Chemistry Formula Sheet

Chapter by chapter, topic by topic. Written by the PadhoNa team for quick revision.

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CHAPTER 13

General Organic Chemistry

Electronic effects and intermediates

INDUCTIVE (−I)

$$-NO_2 > -CN > -COOH > -F > -Cl > -Br > -I > -OH$$

+I

$$-C(CH_3)_3 > -CH(CH_3)_2 > -CH_2CH_3 > -CH_3$$

CARBOCATION STABILITY

$$3^\circ > 2^\circ > 1^\circ > CH_3^+;\ \text{benzyl, allyl stabilised by resonance}$$

CARBANION STABILITY

$$CH_3^- > 1^\circ > 2^\circ > 3^\circ$$

HYPERCONJUGATION

$$\text{number of } \alpha\text{-H atoms} \Rightarrow \text{more stable carbocation / alkene}$$

Acidity, basicity and aromaticity

HÜCKEL'S RULE

$$(4n+2)\,\pi \text{ electrons, planar, cyclic, fully conjugated} \Rightarrow \text{aromatic;} \qquad 4n\ \pi \Rightarrow \text{antiaromatic}$$

ACIDITY

$$RCOOH > PhOH > H_2O > ROH > HC\equiv CH$$

electron-withdrawing groups raise acidity; donating groups raise basicity

AMINE BASICITY (AQUEOUS)

$$2^\circ > 1^\circ > 3^\circ > NH_3 \ \text{(methyl amines);} \qquad \text{aniline is much weaker}$$

Isomerism

STEREOISOMERS

$$\max = 2^{n} \quad (n = \text{chiral centres; fewer if a meso form exists})$$

DEGREE OF UNSATURATION

$$\mathrm{DU} = C - \frac{H}{2} - \frac{X}{2} + \frac{N}{2} + 1$$

PRIORITY (CIP)

$$\text{higher atomic number first;} \quad R : \text{clockwise}, \; S : \text{anticlockwise (lowest away)}$$

Nomenclature

FUNCTIONAL GROUP PRIORITY

$$\mathrm{COOH} > \mathrm{SO_3H} > \text{anhydride} > \text{ester} > \text{acid halide} > \text{amide} > \mathrm{CN} > \mathrm{CHO} > \mathrm{C{=}O} > \mathrm{OH} > \mathrm{NH_2}$$

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