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 (6.02×10^{23} mol^{-1}).

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

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. $NaOH + HCl \rightarrow NaCl + H_2O$ can be written as $H^+ + OH^- \rightarrow H_2O$; the spectator ions are: Na^+, Cl^-

Hydrate: a compound that has molecules of water of crystallisation, e.g. $MgSO_4 \cdot 7\ H_2O$.

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*, gdm^{-3}.

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

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,

$$e.g.\ Zn + 2\ HCl \rightarrow ZnCl_2 + H_2$$

Precipitation reaction: The one that produces an insoluble solid.

$$e.g.\ Ag^+_{(aq)} + Cl^-_{(aq)} \rightarrow AgCl_{(s)}$$

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 $+/-0.20\ cm^3$.

Margin of error: The range in which the true value of a measurement could lie, e.g. for burettes $+/-0.05\ cm^3$.

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.

Percentage uncertainty = (Uncertainty/Reading) x 100%

Percentage yield = (Actual yield/Theoretical yield) x 100%

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

Atom Economy = (Molar mass of desired product/Total molar mass of all products) x 100%