Demonstration: Giant Toothpaste

FOR THE TEACHER

Summary
In this demonstration, students will identify factors that indicate a chemical change has occurred while observing the production of giant toothpaste. This reaction uses simpler materials than those that are often used in the typical high school version of the Elephant’s toothpaste demonstration.

Grade Level
Elementary and Middle School

Objectives
By the end of this demonstration, students should be able to
- Determine indicators that help identify a chemical change.
- Identify a chemical change.
- Record Observations.

Chemistry Topics
This demonstration supports students’ understanding of
- Chemical Reactions
- Chemical changes
- Indicators of Chemical Change
- Energy
- Exothermic & Endothermic

Time
Teacher Preparation: 10 minutes
Lesson: 15 minutes

Materials
- 12 oz. Plastic bottle
- ½ Cup of 3% Hydrogen peroxide
- Liquid dish soap
- 1 package of dry yeast (1/4 ounce)
- 3 tbsp. of warm water
- Plastic or glass cup/bowl
- Stir stick
- Baking sheet/pan to collect the foam produced
- Funnel
- Food coloring
- Measuring spoons & cups

Safety
- Always wear safety goggles when handling chemicals in the lab.
- Students should wear proper safety gear during chemistry demonstrations. Safety goggles and lab apron are required.
- Gloves are recommended during this demonstration.
Teacher Notes

- Factors that indicate a chemical change are: color change, formation of a gas, change of temperature, formation of a solid (precipitate). This lab will demonstrate at least 2 of these.
- I suggest pre-measuring the ingredients so that the demonstration moves along quickly.
- As an option, you may want to conduct two demonstrations, one using a 20 oz. bottle and then another using a 2-liter bottle. You could easily spiral in a quick memo about pressure and how it’s affected by the circumference of a vessel (if you’ve already covered the human body system, more specifically the cardiovascular system).
- You could make a real-world connection to the toothpaste that we use and have them identify chemical changes they’ve noticed while using it.
- If you have access to 6% hydrogen peroxide you could to a comparison of rate of reaction based on difference in concentration.
- Procedure:
  1. Place a large pan or tray on a table.
  2. Stand the bottle upright in the middle of the tray.
  3. Measure 1/2 cup of 3% hydrogen peroxide.
  4. Place a funnel in the mouth of the empty bottle.
  5. Carefully add the hydrogen peroxide to the bottle.
  6. Add a few drops of food coloring to the bottle and swirl.
  7. Add a few drops of dish soap to the mixture. Swirl again.
  8. In the plastic cup or bowl, add 1 package of dry yeast (1/4 ounce).
  9. Measure 3 tbsp. of warm water, and add to the dry yeast. Use your stir stick to mix the water and yeast.
  10. Again, using the funnel, add the water-yeast mixture to the bottle.
  11. Immediately remove the funnel, and observe the reaction!
- See the video of this demonstration for reference.

FOR THE STUDENT

Lesson

Giant Toothpaste: Identifying a chemical change

Background

When a chemical change occurs, most often there are observations that help indicate that it is happening. Indicators of chemical change include: color change, formation of gas by the presence of bubbles or strong smell, formation of a solid, and temperature change.

Pre-lab Questions

1. Identify 3 chemical changes you have witnessed or performed at home.
2. Identify 2 chemical changes you’ve witnessed or have performed in our lab.

Objective

You will identify factors that help indicate a chemical change has occurred.

Materials

- Gloves
- Goggles
- Lab apron

**Safety**
- Students should wear proper safety gear during chemistry demonstrations. Safety goggles and lab apron are required.

**Procedure**
1. Observe the demonstration. Record any changes that occur in the data table.
2. Determine if these changes indicate that a chemical change took place.

**Data**

<table>
<thead>
<tr>
<th>Describe your observation</th>
<th>Explain if this was a chemical change</th>
</tr>
</thead>
<tbody>
<tr>
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**Analysis**
1. Name two pieces of evidence that indicates a chemical reaction has taken place.
2. Were there any other changes that you observed?
3. When you brush your teeth, what evidence tells you that a chemical reaction has taken place?

**Conclusion**
Write a short summary about what you learned and how you will use the information in everyday life.