



EXPERIMENTS @ HOME

Making Elephant Toothpaste

 <https://youtu.be/AXQWY1-YIqQ>



With just a few ingredients you can make something that looks like foamy toothpaste being squeezed from a tube—large enough for an elephant!

KEY CONCEPTS

Chemistry, Biology, Reaction, Catalyst, Surface Tension

MATERIALS

- Empty plastic bottle
- Dry yeast (found in the baking section of the grocery store)
- Warm water
- Liquid dish soap
- 3% hydrogen peroxide
- Measuring cups
- Measuring spoons
- Safety glasses
- Large tub or tray to catch the foam
- Location for the activity that can tolerate spills (of hydrogen peroxide, as well as possibly food coloring), such as a kitchen or bathroom
- Liquid food coloring (optional)
- Different-shaped bottles or glasses (optional)



DID YOU KNOW?

You might be familiar with hydrogen peroxide as an antiseptic used to clean cuts and scrapes, which it does by killing bacteria. But what is it? It is a liquid made from hydrogen and oxygen atoms (its chemical formula is H_2O_2). When it breaks down, it turns into oxygen (O_2) and water (H_2O). Normally, this breakdown happens very slowly, but you can make the reaction happen much more quickly by adding a **catalyst**, like yeast. A **catalyst** is a substance that increases the speed by which a chemical reaction can occur without itself undergoing any permanent chemical change.

That means when you mix yeast with hydrogen peroxide, the hydrogen peroxide will rapidly break down into water and oxygen gas. The oxygen gas forms bubbles that would pop quickly on their own but adding some dish soap provides additional surface tension and poof! You have elephant toothpaste.

INSTRUCTIONS

1. Measure 1/2 cup of hydrogen peroxide and carefully pour it into the bottle.
2. Add a big squirt of dish soap into the bottle and swirl gently to mix.
3. If you want to make your foam a single color, add a few drops of food coloring directly into the hydrogen peroxide and swirl the bottle gently to mix. If you want to give your foam stripes like some toothpastes, put the drops along the inside rim of the bottle's mouth. Let them drip down the inside of the bottle but do not mix.
4. In a measuring cup, mix together 1 tablespoon of yeast and 3 tablespoons of warm water. Stir for about 30 seconds.
5. Pour the yeast mixture into the bottle, then quickly step back and watch your reaction go! What happens? How long does the reaction last?

Extra: Try the activity without the dish soap. What happens? How was the result different?

Extra: Try the activity with different-shaped containers. What happens if you use a bottle with a narrower or wider neck—or a cylindrical drinking glass with no neck?

RESULTS

Document your observations and findings:

Click or tap here to enter text.

Use another sheet of paper if you need additional space to document your observations and findings.

RELATED RESEARCH

Catalysis – <https://bit.ly/3oxjeNY>

Chemical & Molecular Science – <https://bit.ly/3mvHYEn>

Chemical Engineering – <https://bit.ly/2HBmK9A>

CONTACTS



Karen Kniep Blanton

Senior STEM Education Consultant

Office of STEM Education

karen.kniep@pnnl.gov

U.S. DEPARTMENT OF
ENERGY

BATTELLE

This effort aligns with ensuring DOE and the nation have a sustained pipeline of highly skilled and diverse science, technology, engineering, and mathematics (STEM) workers.

DISCLAIMER: By following this experiment template, the parent(s)/guardian(s) and teacher(s) understand and acknowledge that they assume full responsibility and liability for any loss, damage or personal injury related to performing this experiment. Parent(s)/guardian(s) and teacher(s) are always cautioned to use proper care and provide appropriate supervision.



SAFETY TIPS

Put on your safety glasses to do this activity, because hydrogen peroxide can irritate your eyes. (Note: although the product of this activity resembles toothpaste, it is not toothpaste, so do not attempt to use it!)

Do not use hydrogen peroxide that is higher than a 3% concentration as it can be dangerous and must be handled carefully.


Pacific Northwest
NATIONAL LABORATORY

<https://www.pnnl.gov/stem-education>

January 2021