

Conservation of mass



Task 1: What is conservation of mass?

a) **Draw** a particle diagram storyboard to show how mass is conserved in:

i) water boiling

ii) the reaction between carbon (C) and oxygen (O_2) to make carbon dioxide (CO_2)

b) **Identify** which example above is the physical change and which is the chemical reaction.

c) For each reaction, **write** the word equation and then **calculate** the missing mass.

i) 12 g of hydrogen is completely reacted with 6 g of fluorine. **What mass** of hydrogen fluoride is formed?

ii) 40 g of calcium oxide is formed from 15 g of calcium reacting with oxygen. **What mass** of oxygen reacted?

iii) 1.5 g of methane reacted with **how many** grams of oxygen if the total mass of carbon dioxide and water was 3.6 g?



Task 2: Why does mass appear to change?

a) **Explain** why mass appears to change in chemical reactions.

b) For the following reactions, **tick** to show whether the mass will appear to increase or decrease.

Reaction	Mass will appear to increase	Mass will appear to decrease
$\text{Ca(s)} + \text{O}_2\text{(g)} \rightarrow \text{CaO(s)}$		
$\text{K}_2\text{CO}_3\text{(s)} \rightarrow \text{K}_2\text{O(s)} + \text{CO}_2\text{(g)}$		
$\text{Mg(s)} + 2\text{HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{(g)}$		
$\text{Na(s)} + \text{Cl}_2\text{(g)} \rightarrow \text{NaCl(s)}$		
$\text{Al}_2\text{O}_3\text{(s)} \rightarrow \text{Al(s)} + \text{O}_2\text{(g)}$		

Task 3: Conservation of mass experiment

Rewrite the paragraph and **correct** the mistakes.

Oxygen is a solid. When oxygen reacts with magnesium gas from the surroundings, it forms sodium oxide. Magnesium can be cooled in a crucible over a bunsen burner. The mass of the crucible will decrease over the course of the reaction. This is because magnesium oxide is a gas. The word equation for this reaction is:

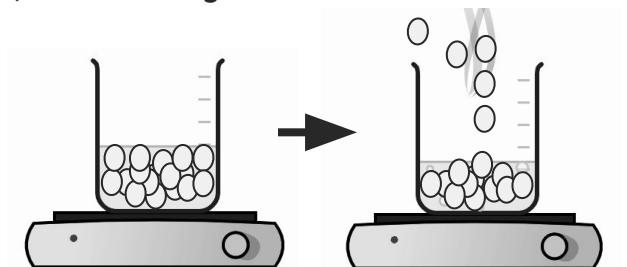
magnesium oxide + oxygen \rightarrow magnesium



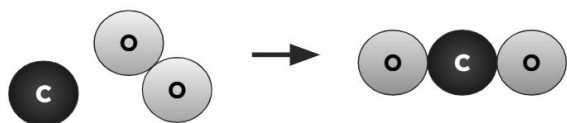
Task 1: What is conservation of mass?

a) **Draw** a particle diagram storyboard to show how mass is conserved in:

i) water boiling



ii) the reaction between carbon (C) and oxygen (O_2) to make carbon dioxide (CO_2)



b) **Identify** which example above is the physical change and which is the chemical reaction.

Water boiling is a physical change.

The reaction between carbon and oxygen is a chemical reaction.

c) For each reaction, **write** the word equation and then **calculate** the missing mass.

i) 12 g of hydrogen is completely reacted with 6 g of fluorine. **What mass** of hydrogen fluoride is formed?

hydrogen + fluorine \rightarrow hydrogen fluoride

18 g hydrogen fluoride

ii) 40 g of calcium oxide is formed from 15 g of calcium reacting with oxygen. **What mass** of oxygen reacted?

calcium + oxygen \rightarrow calcium oxide

25 g oxygen

iii) 1.5 g of methane reacted with **how many** grams of oxygen if the total mass of carbon dioxide and water was 3.6 g?

methane + oxygen \rightarrow carbon dioxide + water

2.1 g oxygen



Task 2: Why does mass appear to change?

a) **Explain** why mass appears to change in chemical reactions.

Mass may appear to decrease or increase.

An increase is due to a gaseous reactant giving solid or liquid products.

A decrease is due to solid or liquid reactants giving a gaseous product that is escaping to the surroundings.

b) For the following reactions, **tick** to show whether the mass will appear to increase or decrease.

Reaction	Mass will appear to increase	Mass will appear to decrease
$\text{Ca(s)} + \text{O}_2\text{(g)} \rightarrow \text{CaO(s)}$	✓	
$\text{K}_2\text{CO}_3\text{(s)} \rightarrow \text{K}_2\text{O(s)} + \text{CO}_2\text{(g)}$		✓
$\text{Mg(s)} + 2\text{HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{(g)}$		✓
$\text{Na(s)} + \text{Cl}_2\text{(g)} \rightarrow \text{NaCl(s)}$	✓	
$\text{Al}_2\text{O}_3\text{(s)} \rightarrow \text{Al(s)} + \text{O}_2\text{(g)}$		✓

Task 3: Conservation of mass experiment

Rewrite the paragraph and **correct** the mistakes.

Oxygen is a solid. When oxygen reacts with magnesium gas from the surroundings, it forms sodium oxide. Magnesium can be cooled in a crucible over a bunsen burner. The mass of the crucible will decrease over the course of the reaction. This is because magnesium oxide is a gas. The word equation for this reaction is:

magnesium oxide + oxygen \rightarrow magnesium

Magnesium is a solid. When oxygen reacts with **oxygen** gas from the surroundings, it forms **magnesium** oxide. Magnesium can be **heated** in a crucible over a bunsen burner. The mass of the crucible will **increase** over the course of the reaction. This is because magnesium oxide is a **solid**. The word equation for this reaction is:

magnesium + oxygen \rightarrow magnesium **oxide**