

Elephant Toothpaste

Target Grade: Grades K-8

Time Required: 15 minutes

Standards/Topics Covered:

NGSS Standards

- 5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.
- MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

Central Focus:

In this activity, students will observe a chemical change by combining a yeast mixture with hydrogen peroxide and dish soap. The resulting foam (“elephant’s toothpaste”) demonstrates a chemical reaction that can “explode” in student engagement!

Keywords: chemicals, demonstration, react, changes, mix, interpret, properties, property, substance, explosion, engaging

Background Information:

A chemical reaction is a process in which substances undergo a chemical change to form a different substance. In this reaction, the hydrogen peroxide is catalyzed by the yeast to release the oxygen molecules. The foam is oxygen-filled bubbles that result from the hydrogen peroxide being broken down into water (H_2O) and oxygen (O_2).

This reaction uses yeast as a catalyst. A catalyst is a substance that increases the rate of a chemical reaction. In this case, the yeast helps to separate the oxygen from the hydrogen peroxide.

In this reaction, the bottle will feel warm to the touch because it is an exothermic reaction. This means that the chemical reaction releases heat as it occurs. The opposite also demonstrates a chemical reaction. An endothermic reaction would feel cool to the touch.

Materials

- Large bowl
- Clear bottle
- 1 packet of dry yeast
- 4 tbsp. warm water



- 4 oz. 20-volume hydrogen peroxide
- Dish-washing liquid
- Food coloring

Instructions

1. Fill a large clear bottle with 4 ounces of 20-Volume Hydrogen Peroxide. Then, place the bottle inside a large clear bowl.
2. Add a squirt of dish-washing liquid to the bottle containing the hydrogen peroxide.
3. Add a few drops of food coloring to the bottle.
4. In a separate container, mix a packet of yeast with 3-4 tablespoons of warm water. Mix thoroughly for a few minutes; the yeast needs time to dissolve and to also to become activated.
5. Pour the yeast/water mixture into the bottle and watch the foam as it rises over the top of the bottle and out into the bowl!

Closure

1. How is the final substance different from its starting ingredients? What are some signs that show it is different?

The starting ingredients (hydrogen peroxide, yeast, water, and dish soap) are separate ingredients that can be identified. The final substance is unable to be separated into distinct parts. The physical appearance, texture, and color are all signs that the final substance is different from its starting ingredients.

2. Has a chemical or physical change taken place here? How do you know?

A chemical change has taken place. One way that we know that is because bubbles are formed. These bubbles indicate that the hydrogen peroxide has been broken apart into water and oxygen. Another reason we know that a chemical change has occurred is because there is a change in temperature. Endothermic and exothermic reactions are indicators of a chemical change.

3. How does this reaction occur?

This reaction occurs when the yeast acts as a catalyst to separate the oxygen from the hydrogen peroxide. The foam is a result of oxygen-filled bubbles from the hydrogen peroxide being broke into water (H_2O) and oxygen (O_2).

4. Is the reaction endothermic or exothermic? How do you know?

The reaction is exothermic. We know this because the bottle will feel warm to the touch when the chemical reaction occurs.