

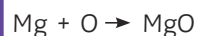
AQA GCSE Chemistry (Combined Science) Unit 5.3: Quantitative Chemistry Knowledge Organiser - Foundation

Conservation of Mass

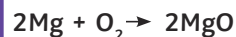
No atoms can be created or made during a chemical reaction, so the mass of the reactants will equal the mass of the product.

Reactions can be shown as a word or symbol equation.

magnesium + oxygen → magnesium oxide



Symbol equations should also be balanced; they should have the same number of atoms on each side.



Relative Formula Mass

The relative formula mass is the sum of all the relative atomic masses of the atoms in the formula.

Examples:

HCl

$$A_r \text{ of H} = 1$$

$$A_r \text{ of Cl} = 35.5$$

$$1 + 35.5 = 36.5$$

H₂SO₄

$$A_r \text{ of H} = 1$$

$$A_r \text{ of S} = 32$$

$$A_r \text{ of O} = 16$$

$$(1 \times 2) + 32 + (16 \times 4)$$

$$2 + 32 + 64 = 98$$

Calculating Percentage Mass of an Element in a Compound

percentage mass of an element in a compound =

$$A_r \times \frac{\text{number of atoms of that element}}{M_r \text{ of the compound}}$$

Find the percentage mass of magnesium in magnesium oxide.

$$A_r \text{ of magnesium} = 24$$

$$A_r \text{ of oxygen} = 16$$

$$M_r \text{ of MgO} = 24 + 16$$

$$= 40$$

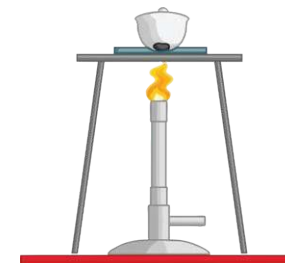
$$\% \text{ mass} = \frac{A_r}{M_r} = \frac{24}{40} = 0.6 \quad 0.6 \times 100 = 60\%$$

During a reaction the mass can change. If one of the reactants is a gas, the mass can go up.

E.g.



Oxygen from the air is added to the magnesium (making the product) which will be heavier in mass.

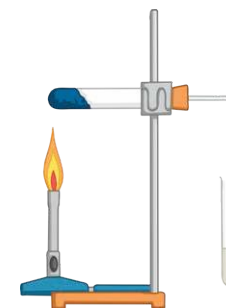


If one of the products is a gas, the mass can go down.

E.g.



When sodium carbonate is thermally decomposed, carbon dioxide gas is produced and released into the atmosphere.



Concentration of Solutions

Concentration is the amount of a substance in a specific volume of a solution. The more substance that is dissolved, then the more concentrated the solution is.

It is possible to calculate the concentration of a solution with the following equation:

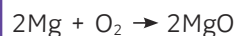
$$\text{concentration (g/dm}^3\text{)} = \text{mass (g)} \div \text{volume of solvent (dm}^3\text{)}$$

The equation can be rearranged to find the mass of the dissolved substance:

$$\text{mass (g)} = \text{concentration (g/dm}^3\text{)} \times \text{volume (dm}^3\text{)}$$

Conservation of Mass

Show that mass is conserved in a reaction.



$$(2 \times 24) + (2 \times 16) \rightarrow 2(24 + 16)$$

$$48 + 32 \rightarrow 2 \times 40$$

$$80 \rightarrow 80$$

Total M_r on the left-hand side of the equation is the same as the M_r on the right-hand side.

Calculate the mass of the product.

8g of magnesium reacts with 6g of oxygen:

$$8 + 6 = 14\text{g of magnesium oxide}$$

