# 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 $^{12}C$ ($6.02 \times 10^{23}$ $mol^{-1}$).

**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%**