



Name: \_\_\_\_\_ Date: \_\_\_\_\_ Group: \_\_\_\_\_

# NEXT STEP INQUIRY

## Access Prior Knowledge

1. What is the Law of Conservation of Mass?

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2. What is meant by a balanced equation?

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3. What is the difference between a coefficient and a subscript?

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## Background

Chemical reactions occur whenever two or more elements combine to form different substances with different properties. These changes, however, do not result in the creation of new matter. The Law of Conservation of Mass states that the quantity of each element does not change in a chemical reaction. In other words, matter is neither created nor destroyed during a chemical reaction, simply rearranged. Thus, each side of a chemical equation must represent the same quantity of each element in the reaction.



All chemical equations must comply with the Law of Conservation of Mass. Equations must have the same number of elements on each side. If an equation does not meet the rules of the law, it is said to be unbalanced. Chemical equations are balanced by adjusting the chemical formula by placing a number, the coefficient, in front of the formula.

You will conduct an investigation on how balanced chemical equations containing coefficients and subscripts relate to the Law of Conservation of Mass.

# NEXT STEP INQUIRY

## Begin the Investigation

1. My Question of Inquiry:

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2. What do I need to do to answer this question? *Consider the setting, scale, and time frame that will be needed to observe the system, to make observations, and to answer the Question of Inquiry.*

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3. What are the variables that I will observe? What are the boundaries of the system that I will observe?

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4. My prediction:

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5. What materials, equipment, and technology will I need for this investigation?

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6. What safety precautions must I take in this investigation?

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7. Carry out this investigation using the following procedure. *Record your procedure in your lab journal if needed.*

# NEXT STEP INQUIRY

## Continue the Investigation

### COLLECT, RECORD, AND ORGANIZE DATA

#### Masses of Reactants and Products

	Mass	Reactants
Plastic resealable bag		X
Bag with Baking Soda		X
Baking Soda (Sodium Bicarbonate) $\text{NaHCO}_3$		
Condiment cup with lid		X
Cup with vinegar		X
Vinegar (acetic acid) $\text{C}_2\text{H}_3\text{O}_2\text{H}$		
Reactants ( $\text{NaHCO}_3$ and $\text{C}_2\text{H}_3\text{O}_2\text{H}$ )		
		<b>Products</b>
Bag with cup and products		X
Products ( $\text{H}_2\text{O} + \text{CO}_2 + \text{NaC}_2\text{H}_3\text{O}_2$ )		

# NEXT STEP INQUIRY

## Continue the Investigation

### ANALYZE DATA

Use the data you organized to answer the following question:

1. How did the mass of the products compare to the mass of the reactants?

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2. Use the chemical formulas in the data table to write the chemical equation for the reaction.

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3. Is the equation balanced? *Explain.*

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4. How does this investigation relate to the Law of Conservation of Mass?

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5. On a piece of notebook paper, use your ideas from the above question to write a scientific explanation of how the chemical reaction you observed in the bag supports the Law of Conservation of Mass. Your explanation must include data from your investigation.

# NEXT STEP INQUIRY

## Reflections and Conclusions

1. Was my prediction correct or incorrect? *Explain.*

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2. Was a relationship between the variables in the system that I observed? *Explain.*

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3. Where could errors have been made while collecting or organizing data?

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4. What type of data did I collect—qualitative or quantitative? *Explain.*

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5. What would I do differently if I were to conduct this experiment again?

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6. What can I conclude from this investigation?

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