CONCEPT MAP

CLASS XI

ESSENTIAL CONCEPTS OF ORGANIC CHEMISTRY

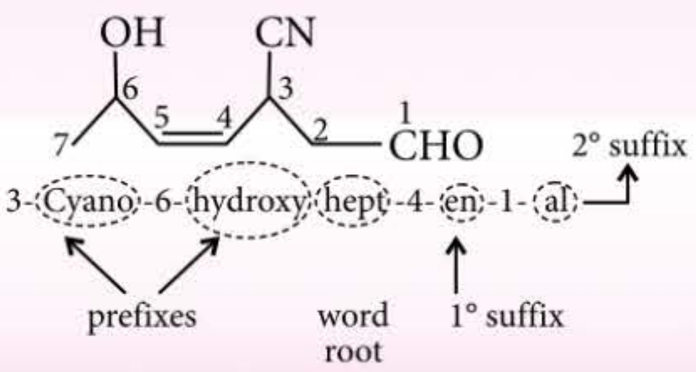
Get well-prepared for exams with quick revision of important concepts of organic chemistry.

Organic Chemistry - Some Basic Principles and Techniques

IUPAC Nomenclature

IUPAC name = prefixes + word root + 1° suffix + 2° suffix

e.g.,



Order of Species Showing Inductive Effect

- **–*I*-effect :** $R_3\overset{+}{N}- > -NO_2 > -SO_2R > -CN > -COOH > -F > -Cl > -Br > -I > -OR > -COR > -OH > -C_6H_5 > -CH=CH_2 > -H$
- **+*I*-effect :** $(CH_3)_3C- > (CH_3)_2CH- > CH_3CH_2- > CH_3- > -D > -H$

Order of Species Showing Resonance or Mesomeric Effect

- **+*R*-effect :** —Cl, —Br, —I, $-NH_2$, —NH*R*, $-NR_2$, —NHCO*R*, —OH, —O*R*, —S*R*, —SH, $-OCH_3$, —OCO*R*
- **–*R*-effect :** $-NO_2$, —CN, $>C=O$, —CHO, —COOH, — COO*R*

- Bond order in compounds which exhibit resonance
$$= \frac{\text{Total number of bonds between two atoms in all the structures}}{\text{Total number of resonating structures}}$$

Hyperconjugation

Number of hyperconjugating structures ∝ number of α-hydrogens ∝ stability ∝ 1/heat of hydrogenation ∝ polarity ∝ dipole moment ∝ 1/bond length

Stability of Free Radicals

- Stability of free radicals $\propto +I\text{-effect} \propto \frac{1}{-I\text{-effect}} \propto +R\text{-effect} \propto \frac{1}{-R\text{-effect}}$

$Ph_3\dot{C} > Ph_2\dot{C}H > Ph\dot{C}H_2 > \text{Allyl} > 3° > 2° > 1° > \dot{C}H_3 > CH_2=\dot{C}H$

Stability of Carbocations

- Stability of carbocations $\propto +I\text{-effect} \propto \frac{1}{-I\text{-effect}} \propto +R\text{-effect} \propto \frac{1}{-R\text{-effect}}$

$Ph_3\overset{+}{C} > Ph_2\overset{+}{C}H > Ph\overset{+}{C}H_2 > \text{Allyl} > 3° > 2° > 1° > \overset{+}{C}H_3$

Stability of Carbanions

- Stability of carbanions $\propto -I\text{-effect} \propto \frac{1}{+I\text{-effect}} \propto -R\text{-effect} \propto \frac{1}{+R\text{-effect}}$

$Ph_3\bar{C} > Ph_2\bar{C}H > Ph\bar{C}H_2 > \text{Allyl} > \bar{C}H_3 > 1° > 2° > 3°$

Stability of Carbene

Triplet > Singlet

Thin Layer Chromatography

Retention factor (R_f)
$$= \frac{\text{Distance travelled by the compound from base line } (x)}{\text{Distance travelled by the solvent from base line } (y)}$$

Quantitative Analysis

- % of C $= \frac{12}{44} \times \frac{\text{mass of } CO_2 \text{ formed}}{\text{mass of compound taken}} \times 100$
- % of H $= \frac{2}{18} \times \frac{\text{mass of } H_2O \text{ formed}}{\text{mass of compound taken}} \times 100$

(Liebig's combustion method)

- % of N $= \frac{28}{22400} \times \frac{\text{vol. of } N_2 \text{ at STP}}{\text{mass of compound taken}} \times 100$
- % of N $= \frac{1.4 \times \text{normality of acid} \times \text{vol. of acid used}}{\text{mass of compound taken}}$

(Dumas method)

- % of N $= \frac{1.4 \times \text{molarity of acid} \times \text{vol. of acid used} \times \text{basicity of acid}}{\text{mass of compound taken}}$

(Kjeldahl's method)

- % of Cl $= \frac{35.5}{143.5} \times \frac{\text{mass of AgCl formed}}{\text{mass of compound taken}} \times 100$
- % of Br $= \frac{80}{188} \times \frac{\text{mass of AgBr formed}}{\text{mass of compound taken}} \times 100$
- % of I $= \frac{127}{235} \times \frac{\text{mass of AgI formed}}{\text{mass of compound taken}} \times 100$
- % of S $= \frac{32}{233} \times \frac{\text{mass of } BaSO_4 \text{ formed}}{\text{mass of compound taken}} \times 100$

(Carius method)

- % of P $= \frac{62}{222} \times \frac{\text{mass of } Mg_2P_2O_7 \text{ formed}}{\text{mass of compound taken}} \times 100$

(Ignition method)

- % of O $= \frac{32}{88} \times \frac{\text{mass of } CO_2 \text{ formed}}{\text{mass of compound taken}} \times 100$
- % of O $= \frac{5\times16}{2\times127} \times \frac{\text{mass of } I_2 \text{ formed}}{\text{mass of compound taken}} \times 100$

(Iodine method)