**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Conservation of Mass Lab**

In this laboratory activity, you and your partner will investigate the Law of Conservation of mass. You will complete the investigation twice. The first trial will be done in an **open system**. You and your partner will decide if you can observe the Law of Conservation of Mass in an open system. The second trial will be using a **closed system**.

Materials: vinegar (acetic acid, HC2H3O2), baking soda (sodium hydrogen carbonate, NaHCO3), ziplock bag, graduated cylinder, styrofoam cups, balance, spoons

Procedure:

**Open System Trial:**

1. Measure approximately 20 mL of vinegar, using a graduated cylinder. Pour into styrofoam cup.

3. Measure approximately 5 heaping spoonfuls of baking soda into a Styrofoam cup.

4. Place both cups on the balance. Record the total mass. Remove both cups from the balance.

5. Add the baking soda to the cup containing the vinegar. Record your observations. Be sure to notice how long it takes for the reaction to occur.

6. Re-mass **both** Styrofoam cups together. Record the final mass.

**Closed System Trial:**

1. Measure approximately 20 mL of vinegar, using a graduated cylinder. Pour into styrofoam cup.

2. Measure approximately 5 heaping spoonfuls of baking soda and place into a Ziploc bag.

3. Determine the combined mass of the Styrofoam cup with vinegar and the plastic bag with baking soda. Write the value in your data table.

4. Without spilling either cup, place both cups into the plastic bag. Try to get as much air out of the bag as possible.

5. Seal the bag. Pick up the vinegar cup (keeping it inside the bag) and pour the vinegar into the baking soda cup.

5. Record observations in the data table. Do not unseal the bag.

6. Record the mass of the sealed bag with the cups inside.

Use UNITS in this data table!

|  |  |  |
| --- | --- | --- |
| System | Mass Before | Mass After |
| Open |  |  |
| Closed |  |  |

**Write-Up Questions**

1. What is the Law of Conservation of Mass?
2. What is an open system?
3. What is a closed system?
4. Is the open system appropriate to display the Law of Conservation of Mass?
5. Is mass conserved in the open system?
6. Why is the Law of Conservation of Mass a law and not a theory?
7. Where did the mass go in the open system?
8. Why did the mass remain constant (stay the same) in the closed system?
9. What is a chemical reaction?
10. What is the Law of Conservation of Mass? How does it relate to this lab?
11. The gas produced in this reaction can put out fires because it is denser than oxygen. Can you make an educated guess of what the gas is?
12. The equation for the reaction you observed is:

NaHCO3 + CH3CO2H -> CH3CO2Na + H2O + CO2

**What can you measure to determine the amount of CO2 produced?**

1. You place **50g of baking soda** in a **plastic cup with a mass of 10g** and **20g of vinegar** in **a plastic cup with a mass of 10g**, into a **plastic bag with a mass of 5 g**, seal the bag and combine the and began a reaction.

When the reaction was complete, there was 10g baking soda left and 2g of vinegar left. There was 30g of combined CH3CO2Na and H2O at the bottom of the bag. How much CO2 (in grams) is left in the system? Show your work.