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Chemistry Definitions

A. QUANTITATIVE CHEMISTRY

Solution: homogenous mixture of solute and solvent.

Solute: the substance that is dissolved in the solution.

Solvent: the substance in which another substance is dissolved, forming a solution.

Concentration: the amount of solute per unit volume of solution.

B. CHEMICAL BONDING

Intramolecular bond: a bond which occurs between atoms within molecules.

Covalent bond: a sharing of at least one pair of electrons by two non-metal atoms.

Non-polar covalent (*pure covalent*): an equal sharing of electrons.

Polar covalent: an unequal sharing of electrons leading to a dipole forming (as a result of electronegativity difference).

Ionic bond: a transfer of electrons and subsequent electrostatic attraction.

Metallic bonding: being between a positive kernel and a sea of delocalised electrons.

Intermolecular forces: a weak force of attraction between molecules, ions, or atoms of noble gasses.

C. ENERGY CHANGE & RATES OF REACTIONS

Heat of reaction (ΔH): the net change of chemical potential energy of the system.

Exothermic reactions: reactions which transform chemical potential energy into thermal energy.

Endothermic reactions: reactions which transform thermal energy into chemical potential energy.

Activation energy: the minimum energy required to start a chemical reaction OR the energy required to form the activated complex.

Activated complex: a high energy, unstable, temporary transition state between the reactants and the products.

Reaction rate: the change in concentration per unit time of either a reactant or product.

Catalyst: a substance that increase the rate of the reaction but remains unchanged at the end of the reaction.

D. CHEMICAL EQUILIBRIUM

Closed system: one in which mass is conserved inside the system but energy can enter or leave the system freely.

Open system: one in which both the energy and matter can be exchanged between the system and its surroundings.

Reversible reaction: one in which products can be converted back into reactants.

Dynamic chemical equilibrium: a reversible reaction in which the forward and reverse reactions are taking place at the same rate, and hence the concentrations of reactants and products are constant.

Le Châtelier's principle: when an external stress (change in pressure, temperature or concentration) is applied to a system in dynamic chemical equilibrium, the equilibrium point will change in such a way as to counteract the stress.

E. ACIDS & BASES

Acid: a proton donor

Base: a proton acceptor

Ionisation: the reaction of a molecular substance with water to produce ions.

Strong acid: an acid that ionises completely in an aqueous solution.

- HCl – hydrochloric acid
- H₂SO₄ – sulfuric acid
- HNO₃ – nitric acid

Weak acid: an acid that only ionises partially on an aqueous solution.

- HF – hydrofluoric acid
- H₃PO₄ – phosphoric acid
- H₂SO₃ – sulphurous acid
- (COOH)₂ – oxalic acid
- CH₃COOH – ethanoic acid
- Other carboxylic acids (see organic chem)

Dissociation: the splitting of an ionic compound into its ions.

Strong base: a base that dissociates / ionises completely in an aqueous solution.

- Group 1 hydroxides

Weak base: a base that dissociates / ionises only partially in an aqueous solution.

- Ammonia solution: NH₃ (aq) OR NH₄OH (aq)

Amphoteric (or amphiprotic): a substance that can act as either an acid or a base (e.g. H₂O, HCO₃⁻, HSO₄⁻).

K_w for water at 25°: [H₃O⁺][OH⁻].

Salt: a substance in which the hydrogen of an acid has been replaced by a cation.

Hydrolysis of a salt: a reaction of an ion (from a salt) with water.

Neutralisation (equivalence point): the point where an acid and base have reacted so neither is in excess.

Standard solution: a solution of known concentration.

F. ELECTROCHEMISTRY

Redox reaction: a reaction involving the transfer of electrons.

Oxidation: the loss of electrons.

Reduction: the gain of electrons.

Oxidising agent: a substance that accepts electrons.

Reducing agent: a substance that donated electrons.

Anode: the electrode where oxidation takes place.

Cathode: the electrode where reduction takes place.

Electrolyte: a substance that can conduct electricity by forming free ions when molten or dissolved in solution.

G. ORGANIC CHEMISTRY

Hydrocarbon: a compound containing only carbon and hydrogen atoms.

Saturated compound: a compound in which all of the bonds between carbon atoms are single bonds.

Unsaturated compound: a compound in which there is at least one double and / or triple bond between carbon atoms.

Functional group: an atom or group of atoms that form the centre of chemical activity in the molecule.

Homologous series: a series of similar compounds which have the same functional group and have the same general formula, in which each member differs from the previous one by a single CH_2 unit.

Structural isomer: compounds having the same molecular formula but different structural formulae.

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