

How to Create Elephant Toothpaste – Demonstration Worksheet

Utah SEEd Standard 5.2.3 – Properties & Changes of Matter: Plan and Carry Out Investigations

Learning Objectives

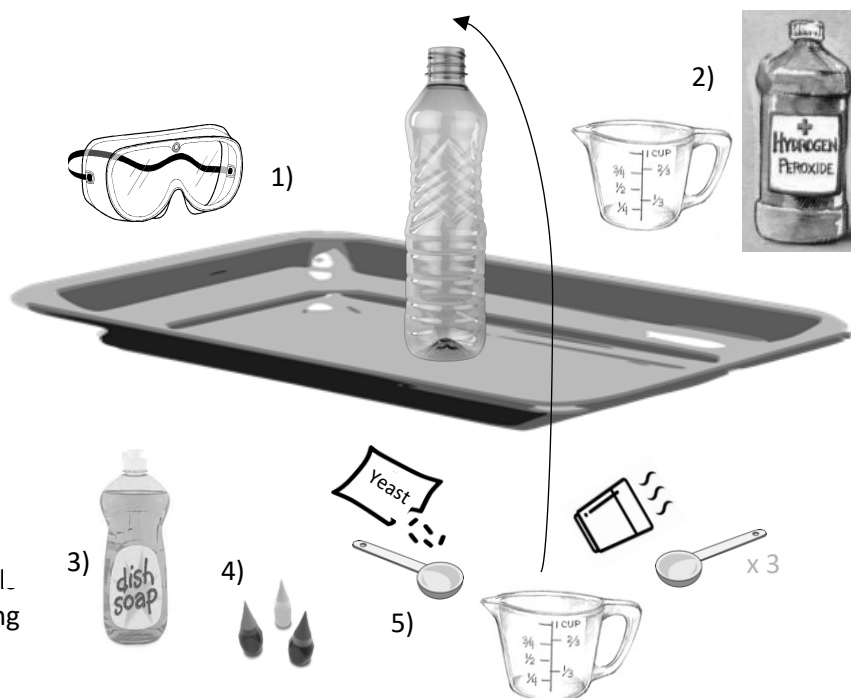
The “Elephant Toothpaste” experiment is a vehicle to teach the SEEd 5.2.3 standards to fifth graders. This is a fun experiment where you mix hydrogen peroxide and yeast, an enzyme catalyst, to speed up the natural breakdown of hydrogen peroxide into liquid water and oxygen gas. It shows that chemical reactions can give off heat, meaning they are exothermic. And finally, it introduces the concept of surface tension, provided by the soap, which causes the reaction to foam – and to produce toothpaste for an elephant!

This demonstration will help your students understand the following concepts:

- Catalysts are enablers and/or accelerators of chemical reactions
- Enzymes are biological catalysts with various purposes
- Hydrogen peroxide, a liquid made of hydrogen and oxygen, can become liquid water and oxygen gas
- Exothermic reactions produce energy in the form of heat
- Surface tension of soap traps much of the oxygen gas and creates foam – which makes it fun
- Safety is important when handling household substances

Materials Needed

- Safety glasses
- Plastic bottle (16 oz)
- 1 Tbsp Dry yeast (found in baking section of grocery store)
- 3 Tbsp Warm water
- Liquid dish soap
- ½ cup 3% (or 12%) hydrogen peroxide
- 1 cup measure
- 1 Tbsp measure
- Large tub or tray to catch the foam
- Location for activity that can tolerate spill of hydrogen peroxide and/or food coloring
- Liquid food coloring (optional)



All of the supplies can be obtained at Wal-mart for \$10 or less. The experiment is much better when using 12% hydrogen peroxide, which can be obtained at most hair salons, as 40 volume developer.

SAFETY & DISPOSAL: DO NOT INGEST ANY OF THE MATERIALS OR PRODUCTS IN THIS EXPERIMENT. All substances used can be disposed of down the sink but may be harmful upon ingestion. Soap and hydrogen peroxide are eye irritants. Hydrogen peroxide may cause skin irritation in large amounts. If irritation occurs, rinse thoroughly with water. If ingestion of hydrogen peroxide occurs, contact poison control.

Steps

1. Wash your hands. Put on safety glasses and set up tray underneath bottle.
2. Measure $\frac{1}{2}$ cup of hydrogen peroxide and pour into plastic bottle.
3. Add a good squeeze of dish soap to plastic bottle, swirl to mix.
4. If you want foam a single color, add a drop or two of food coloring directly to hydrogen peroxide soap mix and stir gently. If you want striped foam like some toothpastes, add the drops to the inside rim of the bottle's mouth and let drip down the sides; do not mix.
5. In a measuring cup, mix 1 tablespoon of yeast and 2 tablespoons of warm water. Stir for about 30 seconds until the yeast is dissolved.
6. Feel the temperature of the bottle before and after this step and record your findings. Pour the yeast mixture into the plastic bottle, and watch the reaction go.

References

Make Elephant Toothpaste – A bubbly science project from Science Buddies. Scientific American.
<https://www.scientificamerican.com/article/make-elephant-toothpaste/>

Hydrogen Peroxide 20% Standard. MSDS https://www.peroxychem.com/media/134403/hydrogen-peroxide_20_standard.pdf.

Exploring Enzymes – A catalyzing science project. Scientific American.
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