

Carolina Quick Tips®

Elephant Toothpaste

Demonstrate the use of a catalyst in the decomposition of hydrogen peroxide. The activity supports 3-dimensional learning and builds toward the following:

- NGSS Scientific and Engineering Practice: Constructing Explanations
- NGSS Core Idea: Physical Science 1: Matter and Its Interactions

Materials Required

Dishwashing Liquid
Hydrogen Peroxide, 30%
Potassium Iodide
Food Coloring (optional)
Graduated Cylinder, 100 mL
Spatula
Safety Goggles
Gloves
Large Garbage Bag or Large Tray
Plastic Bottle or Large Graduated Cylinder (250 to 500 mL)

Activity Procedure

1. Put on gloves and safety goggles.
2. Crush any lumps of potassium iodide (KI) into fine crystals with a spatula, then weigh 1.5 g of it onto a weighing boat or filter paper.
3. Lay a large garbage bag flat on a desk, table, or lab bench to protect the demo area. A large tray can also be used for this purpose.
4. Place the plastic bottle or large graduated cylinder in the middle of the demo area.
5. Measure 15 mL of 30% hydrogen peroxide into the bottle or cylinder.
6. Add 25 drops of dishwashing liquid to the hydrogen peroxide.
7. Swirl the bottle or cylinder to mix the liquid soap and peroxide.
8. Optional: Hold the bottle or cylinder at a 45° angle and add a few drops of red food coloring so that the coloring runs down the inside. Repeat with blue food coloring on the opposite side.
9. Quickly add the KI crystals to the bottle or cylinder and observe the oxygen gas as it forms bubbles in the soap, creating a plume of foam that is quickly expelled.



Safety

Hydrogen peroxide, at 30%, is a very strong oxidizer. It is corrosive to clothing and will cause burns if spilled on the skin. Use appropriate personal protective equipment (PPE)—such as gloves, chemical splash goggles, and lab coats or aprons—to avoid contact. Know and follow all federal, state, and local regulations as well as school district guidelines for the disposal of laboratory wastes. Upon completion of this demo, the bottle can be rinsed; keep PPE on in case the bottle contains any leftover hydrogen peroxide. Unless otherwise prohibited, the foam and catalyst on the trash bag can be carefully rolled up and discarded in the trash.

©Carolina

Carolina grants teachers permission to photocopy or reproduce by other means this document in quantities sufficient for the students in his/her classroom. Also for the purposes of classroom use only, teachers may make an electronic file or overhead transparency of any or all pages in this document.

(continued on back)

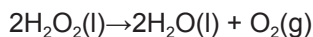
CB814592502

Carolina is a registered trademark.

CAROLINA
UNLEASH LEARNING™

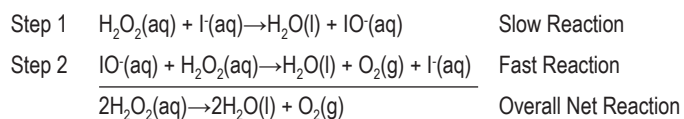
Results/Summary

Hydrogen peroxide (H_2O_2) is stable for at least a year if stored in an airtight opaque container at room temperature. Common in first aid kits, a 3% H_2O_2 solution can be applied to minor cuts and abrasions. When the solution contacts tissue and blood, it rapidly decomposes into water (H_2O) and oxygen gas (O_2).



The oxygen gas creates a foam that lifts and washes contaminants out of the wound. This rapid decomposition can only happen in the presence of a catalyst. In the human body, that catalyst is catalase, a biological catalyst in blood and tissue. In this demo, solid potassium iodide (KI) dissolves in aqueous H_2O_2 , forming an aqueous iodide ion (I^-) and catalyzing the reaction of

aqueous H_2O_2 . The steps of the reaction mechanism are as follows:



In this demo, as the rapidly produced oxygen gas is released into liquid soap, it forms foam that quickly emerges from the bottle in a manner reminiscent of toothpaste squeezed from a tube.

Additional Information

View more information, content links, and products related to this activity at www.carolina.com/takeaways.