals changes when you add water. Describe what you observe:

Try your toothpaste by dipping a swab into the paste and rubbing it on your teeth. How does it taste?

EXPAND I improved my toothpaste by adding:

CONCLUDE What did you discover about your toothpaste? Does it clean your teeth? How does it compare to the toothpaste you use at home?

Set Up the Expedition

Materials:

For the activity leader:

- (3) pictures of common household products of your choice
- 1/4 cup sodium bicarbonate (baking soda)
- (1) 12 oz bottle of powdered calcium carbonate
- 1/2 cup salt
- 1/4 cup glycerin
- 1/4 cup hydrogen peroxide
- assorted food flavorings and colorings of your choice
- additional eye dropper for use with each separate ingredient

For each group:

- *Pearly Whites* Learning Cards
- (1) tablespoon

For each child:

- (1) *Pearly Whites* Data Collection Sheet
- (1) clean eyedropper
- (2) cotton swabs
- (1) small plastic cup
- (1) popsicle stick for stirring
- (1) teaspoon water

Prepare the demonstration:

1. Display the pictures of common household products made from minerals where all the children can see.

Prepare the exploration:

1. Prepare the toothpaste ingredients:
 - Salt can be used to remove plaque.
 - Calcium carbonate is an abrasive mineral used in many toothpastes.
 - Liquid glycerin is often available in drugstores. It is used to make the paste creamy.
 - A drop of hydrogen peroxide can be used to add whitening power.
2. Label the ingredients and a dropper with the name of each ingredient the children will use.

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Activity Leader's Guide

Group Size: 4-6 children

Time: 45 minutes

Engage

- 1 Gather the children together.

Say:

“Minerals are used to make many useful products. Many things found around your home are made from minerals.”

Display various products made from minerals, or use pictures you have gathered from books, magazines, or other sources. Help the children understand that many products they use every day are made from minerals.

- 2 **Ask:**

“Today you’ll get to combine some minerals to make something to clean your teeth. What do you think you’re going to make?” Allow children to make suggestions.

Say:

“Toothpaste is a product that is made from the minerals calcium carbonate and sodium bicarbonate. These minerals are abrasive, like sandpaper, and help remove plaque (the film on your teeth that can cause cavities) and leftover food particles from your teeth.”

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Activity Leader's Guide

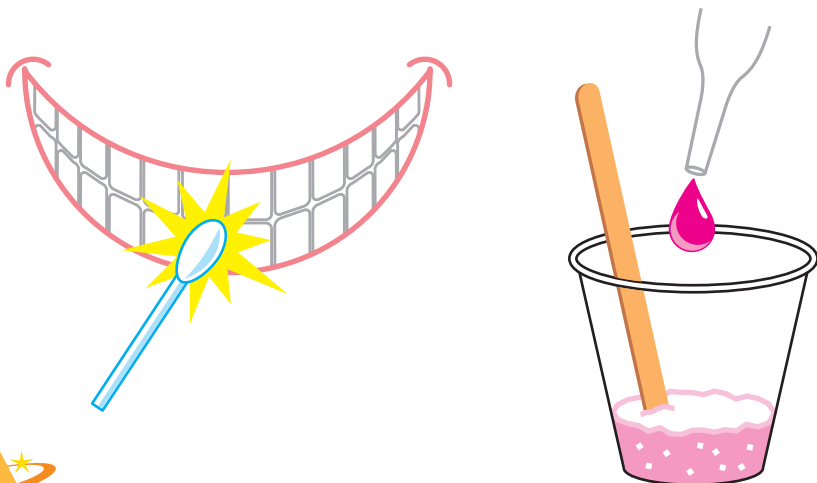
Explore

- 3** If working with more than 4-6 children, divide the children into groups. Distribute the Data Collection Sheet and the Learning Cards.

Say:

"Today you will make your own toothpaste. Follow the instructions on your Learning Card to make basic toothpaste. Once you have made the basic toothpaste, you will have an opportunity to investigate ways to improve it."

- 4** Allow children enough time to complete the WONDER, EXPLORE, RECORD, EXPAND, and CONCLUDE sections of their Learning Card.



Conclude

- 5** Gather the children together and ask the following questions:

"What did you change in the basic toothpaste recipe?"

"What did you notice about your 'new and improved' toothpaste?"

"What did you notice about the toothpaste you made?"

"Does it look or taste like the toothpaste you use everyday?"

- 6** **Say:**
"Congratulations! You have earned your 'Ask Me About Rocks and Minerals' stamp. You are ready to tell people about rocks and minerals."

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Expedition Learning Card



How can minerals be used to make useful products?



mineral
sodium bicarbonate
calcium carbonate



Explore how minerals are important ingredients for things we use everyday.

1

WONDER You use toothpaste every day. What do you think it is made of?

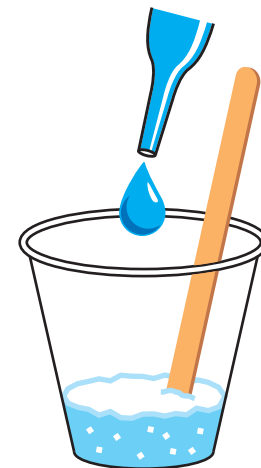
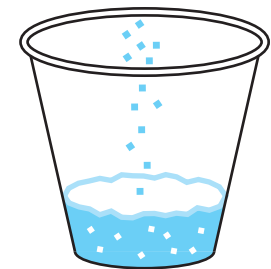


Record your ideas on your Data Collection Sheet.

2

EXPLORE Make your own toothpaste. Make sure to read the labels carefully!

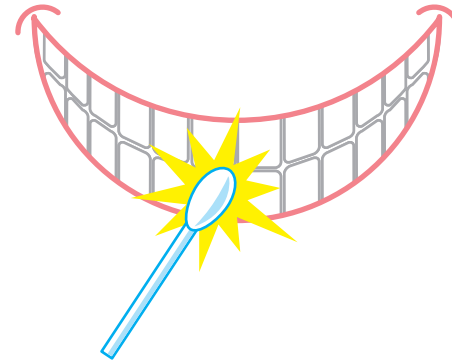
1. Place 2 tablespoons of calcium carbonate into a plastic cup.
2. Mix in 1 teaspoon of sodium bicarbonate.
3. Use an eye dropper to add water, one drop at a time. Use the craft stick to mix after every drop, until the mixture forms a paste.




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Expedition Learning Card

- 3 RECORD** Notice how the physical appearance of the minerals changes when you add water. Try your toothpaste by dipping a swab into the paste and applying it to your teeth. Don't worry - it's just toothpaste!

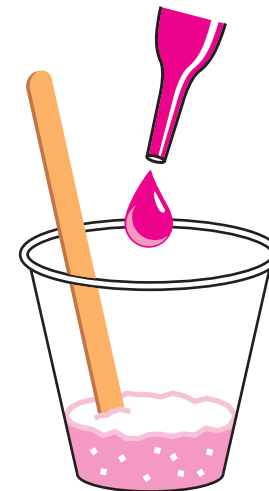


-  Draw or write on your Data Collection Sheet what you observe.

- 4 EXPAND** Use the additional ingredients you have been given to make improvements to the basic toothpaste recipe. Add food coloring and flavors to make it look and taste good. Remember to add very small amounts at a time! One or two drops should be enough.

-  Record what you discovered on your Data Collection Sheet.

- 5 CONCLUDE** What did you discover about your toothpaste? Does it clean your teeth? How does it compare to the toothpaste you use at home?



Discovery

Why did we do that?

- Minerals can be used to make things that are useful to people.
- Materials can change their appearance.

Congratulations!

You have earned your "Ask Me About Rocks and Minerals" stamp! Now you are ready to tell people about rocks and minerals!

