

Cambridge IGCSE Chemistry

Topic 4: Stoichiometry

Stoichiometry

Notes



Use the symbols of the elements and write the formulae of simple compounds

- Examples of symbols of the elements: Sodium (Na), Chlorine (Cl) etc... (how they are shown in the periodic table)
- Example of a formula of a simple compound: Sodium chloride (NaCl).

(Extended only) Determine the formula of an ionic compound from the charges on the ions present

- To find the formula of simple compounds:
 - o work out what charge ion each element should form
 - o balance out the charges (so they equal zero) by increasing the number of certain elements
 - o write the formula, using little numbers e.g. ₂ to show if you have more than one of a certain element
- E.g. Magnesium chloride :
 - o Magnesium forms a Mg^{2+} ion and chlorine forms a Cl^- ion
 - o Therefore, to balance the charges, you need to have 2 x Cl^- ions and 1 x Mg^{2+} ion
 - o MgCl_2

Deduce the formula of a simple compound from the relative numbers of atoms present

- for example, if you had 1 atom of aluminium (Al) for every 3 chlorine atoms (Cl), the formula of the compound would be AlCl_3

(Extended only) Construct equations with state symbols, including ionic equations

- (g) means gas, (s) means solid, (l) means liquid, (aq) means aqueous
- Example to find an ionic equation:
 - o Start with the balanced chemical equation
 - $\text{HCl(aq)} + \text{NaOH(aq)} \rightarrow \text{NaCl(aq)} + \text{H}_2\text{O(l)}$
 - o Split up (aq) compounds into its ions
 - $\text{H}^+ + \text{Cl}^- + \text{Na}^+ + \text{OH}^- \rightarrow \text{Na}^+ + \text{Cl}^- + \text{H}_2\text{O}$
 - o Cancel out the ions that are the same on either side – known as 'spectator ions', leaving the ionic equation
 - $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$



Deduce the formula of a simple compound from a model or a diagrammatic representation

- work out how many of each different element you have in the compound and then write the formula (remember to use smaller letters ₃ to demonstrate how many of each element you have)

(Extended only) Deduce the balanced equation for a chemical reaction, given relevant information

- Must have the same amount of atoms on either side of the equation i.e. if 2Na react, then there must be 2Na that are produced, this includes something like 2NaCl
- to write a balanced equation:
 - o write out the unbalanced equation using symbols for reactants and products e.g. $\text{H}_2 + \text{Cl}_2 \rightarrow \text{HCl}$
 - o count up how many of each element you have on the reactant and product side of the equation.
 - for H: 2 on reactant, 1 on product
 - for Cl: 2 on reactant, 1 on product
 - o use large numbers at the front of formulas to balance out the numbers of atoms of elements so they are the same on both sides
 - $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$
 - o add state symbols
 - $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{aq})$

Construct word equations and simple balanced chemical equations

- Example of word equation: hydrochloric acid + sodium hydroxide → sodium chloride + water
- Example of balanced chemical equation: $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

Define relative atomic mass, A_r , as...

- The average mass of naturally occurring atoms of an element on a scale where the ^{12}C atom has a mass of exactly 12 units

Define relative molecular mass, M_r , as...

- The sum of the relative atomic masses
- Relative formula mass or M_r will be used for ionic compounds.

