



Conservation of Mass

Standard/Benchmarks:

- Use mathematical expressions and techniques to explain data and observations and to communicate findings
- Know the forms and properties of matter and how matter interacts
- Explain the physical processes involved in the transfer, change, and conservation of energy
- Know that scientific knowledge is built on questions posed as testable hypotheses, which are tested until the results are accepted by peers

Objective:

Demonstrate the Law of the Conservation of mass by performing a reaction in a closed system

Prerequisite Learning:

Lab safety

Using a balance

Understanding how a chemical reaction occurs

Skills/Concepts Introduced:

Conservation of Mass

Scientific observation

Activity Overview:

Students allow baking soda to react with vinegar in a plastic bag. They are asked to determine the mass of the system before and after the reaction takes place.



Preparation:

Provide materials listed below

Time Allotment: ~60 minutes

Complete lab: Conservation of Mass

The law of conservation of mass (or matter) states that for any chemical process in a closed system, the mass of the reactants must equal the mass of the products.

Therefore, the [mass](#) of a [closed system](#) will remain constant, regardless of the processes acting inside the system.

Matter cannot be created/destroyed, although it may be rearranged.

Materials:

- 1 Alka-Seltzer tablet
- 1 beaker filled halfway with water
- 1 zip lock bag
- 2 small plastic cups
- vinegar (acetic acid)
- baking soda (sodium bicarbonate)
- triple beam balance

SAFETY NOTE:

Safety goggles must be worn!



Seal the bag completely in the first experiment so that the chemicals do not spray out during the experiment.

Pay attention! Care must be taken to keep the glass flask from breaking due to the pressure of the gas.

Part A:

1) Drop an Alka-Seltzer tablet into a beaker of water.

Watch what happens, and record your observations:

2) Why is it hard to prove the law when a gas is produced?

Your job today is to prove the law when a gas is produced in the second part of this lab experiment.

Part B:

1. Determine the mass of the empty cups and the plastic bag. Write the values in your data table.

2. Fill one cup halfway with vinegar.

3. Fill a second cup halfway with baking soda.

4. Determine the mass of the vinegar and baking soda. Write the values in your data table.



ITEM	MASS (g)
empty cup 1	
empty cup 2	
plastic bag	
vinegar	
baking soda	
total mass	

- Put both cups in the plastic bag. Do NOT spill the contents of either cup.
- Determine the total mass of the cups and their contents, and the plastic bag. Write the values in your data table.
- Seal the plastic bag.
- Without opening the bag, pour the vinegar into the cup of baking soda.
- Without opening the bag, record the mass of the contents of the plastic bag. Take care not to break the seal of the plastic bag.

Questions:

- Define the following terms: Initial Mass (g) Final Mass (g) Change in Mass (g).
- Describe what happens when the vinegar was poured into the cup of baking soda.



3. What is a chemical reaction?

4. The gas produced in this reaction can put out fires. Can you make an educated guess about its identity? What is the name of the gas?

5. What is conservation of mass, and how does it relate to this exercise?

6. When an iron nail rusts, it seems to get heavier in mass. Does the iron nail follow the Law of Conservation of Mass?

7. When wood burns, a small amount of ashes is made. Why is the mass of the wood before the fire not equal to the mass of the ashes after the reaction?

8. How does the Law of Conservation of Mass apply to a burning candle?

Modified from:

<http://www.coe.uh.edu/texasipc/units/changes/conservation.pdf>

Definitions from:

http://en.wikipedia.org/wiki/Conservation_of_mass

References/Resources/Websites:

<http://dbhs.wvusd.k12.ca.us/Equations/Conserv-of-Mass.html>

<http://www.coe.ttu.edu/me/dpj/thermo/Mass/Mass.htm>