CONCEPT MAP

CLASS XI

ESSENTIAL CONCEPTS OF ORGANIC CHEMISTRY

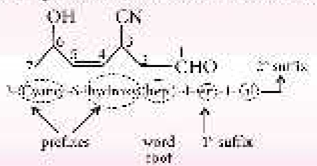
Get well prepared for exams with quick revision of important concepts of organic chemistry.

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: $-Cl$, $-Br$, $-I$, $-NH_2$, $-NHR$, $-NR_2$, $-NHCOR$, $-OH$, $-OR$, $-SR$, $-SH$, $-OCH_3$, $-OCOR$
- $-R$-effect: $-NO_2$, $-CN$, $>C=O$, $-CHO$, $-COOH$, $-COOR$

- 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

(Liebig's combustion method)

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

(Dumas method)

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

(Kjeldahl's method)

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

(Carius method)

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

(Ignition method)

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

(Iodine method)

- $\% \text{ of O} = \frac{32}{88} \times \frac{\text{mass of } CO_2 \text{ formed}}{\text{mass of compound taken}} \times 100$
- $\% \text{ of O} = \frac{5 \times 16}{2 \times 127} \times \frac{\text{mass of } I_2 \text{ formed}}{\text{mass of compound taken}} \times 100$