# Chemical Magic

Name: _____

Date: _____

## Unit Assessment

***ANSWER KEY***

1. Mia, Kayla, and Eli have all set up lemonade stands in their neighborhood. Each person started with the same amount of lemon juice and then added different amounts of sugar, as shown in the table below. Fill in the table with the total weight of each person's lemonade.

| | Lemon Juice | Sugar | Total Weight of Lemonade |
|---|---|---|---|
| Mia | 200 grams | 10 grams | ***210 grams*** |
| Kayla | 200 grams | 20 grams | ***220 grams*** |
| Eli | 200 grams | 30 grams | ***230 grams*** |

2. Sadly, Mia, Kayla, and Eli didn't sell any lemonade. So they all decide that they will turn their lemonade into popsicles. All they do is take the lemonade they made the day before and freeze it. Circle **True** or **False** for each sentence.

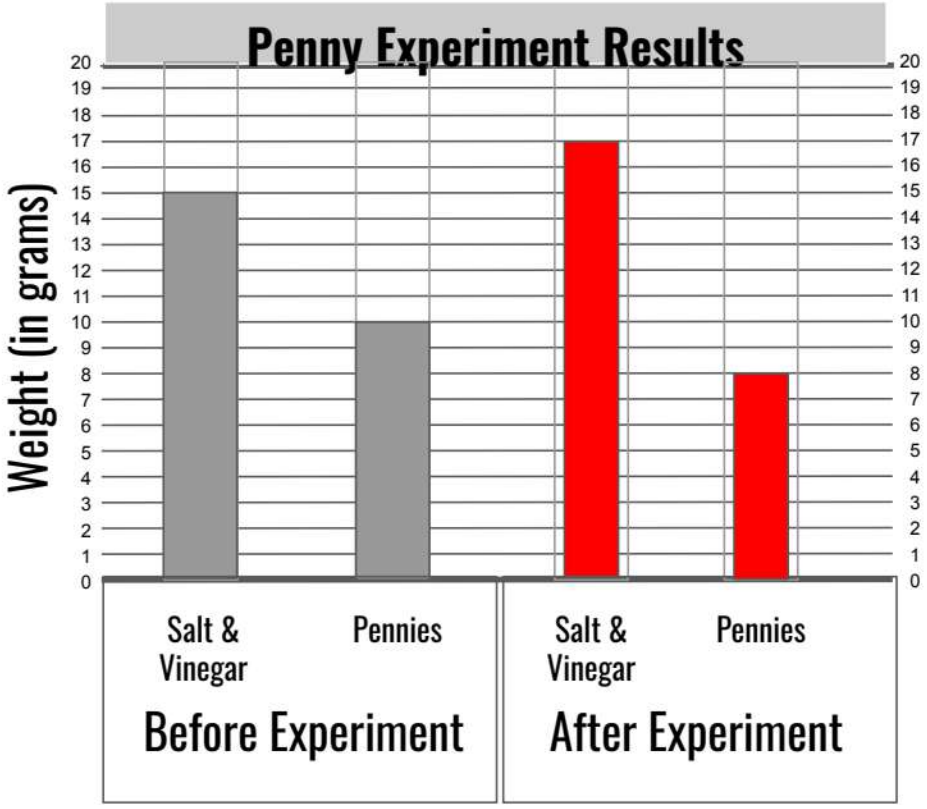
| | |
|---|---|
| (True) False | Eli's popsicles will taste sweeter than Mia's popsicles or Kayla's popsicles because there is more sugar in them. |
| (True) False | Eli's popsicles will weigh slightly more than Mia's popsicles or Kayla's popsicles because there is more sugar in them. |
| True (False) | Eli's, Mia's, and Kayla's popsicles will all be exactly the same. |

Laila empties her piggy bank and finds ten dull, brown pennies. Laila wants her pennies to look shiny, so she performs an experiment. First, she pours salt and vinegar into a container. Then, she adds the ten pennies and waits a few minutes. When she takes the pennies out of the salt and vinegar solution, they look shiny and new!


3. If Laila weighs the salt and vinegar solution and the pennies **after** the experiment, what do you think she will find?

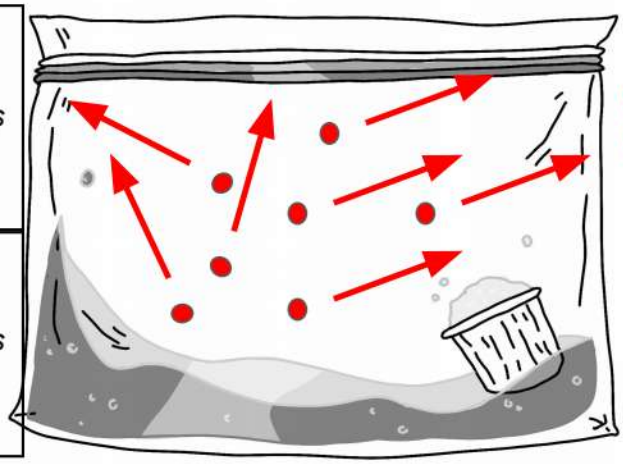
a. ***The solution will weigh more and the pennies will weigh less after the experiment.***
b. The solution will weigh less and the pennies will weigh more after the experiment.
c. The solution will weigh the same and the pennies will weigh the same after the experiment.
d. The solution will weigh the same and the pennies will weigh less after the experiment.

4. The graph to the right shows how much the salt and vinegar solution weighed before the experiment. It also shows how much the pennies weighed before the experiment. Laila weighs the pennies after the experiment and finds that they weigh 8 grams. Complete the bar graph to show how much the pennies weighed and how much the salt & vinegar solution weighed **after** the experiment.



***LESS sophisticated response:***
*Model will show and discuss gas filling and pushing on the bag.*

***MORE sophisticated response:***
*Model will show and discuss gas **particles** filling and pushing on the bag.*



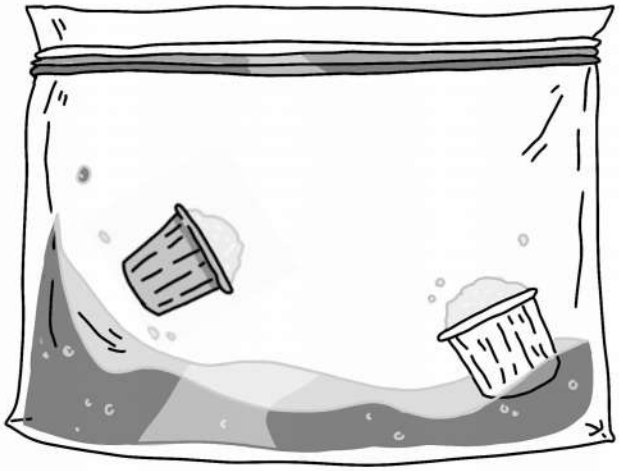
● = gas [particle]

***Gas [particles] will fill the bag.***

***Gas [particles] will push on the bag so it will expand and possibly explode.***

5. The picture above shows a sealed plastic bag filled with vinegar at the bottom. A cup of baking soda is about to mix with the vinegar. When the baking soda mixes with the vinegar, bubbles will form and the plastic bag will start to expand. Why does the bag expand? In the picture above, draw what happens inside the bag. Use arrows and words to explain your drawing.

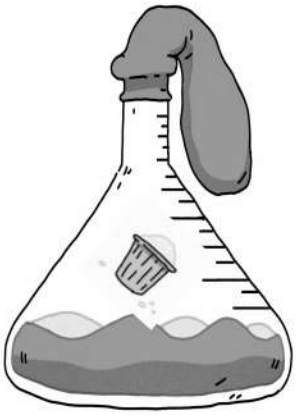
6. If two cups of baking soda are added to the vinegar in the bag, describe how that would change your model from Question 5.



***LESS sophisticated response:***
*There will be more gas created so the bag will inflate more and probably explode.*

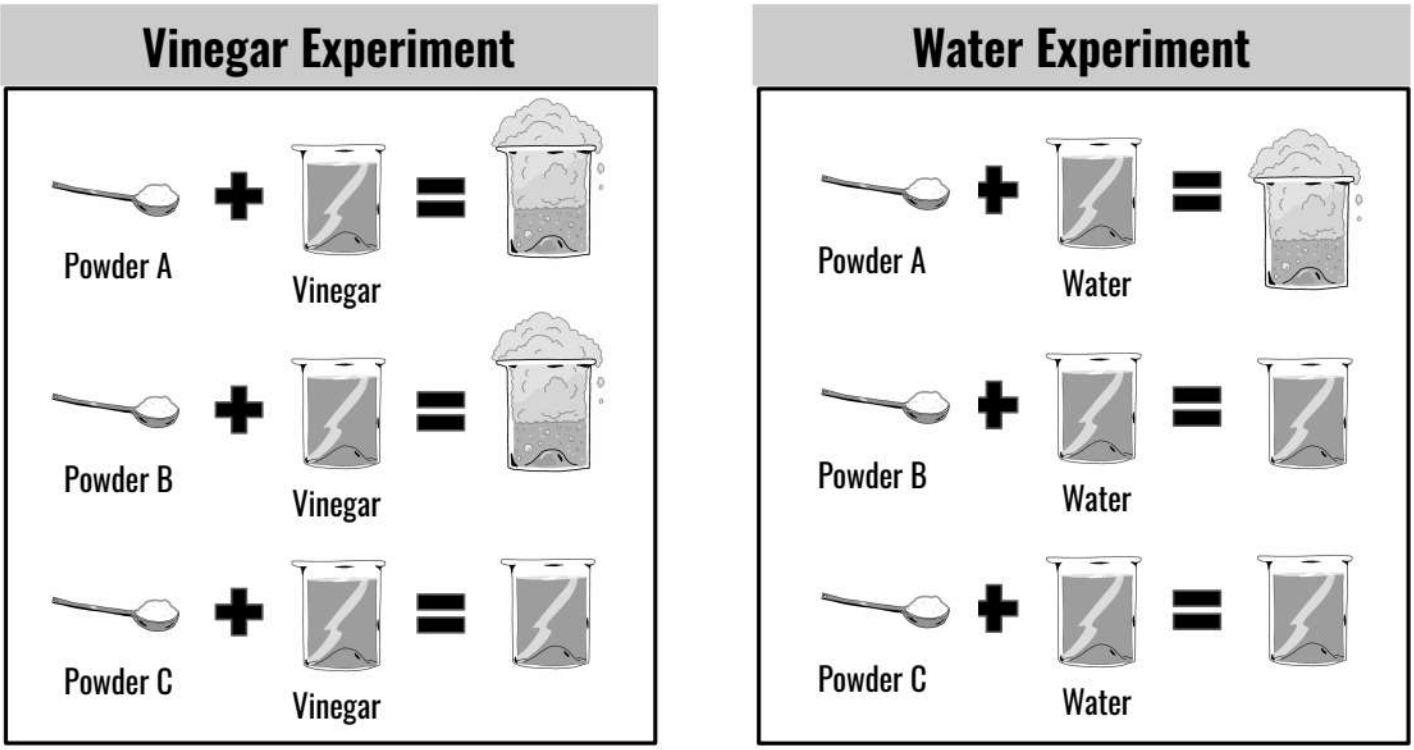
***MORE sophisticated response:***
*If more baking soda mixes with the vinegar, this will create more gas particles. With more gas particles inside the bag, they will push even more on the bag so it is much more likely that the bag will explode.*

7. Emi drops a cup of baking soda into a glass container that has vinegar at the bottom of it. Then, she quickly puts a balloon on top of the container. What do you predict will happen to the balloon?



a. The balloon will get bigger because it will become filled with solid (baking soda) particles that are too small to be seen.
b. The balloon will get bigger because it will become filled with liquid (vinegar) particles that are too small to be seen.
***c. The balloon will get bigger because it will become filled with gas particles that are too small to be seen.***
d. The balloon will stay the same because it will not become filled with anything.

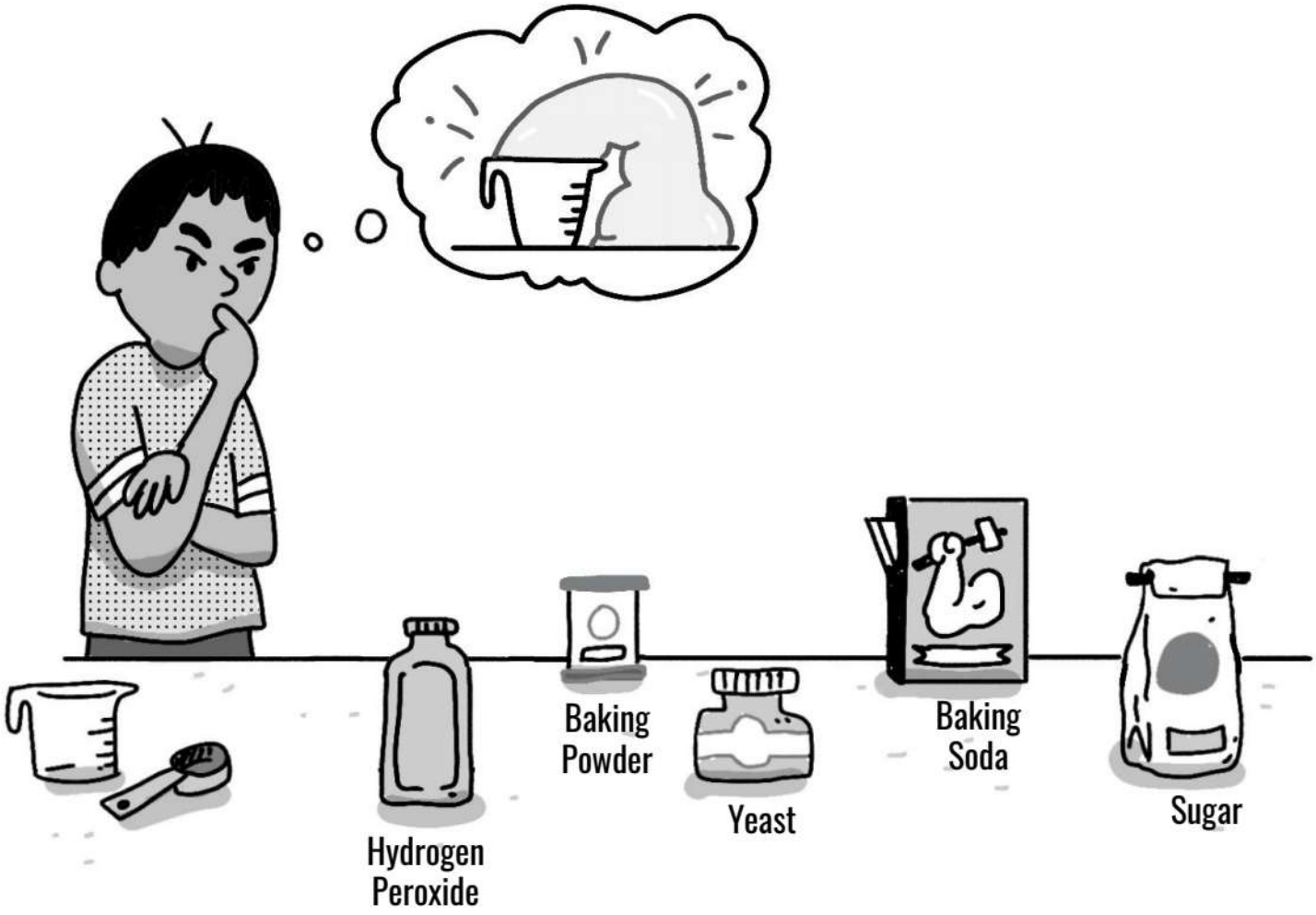
Priya needs some baking **soda** to bake a cake. She has three white powders (salt, baking **soda**, and baking **powder**) in her kitchen, but they don't have labels. She knows that baking **soda** will bubble and fizz if mixed with vinegar, but not with water. Baking **powder** will bubble and fizz if mixed with vinegar. It also bubbles when mixed with water. Salt does not bubble with vinegar or water. Priya conducts the following two experiments in her kitchen.




8. If Priya only looks at the results of the Vinegar Experiment, what can she figure out?
   a. Either B or C is the baking soda. A must be the salt.
   ***b. Either A or B is the baking soda. C must be the salt.***
   c. Either A or C is the baking soda. B must be the salt.
   d. Priya can't figure anything out if she only looks at the Vinegar Experiment.

9. Which of the three powders (Powder A, Powder B, or Powder C) do you think is the baking **soda**? Why do you think that? Support your answer with evidence from the experiments.

| ***LESS sophisticated response:*** | ***MORE sophisticated response:*** |
|---|---|
| *I think Powder B is the baking soda. Powder B creates bubbles when mixed with vinegar, but it doesn't create bubbles when mixed with water. So I think this is the baking soda.* | *I think Powder B is the baking soda. In the Vinegar Experiment, both Powder A and Powder B bubbled when mixed with vinegar, so either of these could be the baking soda. Then, in the Water Experiment, only Powder A bubbles. Because of the evidence from these two experiments, I think that Powder A is the baking powder, Powder B is the baking soda, and Powder C is the salt. Priya should use Powder B for her cake.* |




10. Samuel wants to make something called “elephant toothpaste.” It’s a chemical reaction that creates lots of white foam that looks like toothpaste for an elephant! Samuel knows that the reaction happens when two ingredients are mixed together. He also knows that one of the ingredients is hydrogen peroxide. Samuel doesn’t know what the other ingredient is. Using the ingredients shown in the picture above, describe the steps of an experiment that Samuel could perform to figure out what he needs to make “elephant toothpaste.”

| ***LESS sophisticated response:*** | ***MORE sophisticated response:*** |
|---|---|
| *Samuel should set up an experiment where he mixes hydrogen peroxide with each of the other ingredients. So he should combine hydrogen peroxide and baking powder, hydrogen peroxide and yeast, hydrogen peroxide and baking soda, and hydrogen peroxide and sugar. If any of these combinations creates a reaction, then he will know which ingredients to use.* | *Samuel should set up an experiment where he mixes hydrogen peroxide with each of the other ingredients. He should make sure to use equal amounts of each ingredient. For example, he could use a cup of each. So he should combine one cup of hydrogen peroxide and one cup of baking powder. Then he should watch for a reaction. He should continue combining ingredients so that he tests hydrogen peroxide and yeast, hydrogen peroxide and baking soda, and hydrogen peroxide and sugar. If he observes a reaction for one of these combinations, then he will know which ingredients to use.* |

The table below indicates the Next Generation Science Standards (NGSS) Performance Expectation that is addressed with each question in this assessment. Beside each performance expectation is the Disciplinary Core Idea (DCI), Science & Engineering Practice (SEP), and Crosscutting Concept (CCC) that is the focus for each assessment question.

| Item # | PE | DCI | SEP | CCC |
|---|---|---|---|---|
| 1 | 5-PS1-2 | PS1.A: Structure and Properties of Matter | Using Mathematics and Computational Thinking | Scale, Proportion, and Quantity |
| 2 | 5-PS1-2 | PS1.A: Structure and Properties of Matter | Using Mathematics and Computational Thinking | Scale, Proportion, and Quantity |
| 3 | 5-PS1-2 | PS1.B: Chemical Reactions | Using Mathematics and Computational Thinking | Scale, Proportion, and Quantity |
| 4 | 5-PS1-2 | PS1.B: Chemical Reactions | Using Mathematics and Computational Thinking | Scale, Proportion, and Quantity |
| 5 | 5-PS1-1 | PS1.A: Structure and Properties of Matter | Developing and Using Models | Scale, Proportion, and Quantity |
| 6 | 5-PS1-1 | PS1.A: Structure and Properties of Matter | Developing and Using Models | Scale, Proportion, and Quantity |
| 7 | 5-PS1-1 | PS1.A: Structure and Properties of Matter | Developing and Using Models | Scale, Proportion, and Quantity |
| 8 | 5-PS1-3 | PS1.A: Structure and Properties of Matter | Planning and Carrying Out Investigations | Scale, Proportion, and Quantity |
| 9 | 5-PS1-3 | PS1.A: Structure and Properties of Matter | Planning and Carrying Out Investigations | Scale, Proportion, and Quantity |
| 10 | 5-PS1-4 | PS1.B: Chemical Reactions | Planning and Carrying Out Investigations | Cause and Effect |

**5-PS1-1.** Develop a model to describe that matter is made of particles too small to be seen.

**5-PS1-2.** Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

**5-PS1-3.** Make observations and measurements to identify materials (baking soda/powders, metals, minerals, liquids) based on their properties (color, hardness, reflectivity, solubility).

**5-PS1-4.** Conduct an investigation to determine whether the mixing of two or more substances results in new substances.