

Definitions and Concepts for Edexcel Chemistry A-level

Topic 5: Formulae, Equations & Amounts of Substance

Mole: The unit for the amount of substance. This is the amount of chemical species found in 12 g of ^{12}C .

Avogadro's constant: The number of atoms in exactly 12 g of ^{12}C ($6.02 \times 10^{23} \text{ mol}^{-1}$).

Molar Mass: Mass of one mole of the substance expressed in g mol^{-1} .

Empirical formula: Smallest whole number ratio of atoms of each element in a compound, e.g. the empirical formula of benzene (C_6H_6), cyclobutadiene (C_4H_4) and acetylene (C_2H_2) is simply "CH".

Molecular formula: The actual number of atoms of each element in a molecule.

Spectator ions: Ions that do not take part in the reaction,

e.g. $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$ can be written as $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$; the spectator ions are: Na^+ , Cl^-

Hydrate: a compound that has molecules of water of crystallisation, e.g. $\text{MgSO}_4 \cdot 7 \text{H}_2\text{O}$.

Solution: *solute* (is dissolved) + *solvent* (dissolves the solute). *Standard solution* is the one with accurately known concentration.

Mass concentration: mass of *solute* per volume of *solution*, g dm^{-3} .

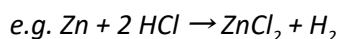
Molar concentration: moles of *solute* per volume of *solution*, mol dm^{-3} .

Primary standard: a substance used for preparation of a standard solution by weighing.

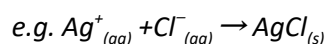
Avogadro's law: Provided the conditions of temperature and pressure are the same, equal volume of gases contain the same number of molecules.

Molar volume: The volume of 1 mol of a gas.

Displacement reaction: More reactive element reacts to take place of less reactive element in a compound,



Precipitation reaction: The one that produces an insoluble solid.



Error: A discrepancy between the value obtained in the experiment and an actual value.

Precision: Refers to how close to each other are the values obtained in an experiment.

Accuracy: Refers to how close these values are to the actual value.

Concordant results: Results that lie close to each other. In titration, these are titres that usually lie within $\pm 0.20 \text{ cm}^3$.

Margin of error: The range in which the true value of a measurement could lie, e.g. for burettes $\pm 0.05 \text{ cm}^3$.



Random errors: They occur when conditions are varied in an unpredictable manner.

Systematic errors: Errors which are constant when you repeat an experiment. They usually are a result of the apparatus used.

$$\text{Percentage uncertainty} = (\text{Uncertainty/Reading}) \times 100\%$$

$$\text{Percentage yield} = (\text{Actual yield/Theoretical yield}) \times 100\%$$

Atom economy: Measure of the proportion of reaction atoms that become part of the desired product in the balanced chemical equation.

$$\text{Atom Economy} = (\text{Molar mass of desired product/Total molar mass of all products}) \times 100\%$$

