PENANG SANGAM HIGH SCHOOL
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LESSON NOTES

Year/Level: 11 C/D **Subject:** Chemistry

Strand	3 Reactions
Sub Strand	3.1 chemical equations and calculations
Content Learning Outcome	Define and verify the Law of Conservation of Mass by carrying out experiments

Law of Conservation Of Mass

- The **law of conservation of mass** states that mass is neither created nor destroyed in any ordinary chemical reaction. Therefore the mass of the reactants will always be equal to the mass of the products.
- The law of conservation of mass was established in 1789 by French Chemist Antoine Lavoisier

Example: 1

In an experiment to prove that the law of conservation of mass is correct, copper carbonate ($CuCO_3$) was decomposed by heating it. The products were copper oxide (CuO) and carbon dioxide (CO_2).

The mass of copper carbonate at the beginning of the experiment was 12.4g.

The mass of copper oxide at the end of the experiment was 8.0g.

Carbon dioxide was collected by bubbling it through sodium hydroxide solution.

What mass of carbon dioxide was collected?

12.4g $CuCO_3$ ⟶ 8.0g CuO + ? CO_2

$CuCO_{3(s)}$ ⟶ $CuO_{(s)}$ + $CO_{2(g)}$

12.4g 8.0g 4.4g

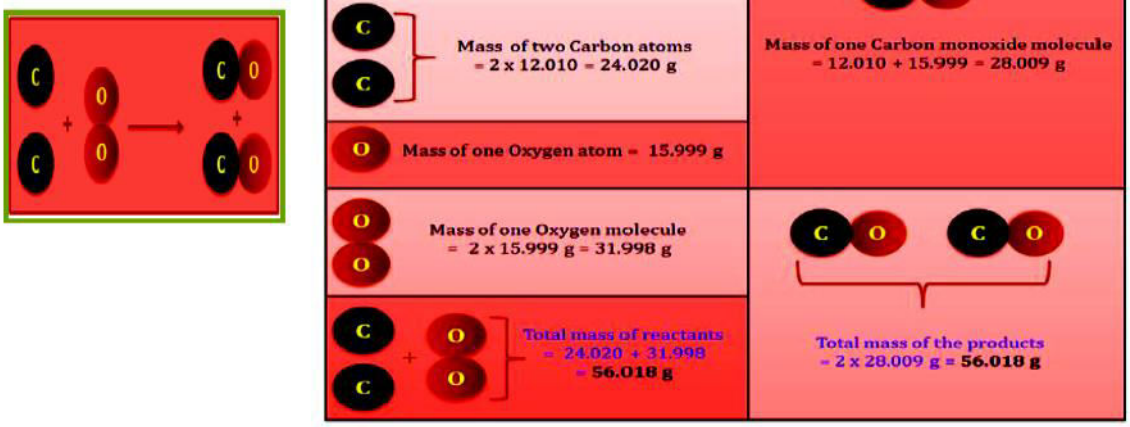
12.4
- 8.0
4.4g

Example 2

Carbon combines with oxygen at low concentration to form carbon monoxide.

$$\mathbf{2C + O_2 \rightarrow 2CO}$$

This equation shows that the total mass of the reactants and products are equal. The number of atoms of carbon and oxygen in the reactant and product sides are also equal.



Examples showing the Law of Conservation of Mass

1. In an experiment where 50 g of sodium was reacted with 76 g of chlorine to form sodium chloride salt, it was found that 126 g of the salt was formed.

$$\underset{50\text{ g}}{2Na(s)} + \underset{76\text{ g}}{Cl_2(g)} \longrightarrow \underset{126\text{ g}}{2NaCl(s)}$$

2. When 24.8 g of copper carbonate is strongly heated, it produces 16 g of copper oxide and 8.8 g of carbon dioxide gas.

$$\underset{24.8\text{ g}}{CuCO_3(s)} \longrightarrow \underset{16\text{ g}}{CuO(s)} + \underset{8.8\text{ g}}{CO_2\ g)}$$

3. When a 10 g sample of iron reacts with oxygen to form 18.2 g of ferric oxide, 8.2 g of oxygen was needed.

$$\underset{10\text{ g}}{4Fe(s)} + \underset{8.2\text{ g}}{3O_2(g)} \longrightarrow \underset{18.2\text{ g}}{2Fe_2O_3(s)}$$

Activity

1. a. If 178.8 g of water is separated into hydrogen and oxygen gas, and the hydrogen gas has a mass of 20.0 g. What is the mass of the oxygen gas produced?

$H_2O_{(l)} \longrightarrow H_{2(g)} + O_{2(g)}$

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b. From a laboratory process, a student collects 28.0 g of hydrogen and 224.0 g of oxygen. How much water was originally involved in the process?

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