

Module F325 Definitions

Topic 1 - How far?

No definitions

Topic 2 - How fast?

Rate of reaction	rate of change of concentration of reactants or products (units are mol dm ⁻³ s ⁻¹)
Order of reaction	power of reactant's concentration in the rate equation
Rate constant	the constant of proportionality, k, in the rate equation
Half-life	the time for the concentration of a reactant to fall to half its original value
Rate determining step	the slowest step (in the reaction mechanism)

Topic 3 - Acids and bases

Acid (Bronsted-Lowry)	proton donor
Base (Bronsted-Lowry)	proton acceptor
Strong acid or base	fully ionised (or dissociated)
Weak acid or base	partially ionised (or dissociated)
Conjugate acid-base pairs	Two species differing by H ⁺
pH	pH = -log[H ⁺]
K _w (ionic product of water)	K _w = [H ⁺][OH ⁻]
K _a (acid dissociation constant)	K _a = $\frac{[H^+][A^-]}{[HA]}$
pK _a	pK _a = -log[K _a]
Buffer solution	a solution that resists change in pH
Enthalpy of neutralisation	the change in enthalpy that occurs when an acid and base undergo a neutralisation reaction to form one mole of water i.e. H ⁺ (aq) + OH ⁻ (aq) → H ₂ O(l)

Topic 4 - Lattice enthalpy and entropy

Lattice enthalpy	the enthalpy change that accompanies the formation of one mole of a solid compound from its constituent gaseous ions e.g. $\text{Na}^+(\text{g}) + \text{Cl}^-(\text{g}) \rightarrow \text{NaCl}(\text{s})$
Enthalpy of solution	Enthalpy when one mole of an ionic solid is completely dissolved in water e.g. $\text{NaCl}(\text{s}) \rightarrow \text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})$
Enthalpy of hydration	Enthalpy change when one mole of gaseous ions is completely dissolved in water e.g. $\text{Na}^+(\text{g}) \rightarrow \text{Na}^+(\text{aq})$ or $\text{Cl}^-(\text{g}) \rightarrow \text{Cl}^-(\text{aq})$

Topic 5 - Transition elements

Transition element	a d-block element that forms one or more stable ions with an incomplete set of d electrons
Complex ion	a central ion surrounded by ligands
Ligand	an ion or molecule with a lone pair of electrons able to form a dative covalent bond
Ligand substitution	a reaction in which one ligand is displaced by another ligand
Co-ordination number	the number of lone pairs bonded to the central ion
Bidentate ligand	a ligand that can form two dative bonds because it has two lone pairs
Stability constant, K_{stab}	equilibrium constant for the formation of a complex ion in a solvent from its constituent ions e.g. for $[\text{Fe}(\text{H}_2\text{O})_6]^{2+} + 6\text{NH}_3 \rightleftharpoons [\text{Fe}(\text{NH}_3)_6]^{2+} + 6\text{H}_2\text{O}$

$$K_{\text{stab}} = \frac{[\text{Fe}(\text{NH}_3)_6]^{2+}}{[\text{Fe}(\text{H}_2\text{O})_6]^{2+} [\text{NH}_3]^6}$$

Topic 6 - Electrode potentials

Standard electrode potential	the voltage of a cell when the electrode is connected to a hydrogen electrode under standard conditions
Redox reaction	reaction in which one element loses electrons and another element gains electrons
Half-equation	an equation involving electrons that shows a species being oxidised or reduced
Oxidation state (or number)	difference between the number of electrons associated with an element on its own and when in a compound
Oxidising agent	electron acceptor
Reducing agent	electron donor