Mission: Bubble detectives

Elephant Toothpaste Trouble • Ages 4–9 • 30–40 minutes + reading

Big question

What clues show that a change is happening? Use a small teacher-led demonstration. Children predict, observe from a marked viewing area, draw evidence, and revise an explanation.

After the story

Ask: What can we notice when an experiment surprises us? Is a prediction a promise? Partners draw an “I wonder” bubble and suggest one observation the characters could record. Rehearse: “I noticed ___, so now I wonder ___.”

Prepare one demonstration

One clean, empty 500 mL plastic bottle, uncapped; deep spill tray; 120 mL (½ cup) HOUSEHOLD 3% hydrogen peroxide; 15 mL (1 tablespoon) liquid dish soap; 1 tablespoon dry yeast; 45 mL (3 tablespoons) comfortably warm water; separate cup, spoon, funnel and measuring tools. Food coloring is optional; omit it to reduce stains. Do not scale up.

Teacher safety check — before children gather

Follow school chemical-use policy and product safety information; trial the demonstration in advance. Use ONLY labeled 3% peroxide, never stronger peroxide or another catalyst. The adult handles peroxide, mixing, pouring and cleanup. Wear splash goggles, protective gloves and an apron; provide eye protection for observers in the demonstration area. If safe setup or supervision is unavailable, use the virtual lab instead.

Set a clear observation boundary

Keep children back from the tray and bottle opening. Keep the bottle upright and OPEN: never cap, stopper, squeeze or aim it. No touching, tasting or smelling ingredients or foam. It is not toothpaste. Reaction liquid and foam may be warm and may contain peroxide. Keep away from eyes, skin, clothing and food; avoid yeast dust. Check relevant allergies and access needs.

Teacher-led demonstration

Elephant Toothpaste Trouble • Teacher notes

1. Place the uncapped bottle upright in the tray. Show the student handout and ask for a drawing prediction before you mix anything.

2. Adult: measure 120 mL of 3% peroxide into the bottle, add 15 mL dish soap, and gently swirl without closing the bottle. Optional coloring is not needed for the science.

3. In a separate cup, stir 1 tablespoon dry yeast into 45 mL comfortably warm—not hot—water to make an even mixture. Keep all materials at the adult bench.

4. Adult: pour the yeast mixture into the open bottle and step back. Do not lean over the opening. Children watch for new bubbles, changes in foam height and overflow into the tray.

5. At about 0, 30 and 60 seconds, invite students to draw or describe what they see. Timing is approximate; results vary. Do not ask students to touch the bottle to test warmth.

6. After observation, the adult lets the mixture cool and manages disposal under product directions and local school rules. Keep the vessel open while it reacts. Wash equipment and hands, wipe the area, and store unused peroxide securely in its original labeled container.

If the reaction is small

Do not increase concentration or quantities to make a bigger show. Treat a small result as data. Check the label, freshness of yeast/peroxide, water temperature and measuring steps before a later teacher trial. Do not invite children to troubleshoot by handling chemicals.

If a splash occurs

Follow the product first-aid instructions and school response procedure immediately. Rinse exposed skin with water; for eye exposure, begin continuous water irrigation and obtain appropriate medical/poison-control advice. Keep the product label available.

Explain the evidence

Elephant Toothpaste Trouble • Teacher notes

Notice learning, not just the final product

Look for a prediction separated from an observation, and a statement supported by a visible clue. “I saw bubbles increase” is evidence; “it was magic” is a starting idea to investigate.

Teacher look-fors / possible answers

Catalase, an enzyme in yeast, speeds hydrogen peroxide breaking down into water and oxygen gas. Soap traps oxygen in bubbles. The reaction releases heat. Yeast does not simply make this foam rise as it does bread, and soap does not create the oxygen. Foam height alone does not measure how much gas was made.

Extend the adventure

Use the virtual lab to omit soap or yeast without a second classroom chemical trial. Keep drawings beside a three-role chart: peroxide supplies reaction material; yeast contains the catalyst; soap traps gas. Older students can explain why a prediction may differ from evidence.

Make room for every learner

Ages 4–6: draw, point, act out a prediction, or dictate to an adult; work with a partner. Ages 7–9: label a diagram, record evidence, and explain a change. Offer large-print copies, pre-cut materials and picture choices. Accept oral responses; do not assess handwriting as science understanding.

Exit ticket

“At first I thought ___. My evidence showed ___. Next I would ___.” Invite children to share one kind, helpful thing a teammate did.

Sources for the adult procedure

Quantities and sequence adapted from USDA ARS AgLab, “Elephant Toothpaste.” Classroom role restrictions and observation sheet are Emcee teaching adaptations. Consult the product label and school policy for your setting.

USDA ARS: https://aglab.ars.usda.gov/let-s-get-to-work/elephant-toothpaste

Chemistry cross-check: American Chemical Society, Chicago Section, “Elephant Toothpaste” (2024): https://chicagoacs.org/articles/456