# The Law of Conservation of Mass

**Problem:** In a chemical reaction, is the mass of the products equal to the mass of the reactants?

**Hypothesis:**

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**Materials:** Erlenmeyer flask, small test tube, rubber stopper, balance.

*Three pairs of solutions:*

- copper (II) sulphate ($CuSO_4$) and sodium hydroxide (NaOH)
- sodium sulphide ($Na_2S$) and zinc nitrate ($ZnNO_3$)
- iron (III) chloride ($FeCl_3$) and potassium hydroxide (KOH)

**Procedure:**

1. Put on your safety glasses.
2. Carry out the reactions one at a time. For each pair of solutions, pour about 10 mL of one solution into the flask. Half fill a small test tube with the other solution. Describe the reactants in your observations table.
3. Carefully, so that the two solutions do not mix, slide the small test tube into the flask. The test tube should be placed so that it rests diagonally against the flask as shown in figure 1.
4. Place a stopper in the Erlenmeyer flask, to ensure no materials may enter or exit the flask.
5. Measure and record the mass of the flask and contents.
6. Carefully tip the flask to allow the two solutions to mix. Swirl the flask carefully so that you do not break the small test tube. Keep swirling to allow the reaction to take place (you'll know the reaction has taken place when the solutions change colour).
7. When the reaction has taken place, measure and record the mass of the flask and contents.
8. To clean up: pour the contents of the flask into the chemical waste container. Wash the flask and test tube.
9. Repeat the above procedure with each pair of solutions.

**Observations:**

| | Names of Reactants | Description of Reactants | Mass of Reactants (g) | Description of Reaction and Products | Mass of Products (g) |
|---|---|---|---|---|---|
| 1 | Copper (II) Sulphate | | | | |
| | Sodium Hydroxide | | | | |
| 2 | Sodium Sulphide | | | | |
| | Zinc Nitrate | | | | |
| 3 | Iron (III) Chloride | | | | |
| | Potassium Hydroxide | | | | |

**Analysis:**

1. For each of the reactions, explain how you know that a chemical change has taken place.

2. Compare the mass of the starting substances (reactants) to new substances (products).

3. Using your own words state the law of conservation of mass.

4. Solution A has a mass of 70 g. Solution B has a mass of 35 g. When they are mixed, a chemical reaction occurs in which gas is produced. If the mass of the final mixture is 90 g, what mass of gas was produced?

5. Give an example of a process you notice or use each day that obeys the conservation of mass law. Explain how this process works.