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

Sci10: CR2 Chemical Equations  **Investigation**

**Conservation of Mass Lab \_\_\_\_\_ /36 = \_\_\_\_\_%**

In this investigation you compare the total mass of the products formed in a chemical reaction with the total mass of the reactants.

**Materials:**

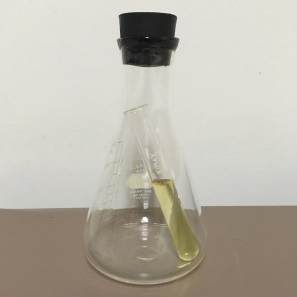
Balance/Digital Scale

Erlenmeyer flask and stopper

Small test tube

Solutions of each of the following: lead nitrate, potassium iodide, copper sulfate, sodium hydroxide, barium chloride, sodium sulfate

**Procedure:**

1. Use the table below to record your results. The procedures for all three reactions are the same. Your teacher will tell you which reaction(s) to do.
2. Half-fill the small test tube with one of the solutions.
3. Pour 10mL of the other solution into the Erlenmeyer flask.
4. Carefully slide the small test tube and contents into the flask (see figure).
5. Put the stopper in the flask. Record a description of the reactants.

*CAUTION: Avoid contact of solutions with eyes, skin and clothing.*

*Rinse thoroughly with water if an accident does happen.*

1. Find the mass of the entire assembly. Record the mass in the “Mass of Reactants” column.
2. Remove the assembly from the balance or digital scale. Do not adjust the balance if using a balance scale. Invert the assembly and swirl the contents to mix the solutions.
3. Return the assembly to the balance/digital scale and find its mass.
4. Record a description of the reaction and the products. Note the mass and record it in the “Mass of Products” column.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table: Conservation of Mass (12 marks)** | | | | | |
| **Reaction #** | **Names of Reactants** | **Description of**  **Reactants** | **Mass of Reactants (g)** | **Description of**  **Reaction & Products** | **Mass of Products (g)** |
| 1 | lead nitrate (aq)  potassium iodide (aq) |  |  |  |  |
| 2 | copper sulfate (aq)  sodium hydroxide (aq) |  |  |  |  |
| 3 | barium chloride (aq)  sodium sulfate (aq) |  |  |  |  |

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

Sci10: CR2 Chemical Equations  **Investigation**

**Discussion Questions:**

1. For each reaction explain how you know that a chemical change was involved. (3 marks)

Reaction #1 –

Reaction #2 –

Reaction #3 –

1. Make ONE (1) generalized statement that reflects your results for all three reactions. Do your results support the Law of Conservation of Mass? (2 marks)
2. Predict the mass of sulfur trioxide produced when 100g of sulfur reacts with 150g of oxygen.

Write the word equation for the reaction. (2 marks)

1. When 80g of sulfur trioxide reacts with water, 98g of sulfuric acid is formed. What mass of water is required? Write the word equation for the reaction. (2 marks)
2. Represent each of the reactions correctly as chemical equations: (5 marks each)
   1. Reaction #1 - A solution of lead nitrate is mixed with a solution of potassium iodide, making a lead iodide precipitate and a solution of potassium nitrate.
   2. Reaction #2 - A solution of copper sulfate is combined with a solution of sodium hydroxide which makes solid copper hydroxide and a solution of sodium sulfate.
   3. Reaction #3 - A solution of barium chloride combines with a solution of sodium sulfate to make a solution of sodium chloride and barium sulfate precipitate.

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

Sci10: CR2 Chemical Equations **ANSWER KEY Investigation**

**Discussion Questions:**

1. For each reaction explain how you know that a chemical change was involved. (3 marks)

Reaction #1 – **Color change turning bright yellow with minute precipitate forming.**

Reaction #2 – **Forms blue precipitate.**

Reaction #3 – **Forms white precipitate.**

1. Make ONE (1) generalized statement that reflects your results for all three reactions. Do your results support the Law of Conservation of Mass? (2 marks)

**The assembly weighed the same before AND after the reactions. Yes it does.**

1. Predict the mass of sulfur trioxide produced when 100g of sulfur reacts with 150g of oxygen.

Write the word equation for the reaction. (2 marks)

**250g of sulfur trioxide**

**oxygen(g) + sulfur(s) 🡪 sulfur trioxide(s)**

1. When 80g of sulfur trioxide reacts with water, 98g of sulfuric acid is formed. What mass of water is required? Write the word equation for the reaction. (2 marks)

**18g = 18mL of water**

**sulfur trioxide(s) + water(l) 🡪 sulfuric acid(aq)**

1. Represent each of the reactions as balanced chemical equations: (5 marks each)
   1. Reaction #1 - A solution of lead nitrate is mixed with a solution of potassium iodide, making a lead iodide precipitate and a solution of potassium nitrate.

**Pb(NO3)2(aq) + 2KI(aq)  🡪 PbI2(s) + 2KNO3(aq)**

**Pb = 1 Pb = 1**

**N = 2 N = ~~1~~ 2**

**O = 6 O = ~~3~~ 6**

**K = ~~1~~ 2 K = ~~1~~ 2**

**I = ~~1~~ 2 I = 2**

* 1. Reaction #2 - A solution of copper sulfate is combined with a solution of sodium hydroxide which makes solid copper hydroxide and a solution of sodium sulfate.

**Cu(SO4)(aq) + 2NaOH(aq) 🡪 Cu(OH)2(s) + Na2SO4(aq)**

**Cu = 1 Cu = 1**

**S = 1 S = 1**

**O = ~~5~~ 6 O = 6**

**Na = ~~1~~ 2 Na = 2**

**H = ~~1~~ 2 H = 2**

* 1. Reaction #3 - A solution of barium chloride combines with a solution of sodium sulfate to make a solution of sodium chloride and barium sulfate precipitate.

**BaCl2(aq)  + Na2SO4(aq) 🡪 2NaCl(aq) + BaSO4(s)**

**Ba = 1 Ba = 1**

**Cl = 2 Cl = ~~1~~ 2**

**Na = 2 Na = ~~1~~ 2**

**S = 1 S = 1**

**O = 4 O = 4**

Miss Foley

Sci10: CR2 Chemical Equations  **Investigation**

**Conservation of Mass Lab:**

**Mixing Chemicals Teacher Prep**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chemical** | **Pb**  **Atomic Mass** | **2N**  **Atomic Mass** | **6O**  **Atomic Mass** | **g/mol/L** | **divide by 10 = g/0.1mol/L** |
| **lead nitrate(aq)**  **Pb(NO3)2** | 207.19 amu | 2(14.01)=28.02 amu | 6(16.00)=96.00 amu | 331.21 | 33.12 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Chemical** | **K**  **Atomic Mass** | **I**  **Atomic Mass** | **g/mol/L** | **divide by 10 = g/0.1mol/L** |
| **potassium iodide(aq)**  **KI** | 39.10 amu | 126.90 amu | 166.00 | 16.60 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chemical** | **Cu**  **Atomic Mass** | **S**  **Atomic Mass** | **4O**  **Atomic Mass** | **g/mol/L** | **divide by 10 = g/0.1mol/L** |
| **copper sulfate(aq)**  **CuSO4** | 63.55 amu | 32.06 amu | 4(16.00)=64.00 amu | 159.61 | 15.96 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chemical** | **Na**  **Atomic Mass** | **O**  **Atomic Mass** | **H**  **Atomic Mass** | **g/mol/L** | **divide by 10 = g/0.1mol/L** |
| **sodium hydroxide(aq)**  **NaOH** | 22.99 amu | 16.00 amu | 1.01 amu | 40.00 | 4.00 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Chemical** | **Ba**  **Atomic Mass** | **2Cl**  **Atomic Mass** | **g/mol/L** | **divide by 10 = g/0.1mol/L** |
| **barium chloride(aq)**  **BaCl2** | 137.33 amu | 2(35.45) = 70.90 amu | 208.23 | 20.80 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Compound** | **2Na**  **Atomic Mass** | **S**  **Atomic Mass** | **4O**  **Atomic Mass** | **g/mol/L** | **divide by 10 = g/0.1mol/L** |
| **sodium sulfate(aq)**  **Na2SO4** | 2(22.99)=45.98 amu | 32.06 amu | 4(16.00)=64.00 amu | 142.04 | 14.20 |