Class12-Chemistry-JEE-Mains-Formulas

October 18, 2025

Chapter	Concept	Formula / Key Point
Solid State	Types of Solids	Crystalline (long-range order), Amorphous (no order)
	—	—
	Unit Cell Parameters	Edge length (a), angles (α, β, γ)
	—	—
	Packing Efficiency	SC = 52%, BCC = 68%, FCC = 74%
	—	—
	Density of Unit Cell	$\rho = \frac{ZM}{N_A a^3}$
	—	—
Solutions	Molarity (M)	$M = \frac{\text{moles solute}}{\text{liters of solution}}$
	—	—
	Molality (m)	$m = \frac{\text{moles solute}}{\text{kg of solvent}}$
	—	—
	Mole Fraction (X_A)	$X_A = \frac{n_A}{\sum n_i}$
	—	—
	Vapour Pressure Lowering (Raoult's Law)	$P_{\text{solution}} = X_{\text{solvent}} P^0_{\text{solvent}}$
	—	—
	Boiling Point Elevation	$\Delta T_b = K_b m$
	—	—
	Freezing Point Depression	$\Delta T_f = K_f m$
	—	—
	Osmotic Pressure	$\Pi = MRT$
	—	—
	Van't Hoff Factor	$i = \frac{\text{observed colligative effect}}{\text{calculated colligative effect}}$
	—	—
Electrochemistry	Electrode Potential	$E = E^\circ - \frac{0.0591}{n} \log Q$ (Nernst Equation at 25°C)
	—	—
	Gibbs Free Energy and Cell Potential	$\Delta G = -nFE$
	—	—

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	Relation with Equilibrium Constant	$E^\circ = \frac{0.0591}{n} \log K$
	—	—
	Electrolytic Conductance	$\kappa = \frac{1}{R}\frac{l}{A}$
	—	—
	Molar Conductance	$\Lambda_m = \frac{\kappa \times 1000}{C}$
	—	—
Chemical Kinetics	Rate Law	Rate $= k[A]^m[B]^n$
	—	—
	Order of Reaction	Sum of powers in rate law $(m + n)$
	—	—
	First Order Reaction	$[A] = [A] * 0e^{-kt}$, $t * 1/2 = \frac{0.693}{k}$
	—	—
	Arrhenius Equation	$k = Ae^{-\frac{E_a}{RT}}$
	—	—
Surface Chemistry	Adsorption Isotherm	Langmuir Isotherm: $\frac{x}{m} = \frac{abP}{1+bP}$
	—	—
	Catalysis	Homogeneous & Heterogeneous catalysis; Activation energy lowering
	—	—
The p-Block Elements	Group 13 (Boron Family)	Oxidation states: +3 and +1; Borax formula: Na2B4O7 · 10H2O
	—	—
	Group 14 (Carbon Family)	Oxidation states: +4 and +2; Catenation strongest in Carbon
	—	—
	Group 15 (Nitrogen Family)	Oxidation states: -3 to +5; Nitric acid, ammonia important compounds
	—	—
	Group 16 (Oxygen Family)	Oxidation states: -2, +4, +6; Sulfur allotropes, SO2, SO3
	—	—
	Group 17 (Halogens)	Oxidation states: -1 to +7; Reactivity decreases down group
	—	—
	Group 18 (Noble Gases)	Mostly inert; Compounds like XeF4 exist
	—	—
The d-Block Elements	General Characteristics	Variable oxidation states; Form colored ions
	—	—

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	Electronic Configuration	(n-1)d^{1-10} ns^{0-2}
	—	—
	Magnetic Moment	$\mu = \sqrt{n(n+2)}$ BM (n = number of unpaired electrons)
	—	—
	Complex Formation	Ligand coordination; Coordination number 4 or 6 common
	—	—
The Coordination Compounds	Coordination Number	Number of ligand bonds to central atom
	—	—
	Werner's Theory	Primary & secondary valency
	—	—
	Crystal Field Splitting	$ _0$ (octahedral), $ _t$ (tetrahedral)
	—	—
	Color & Magnetic Properties	Due to d-orbital splitting and electron arrangement
	—	—
The Organic Chemistry	IUPAC Nomenclature	Rules for naming organic compounds
	—	—
	Isomerism	Structural, geometrical, optical
	—	—
	Functional Groups	Alcohol (-OH), Aldehyde (-CHO), Ketone (>C=O), Carboxylic Acid (-COOH), etc.
	—	—
	Reaction Types	Addition, Substitution, Elimination, Rearrangement
	—	—
The Haloalkanes & Haloarenes	Reactions	Nucleophilic substitution, elimination
	—	—
The Alcohols, Phenols & Ethers	Properties	H-bonding, acidity of phenols > alcohols
	—	—
	Reactions	Dehydration, oxidation, esterification
	—	—
The Organic Compounds Containing Nitrogen	Amines	Basicity, substitution reactions
	—	—
	Diazonium Salts	Preparation, reactions in azo dye synthesis