Teacher note: Several materials are required for this activity. The activity requires a demonstration of elephant toothpaste. It is highly recommended that the teacher practice the elephant toothpaste demo prior to performing it in front of the class. Larger reactions should be performed outside, goggles should be worn, and students should be kept a safe distance from the demo. Smaller reactions can be performed in the classroom with proper safety precautions. The demo should be recorded as it is performed. If the demo cannot be recorded an online video could be used.
Qualitative and quantitative measurement tools should be used to collect data before and after the experiment. These include observations of color, mass, volume, temperature.
Guide students to understand that qualitative data refers to any observation that is not measured numerically (color, surface texture, big, little, shiny). Qualitative data is descriptions based on individual opinion, example rough or smooth. On the other hand, quantitative data refers to data that involves numbers (length, width, depth, mass, temperature) Quantitative data means the same thing to every person, examples: 3 centimeters or 5 grams.

Materials

- 100 mL 30% Hydrogen Peroxide or you can use SalonCare 40
- 10 g Potassium Iodide or you can use 1 active dry yeast packets dissolved in warm water
- Erlenmeyer Flask (250 mL or larger)
- Water
- Clear dish soap
- Thermometer (Infrared is best)
- Video recording device (phone, ipad, etc.)

* Note: If using SalonCare and/or yeast, the reaction will not be as dramatic.

Elephant Toothpaste Demo using 30% Hydrogen Peroxide & Potassium Iodide Solution

1. Before students arrive:
    a. Have 100 mL of 30% hydrogen peroxide in a large erlenmeyer flask.
    b. Have 10g of Potassium Iodide (KI) in a glass beaker
    c. Have 10-20mL of clear dish soap in a dropper
    d. Have a beaker of water that will be used to add to the KI to create the solution

2. With students indoors:
    a. First have students observe the materials & notice that there are solids and clear liquids.
    b. Pour a small amount of water into the KI beaker and stir. Continue to add small amounts of water until most of the crystals have dissolved.
    c. Add the dropper full of dish soap to the peroxide in the flask.
    d. Have students observe that even though substances have mixed together, there are still 2 clear liquids. You could also get temperature readings at this point.

3. Go outside with the flask and the beaker with the KI solution.

4. Place the flask on level ground. Keep students at a safe distance.
    a. Assign a student to video record with a phone, iPad, etc.

   b. If you have an infrared thermometer, assign 2 students to use and record the temperature changes. Be sure they get initial, immediate after, and final temperature readings. Students must stay back when the chemicals are mixed.

5. Pour the KI solution into the flask and quickly step back to observe.
   a. Depending on the peroxide percentage and on the concentration of the KI solution, you could have a reaction that shoots out of the flask with color change, foam, and steam. The lesser of either of those 2 substances, will cause the reaction to be slower therefore having a more oozing reaction with steam and color change.

6. DO NOT TOUCH FLASK until it cools down.

Phenomenon Video *(Use one of these videos if unable to record the class demonstration)***:**

Video 1
https://www.bing.com/videos/search?q=elephant+toothpaste+with+potassium+iodide&&view=detail&mid=8CD441E43833D26089C78CD441E43833D26089C7&rvsmid=B2AC78D1EFAC864175B1B2AC78D1EFAC864175B1&FORM=VDQVAP

Jimmy Kimmel :
https://www.bing.com/videos/search?q=jimmy+kimmel+elephant+toothpaste&view=detail&mid=E6949652E7E0C513B150E6949652E7E0C513B150&FORM=VIRE

Lesson 4: What happens when chemicals combine?

Watch the demonstration and record your observations of what happened: include observations of color, mass, volume and temperature.

It changed color.
Steam came off of the flask.
There were bubbles.
It got hot.

The students should write their own observations and then a whole group share out can be performed. During the whole group share out students should write any observations that they had not already recorded.

Now watch the video of our demonstration and record new observations.

Students should write any new observations.

Combine your observations to create a diagram of before, during, and after the event. Include titles, labels, and descriptions.

Students should draw the flask and record the observations they made before and after the experiment. It may be helpful to have students create the “before” section of this worksheet prior to conducting the experiment. The video can also be useful in helping students complete this section.

Students should share their models in small groups and add to theirs based on peer feedback.

Using quantitative and qualitative evidence from the demonstration you observed, what can happen when chemicals combine?

It can bubble/foam. It can get hot. It can change color.

Think about the reaction you observed and brainstorm everyday examples of similar reactions.

Coke and Mentos, explosions, shaking a soda, water rockets, baking soda/vinegar, soda left in the car during freezing temperatures

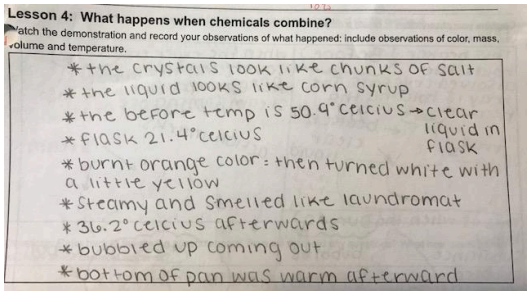
Students should initially be given time to complete this section on their own and then a whole group share out can be conducted.

Questions: Refer back to the driving question board, have we resolved any questions? What new questions do you have about chemical reactions?

The teacher should lead a discussion about which driving questions have been resolved thus far. Students should be encouraged to write their individual questions about chemical reactions with the aim of steering student thinking about different types of reactions. Do all chemical reactions produce bubbles, gas, heat, color change? Is the gas released safe for the baby? Are there chemical reactions that produce “safe” heat?

Lesson 4 Rubrics

Box 1

	Rubric	*Sample Response*
Proficient (2)	*Student lists at least four different observations including color,, mass, volume, temperature.*	 *It changed color. Steam was present. There was foam/bubbles. Substances were mixed together. The volume of the bubbles was greater than the flask could hold. The reaction was immediate and continued for some time.*
Developing (1)	*Student includes two or three observations that include color, mass, volume, temperature.*	Steam came off of the flask. There were bubbles. It got hot.
Needs Improvement (0)	*Student makes one observation that may or may not include color, mass, volume, temperature.*	*The student has one response but leaves out most of the criteria or has no response.*

Box 2

Rubric: Student lists a new observation or observations. However, if the student created a thorough list of observations in the section above and cannot make any new observations in this section, then the student states no observations were made. (1 pt)

Box 3

Disclaimer: When we teach our students about designing models, we teach them model norms. The model norms require students to have a title that describes the model, labels, action marks, caption that is two - four sentences that describes what is happening in the model.

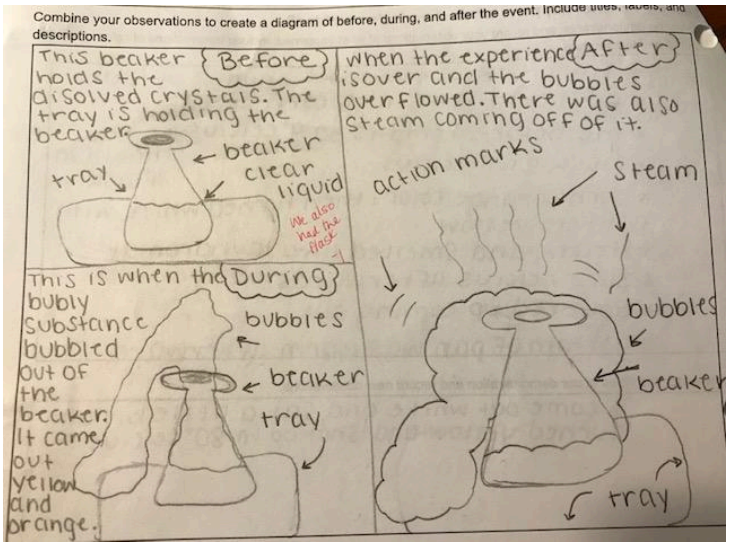
Rubric

3	*2*	*1*	*0*
	Main title is present for section and indicates "before," during," and "after".	*Main title is present but lacks indicicating "before," during," and "after" titles.*	*No title is present.*
		Action of foam movement and/or steam is indicated using action marks	*No action is indicated.*
Before, during, and after models are present and include flask, mystery solutions, reaction.	*One or two of the "before," during," and "after" moments are drawn and include necessary details.*	*Models that are drawn are missing key details.*	*No models are drawn.*
	Many labels are present. *-includes labels for flask, mystery solution, bubbles, steam/heat, color change.*	*Some labels are present.*	*Two or fewer labels are used.*
The caption accurately and thoroughly describes what was observed 2-4 sentences.	*Caption accurately describes what was observed with some detail missing.*	*Caption missing many key observations.*	*Descriptions are very incomplete or missing.*

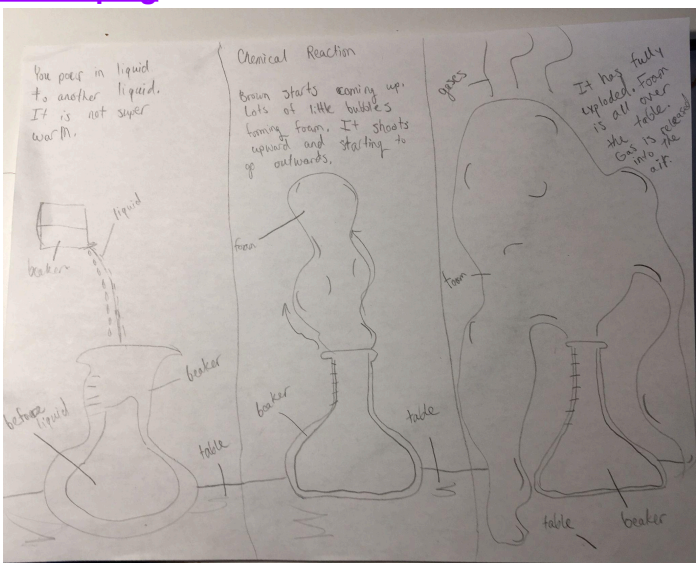
Total Points for this section: 11 pts

Sample of Student Work

Proficient:



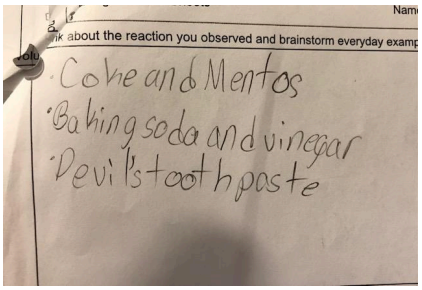
Developing



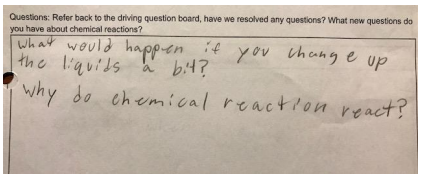
Box 4

	Rubric	*Sample Response*
Proficient (2)	*Student uses qualitative AND quantitative evidence in their response.*	*Actual Student Response (Online Student): When you combine chemicals together they get really hot and expand/explode. The water is 22.5 degrees celsius. The powder is 25 degrees celsius. But when combined with the mysterious liquid, it reached 74 degrees celsius. That is a huge difference of temperature in a few seconds. When we saw the explosion since all of the oxygen and chemicals were hot it expanded. It expanded upward then it spread out.*
Developing (1)	*Student writes about one type of evidence but leaves the other out.*	*Actual Student Response (Online Student):* *It can cause a reaction in many ways and many different situations. Two chemicals have to meet each other to cause a reaction. I know this because in my case the two chemicals created millions of tiny bubbles. These also put off heat.*
Needs Improvement (0)	*Student does not share any qualitative or quantitative evidence.*	*No response*

Box 5

	Rubric	Sample Response
Proficient (2)	*Student lists at least three examples.*	
Developing (1)	*Student lists two examples.*	*Baking Soda and Vinegar* *Coke and Mentos*
Needs Improvement (0)	*Student lists one example or has no response .*	*One response listed or none listed.*

Box 6

	Rubric	Sample Response
Proficient (2)	*Student clearly answers which questions were resolved and also includes new questions they have about chemical reactions.*	*Actual Student Response (Online Student):* *When was the chemical reaction really discovered? What happens if chemical reactions won't work any more? Do chemical reactions happen in nature? If so, how do they happen in nature? Are there any other ingredients that explode together?*
Developing (1)	*Student somewhat answers which questions were resolved and also includes a new question or two they have about chemical reactions.*	
Needs Improvement (0)	*Student does not write down any new questions.*	*No response*