

JEE Main Chemistry Formula & Reaction Handbook

Key Equations, Named Reactions & Concepts for Quick Revision

Physical Chemistry — Key Formulas

- Mole concept: $n = \text{given mass} / \text{molar mass} = N / N_A$ ($N_A = 6.022 \times 10^{23}$)
- Ideal Gas Equation: $PV = nRT$
- $\text{pH} = -\log[\text{H}^+]$, $\text{pOH} = -\log[\text{OH}^-]$, $\text{pH} + \text{pOH} = 14$ (at 25 C)
- Rate Law: $\text{Rate} = k[\text{A}]^x [\text{B}]^y$ (order = $x + y$)
- Nernst Equation: $E = E(\text{standard}) - (RT/nF) \ln Q$
- Gibbs Free Energy: $\Delta G = \Delta H - T(\Delta S)$

Important Named Reactions (Organic)

- Aldol Condensation — base-catalysed self-addition of aldehydes/ketones with an α -H
- Cannizzaro Reaction — disproportionation of aldehydes without α -H under strong base
- Friedel-Crafts Alkylation/Acylation — electrophilic substitution on benzene using AlCl_3 catalyst
- Hofmann Bromamide Reaction — amide to primary amine (one carbon less) using Br_2/NaOH
- Wurtz Reaction — coupling of alkyl halides with sodium metal to form higher alkanes
- Sandmeyer Reaction — diazonium salt to aryl halide using $\text{CuCl}/\text{CuBr}/\text{CuCN}$

Periodic Trends to Remember

- Atomic radius decreases across a period, increases down a group
- Ionisation enthalpy increases across a period, decreases down a group
- Electronegativity increases across a period, decreases down a group
- Metallic character decreases across a period, increases down a group

Exam Tip

Organic Chemistry named reactions are a reliable, high-frequency scoring area — questions often test direct recognition of reagents and products rather than derivation, making this section very efficient to revise close to exam day.

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