Year 1 Definitions and Laws

Module 2: Foundations in Chemistry

Isotopes	Atoms of the same element with the same numbers of protons and electrons, different numbers of neutrons and different masses
Relative isotopic mass	Mass of an isotope compared with 1/12 of the mass of an atom of carbon-12
Relative atomic mass	Weighted mean mass of an atom of an element compared with $1/12^{th}$ of the mass of an atom of carbon-12
Amount of substance	Number of particles in a substance, measured in moles (mol).
Mole ('mol')	The unit for amount of substance
1 mole	The same number of particles as there are atoms in exactly 12g of carbon-12. Contains 6.02×10^{23} particles [the Avogadro number of particles]
Avogadro constant, N_A	The number of particles per mol. $N_A = 6.02 \times 10^{23}$ mol^{-1}
Molar mass	Mass in grams per mole of a substance. Units: g mol^{-1}
Molar gas volume	The volume of 1 moles of a gas. Units: dm^3 mol^{-1}
Empirical formula	The simplest whole number ratio of atoms of each element present in a compounds.
Molecular formula	The number of atoms of each element in a molecule
Anhydrous	Contains no water of crystallisation.
Hydrated	Contains water molecules (water of crystallisation) as part of the crystalline structure.
Water of crystallisation	The water molecules contained within a crystalline structure.
Ideal gas equation	$pV = nRT$
Atom economy	$= \frac{M_r\_of\_useful\_products}{sum\_of\_M_r\_of\_all\_products} \times 100$
Oxidation	Loss of electrons (increase in oxidation number)
Reduction	Gain of electrons (decrease in oxidation number)
Atomic orbital	Region around the nucleus that can hold up to two electrons, with opposite spin
Ionic bonding	The electrostatic attraction between positive and negative ions
Covalent bonding	The strong electrostatic attraction between a shared pair of electrons and the nuclei of the bonded atoms
Electronegativity	The ability of an atom to attract the bonding pair of electrons in a covalent bond

Module 3: Periodic Table and Energy

First ionisation energy	Energy required to remove 1 mole of electrons from 1 mole of gaseous atoms.
Metallic bonding	The strong electrostatic attraction between cations (positive ions) and delocalised electrons
Disproportionation	Oxidation and reduction of the same element
Standard conditions	100kPa and 298K
Standard states	Physical state of a substance under standard conditions (100kPa, 298K)
Enthalpy change of reaction $\Delta_r H$	The enthalpy change associated with a reaction in the molar quantities shown in the chemical equation.
Enthalpy change of formation $\Delta_f H$	The enthalpy change on formation of 1 mole of a compound from its elements.
Enthalpy change of combustion $\Delta_c H$	The enthalpy change on complete combustion of 1 mole of a substance.
Enthalpy change of neutralisation $\Delta_{neut} H$	The enthalpy change on formation of 1 mole of water from neutralisation.
Standard enthalpy change	As above but add 'under standard conditions and with all substances in their standard states'
Average bond enthalpy	Enthalpy change on breaking 1 mole of bonds in gaseous molecules.
Catalyst	Substance which increases the rate of reaction without being used up by the overall reaction. Allows a reaction to proceed via a different route with a lower activation energy.
Homogeneous catalyst	Has the same physical state as the reactants.
Heterogeneous catalyst	Has a different physical state to the reactants.
Le Chatelier's Principle	The position of an equilibrium will shift so as to minimise the effect of any change in conditions.

Module 3: Core Organic Chemistry

Homologous Series	A series of organic compounds with the same functional group and each successive member differs by CH_2
Structural isomers	Compounds with the same molecular formula but different structural formulae
Stereoisomers	Compounds with the same structural formula but with a different arrangement in space.
E/Z isomers	An example of stereoisomerism. Restricted rotation about the C=C double bond and 2 different groups attached to each carbon atom of the C=C double bond.
Cis-trans isomers	A special case of E/Z isomerism where 2 of the groups attached to each carbon atom of the C=C double bond are the same (must define E/Z isomerism too).
Homolytic fission	The breaking of a covalent bond so that each atom receives one electron from the bonded pair forming two radicals.
Heterolytic fission	The breaking of a covalent bond so that one atom takes both electrons from the bonded pair.
Curly arrow	Shows movement of an electron pair.
Radical	A species with an unpaired electron.
Electrophile	An electron pair acceptor.
Nucleophile	An electron pair donor.
σ bond	Overlap of orbitals directly between the bonding atoms
π bond	Sideways overlap of 2 p-orbitals
Aliphatic	Compounds containing C and H joined together in straight chains, branched chains or non-aromatic rings.
Alicyclic	Aliphatic compounds containing C and H joined together in non-aromatic rings.
Aromatic	A compound containing a benzene (arene) ring.