

Elephant Toothpaste

OVERVIEW

Students will mix household products to make an 'elephant-size' chemical reaction!

In this activity, students mix hydrogen peroxide, liquid dish soap, and active yeast to create new products through a chemical reaction. Students explore how catalysts work in a decomposition reaction, how reactants change to products in a chemical reaction, and how thermal energy changes in this fun, colorful experiment.

Inquiry Questions: How do we know a chemical reaction or change has occurred? What is a catalyst and how does change chemical reactions?

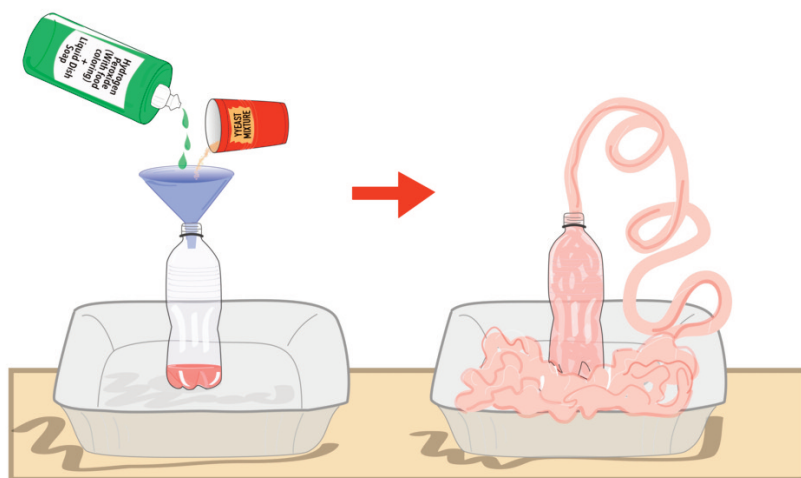
MATERIALS

- ✓ Empty, 16-oz. plastic soda pop bottle
- ✓ Foil cake pan with 2-inch sides
- ✓ 3% or 6% Hydrogen peroxide
- ✓ Dawn® Ultra dishwashing liquid
- ✓ Active yeast
- ✓ Funnel
- ✓ Warm water
- ✓ Cup or bowl
- ✓ ½ cup liquid measurer
- ✓ Spoon
- ✓ Food coloring

EXPLORE

Procedure:

1. Place empty soda pop bottle in the center of the cake pan with the funnel in the opening of the bottle.
2. Pour ½ cup of hydrogen peroxide through the funnel and into the bottle.
3. Add about one tablespoon of Dawn® Ultra dishwashing liquid to the bottle along with a few drops of food coloring.
4. In the cup or bowl, mix one packet of yeast with warm water (be sure to follow the activation instructions on the yeast label).
5. Pour the yeast mixture into the bottle, quickly remove the funnel, and step back!

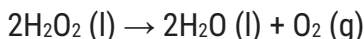


EXPLANATION

What's Happening in this Activity?

During a chemical reaction the reactants change into new substances known as the products, and bonds between atoms are broken or formed. This is true of all chemical reactions, but not all reactions occur the same way. Some types of chemical reactions are synthesis reactions, decomposition reactions, and displacement reactions.

During a **decomposition reaction**, a larger molecule breaks down into two or more smaller molecules. In this experiment, we see the decomposition of hydrogen peroxide, H_2O_2 . This reaction produces water, H_2O , and oxygen gas, O_2 .



Because breaking chemical bonds requires energy, the decomposition of hydrogen peroxide happens very slowly under normal conditions. One way to make hydrogen peroxide decompose faster is to add a catalyst. A **catalyst** is a substance that changes the rate of a reaction but doesn't get used up during the reaction. In this case, we use yeast as a catalyst to make the hydrogen peroxide break down faster. This produces a lot of oxygen gas very quickly, which we can see in a big explosion of foam!

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CHEMISTRY IN ACTION 🌐

Real-World Applications

- Humans need catalysts! Your body burns fuel (in the form of food), just like a car's engine burns fuel. The reactions in our bodies that digest food and turn it into fuel require energy. There are special catalysts in the body called enzymes that help these reactions to start. The slowest known biological reaction would take 1 trillion years without an enzyme. With enzymes, the same reaction can occur in just 10 milliseconds.
- Hydrogen peroxide has many uses, including acting as a bleaching agent, disinfectant, and, in high concentrations, as a propellant for rockets!
- Chemical reactions occur all around us! From packaging the food we eat to the production of cleaning products like soap, chemical reactions allow scientists to create products from different compounds with new properties. For example, scientists can create soap through a chemical reaction that combines a water-soluble compound and a water-insoluble compound, allowing one side of the new molecule to attract fats and oils, while the other side attracts water. The unique properties of the new molecule allow water to mix with fats and oils and wash water-insoluble compounds away.



What Does a Career in Chemistry Look Like?

Check out the profiles below to learn more about how scientists use their knowledge of chemistry to make a difference in our lives!

Why did you pursue a career in chemistry?

I pursued a career in chemistry to get answers to my questions about the world and to understand more about chemical reactions. I pursued a doctorate degree in organic chemistry where I learned how the combination of molecules in a chemical reaction can create new molecules that can absorb energy from the sun and can be used to help solar cells be more efficient. Now as a scientist at P&G I use my chemistry knowledge to solve problems to make our products better and change the life of our consumers.



LEO OQUENDO Procter & Gamble

What does a typical day as a scientist look like for you?

On a typical day, I work with a team of scientists and engineers to solve problems that enable the development of exciting new paper products. To solve these problems, I design and test experiments in the laboratory based on hypotheses developed by the team.



ATIYA JORDAN-BROWN Procter & Gamble

Paper towel and tissue products are used every day for drying hands, cleaning up messes, and wiping noses and faces. In Analytical Chemistry, I use instruments like microscopes to develop innovative ways to measure these products and make sure they work every time.