

**Grade Levels:** Fourth Grade

**Time:** 20 minutes

**Brief Description of Lesson:** In this activity, students will become engineers and explore the concept of chemical reactions as they test out the BEST way to make elephant toothpaste.

*FIU-EOW offers ways to **differentiate** to provide opportunities for all students to access the curriculum or standards. These are being provided as **suggestions**.*

SCIENCE	TECHNOLOGY	ENGINEERING	MATHEMATICS
<p><b>Standard:</b> <b>SC.4.P.8.1</b> Measure and compare objects and materials based on their physical properties, including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets.</p>	<p><b>Standard:</b> <b>ISTE: 1.4: Innovative Designer:</b> Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.</p>	<p><b>Standard:</b> <b>3-5-ETS1-3 Engineering Design</b> Plan and carry out fair tests in which variables are controlled, and failure points are considered to identify aspects of a model or prototype that can be improved.</p>	<p><b>Standard:</b> <b>MA.4.M.1.1</b> Select and use appropriate tools to measure attributes of objects.</p>
<p><b>Activity:</b> The mentor will introduce the experiment and ask if anyone is familiar with the activity. Then proceed by teaching common terminology needed better to understand the component and the purpose of the experiment. After this step, students should clearly understand how each component affects and its role in the experiment.</p> <p><b>VOCABULARY</b> <b>Chemical Reaction:</b> A process that involves rearrangement of the molecular or ionic structure of a substance, as opposed to a change in physical form or a nuclear reaction. <b>Hydrogen Peroxide:</b> A colorless, viscous, unstable liquid with strong oxidizing properties, commonly used in diluted form in disinfectants and bleaches.</p>	<p><b>Activity:</b> The students would have to time their reactions using a timer from an intelligent device.</p> <p>Two groups of students will be completing the experiment at the same time. For the last step, before adding the yeast, the two groups will start the timer to record the fastest reaction and assess the effectiveness of their respective procedure and what could have been completed differently, i.e., for a quicker reaction.</p>	<p><b>Activity:</b> <b>Hook:</b> Students must design their procedure, identifying and agreeing on which steps to take first.</p> <p><b>Problem:</b> How would students know which step to take first?</p> <p><b>Measurable Goal:</b> After the science activity step, students will have to design their procedure, identifying and agreeing on which steps go first. Then proceeding to the technology component, timing their reaction and reassessing their procedure after completion by evaluating the results regarding the chemical components used and what they can change to improve the chemical reaction if needed.</p> <ol style="list-style-type: none"> <li>1. Pour hydrogen peroxide into a bottle</li> </ol>	<p><b>Activity:</b> Students will have to measure and record the amount of each ingredient they used in their procedure design to help them reassess their results if the experiment was not completed effectively. Several liquids and powders will be used, including soap, yeast, food coloring, and hydrogen peroxide. They will be provided with a measuring spoon, funnel, and 250ml graduated cylinder.</p> <ol style="list-style-type: none"> <li>1. Pour 60ml of hydrogen peroxide into the graduated cylinder. [measurement labeled in the cylinder]</li> <li>2. Add four drops of your favorite food coloring into the graduated cylinder.</li> <li>3. Add about one tablespoon of liquid dish</li> </ol>

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<p><b>Catalase:</b> An enzyme that catalyzes the reduction of hydrogen peroxide.</p> <p><b>Chemistry:</b> the branch of science that deals with identifying the substances of which matter is composed; the investigation of their properties and how they interact, combine, and change; and the use of these processes to form new substances.</p> <p><b>Components:</b></p> <ul style="list-style-type: none"><li>• A clean 250ml graduated cylinder</li><li>• 60ml 20-volume hydrogen peroxide liquid (20-volume is a 6% solution)</li><li>• One packet of dry yeast</li><li>• 3 Tablespoons of warm water</li><li>• Liquid dishwashing soap</li><li>• Food coloring</li><li>• Small cup</li></ul>		<ol style="list-style-type: none"><li>2. Add dish soap</li><li>3. Add food coloring to the bottle</li><li>4. Mix water and yeast in a cup</li><li>5. Funnel yeast into the bottle</li></ol>	<p>soap into the graduated cylinder and mix.</p> <ol style="list-style-type: none"><li>4. In a separate small cup, combine 3 Tablespoons of warm water and one packet of yeast together and mix for about 30 seconds.</li><li>5. Pour the yeast water mixture into the graduated cylinder.</li></ol>
<p><b>Differentiation:</b> Students will be given the opportunity to ask about each component and its role anytime throughout the activity. They can be provided with real-life examples and change vocabulary if needed.</p> <p><u>Elephant Toothpaste</u></p>	<p><b>Differentiation:</b> The mentor and the volunteer will assist students with reactions at the right step, easing challenges around observation and technicality.</p>	<p><b>Differentiation:</b> When creating the Elephant toothpaste, students should be allowed to reference an instruction manual with pictures and descriptions of each step.</p> <p><u>Worksheet 1</u></p>	<p><b>Differentiation:</b> On the procedure worksheet in the table, there will be a column for measurement in which students will add needed measurements for each component. Doing so will also help with challenges around organization and memory which will elevate any anxiety the student has with timing and remembering.</p> <p><u>Worksheet 1</u></p>