

Electron Displacement Effect

- ▶ Displacement of electron pair in the covalent bonds can result in two types of polarizations, permanent polarization and temporary polarization.
- ▶ **Permanent Polarizations:** - Occurs in the ground state under the influence of an atom or a substituent group, e.g.; Inductive effect, Mesomeric effect and Hyperconjugation.
- ▶ **Temporary Polarization:** - occurs in presence of an attacking reagent, e.g.; Electromeric effect.

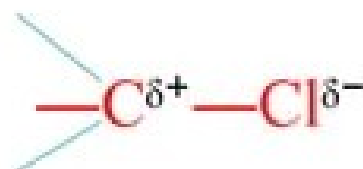
Inductive Effect

1. it refers to the polarity produced in a molecule as a result of higher electronegativity of one atom compared to another. e.g.



1. polarization of σ -bond results in partial charge over adjacent atoms and is transmitted along a chain.
1. occurs in σ -bonds only formed between atoms of different electronegativity.
2. electron cloud is displaced towards more electronegative atom .
3. C—H bond is used as standard ,**zero effect** is assumed in this case.
4. It is of two types; +I effect and -I effect .

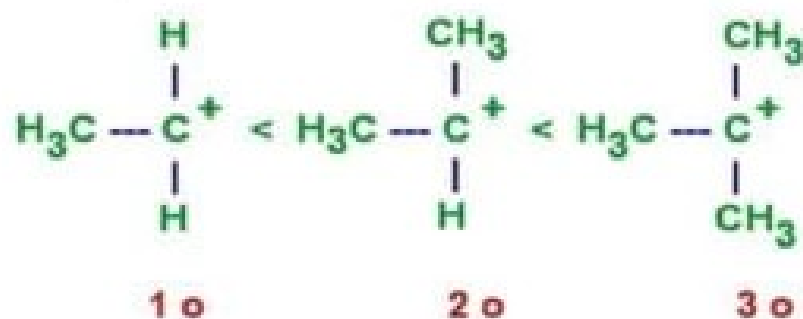
- ▶ **-I Effect:**-occurs when atoms or group of atoms having more electron attracting capacity than H-atom (e-withdrawing group) is attached to a molecule , e.g. NO_2 , COOH , Cl , Br , etc.



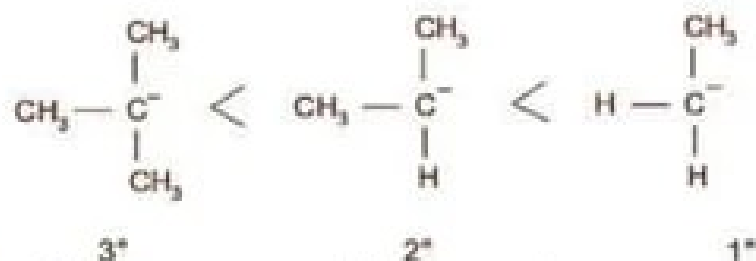
- ▶ **+I Effect:**-occurs when atoms or group of atoms having less electron attracting capacity than H-atom (e-releasing group) is attached to an organic molecule ,e.g. $(\text{CH}_3)_3\text{C-}$, $(\text{CH}_3)_2\text{CH-}$, $\text{CH}_3\text{CH}_2\text{-}$, $\text{CH}_3\text{-}$.



- ▶ **Applications of Inductive Effect**:-it explains the relative stability of
- ▶ **Carbocation's** ; stability increases with increase in the no of alkyl groups . E.g.



- ▶ **Carbanions** ; stability decreases with increase in the no of alkyl groups.eg;

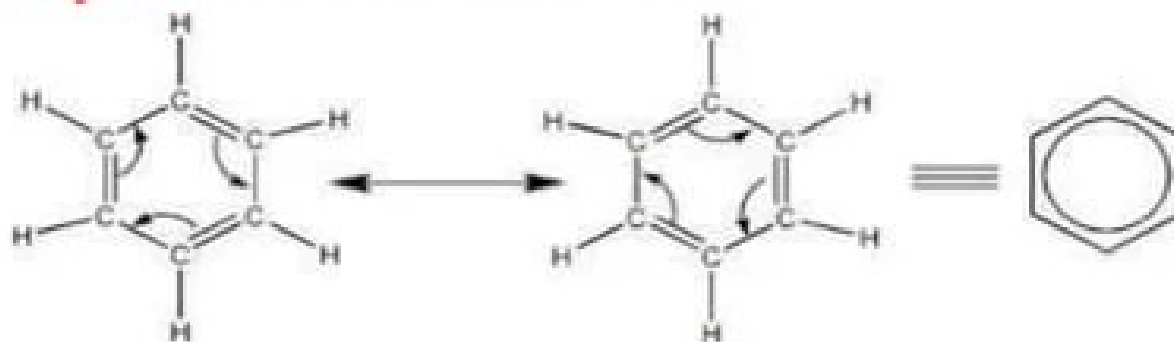


- ▶ **Acidic strength** ; Electron withdrawing group decreases the negative charge on the carboxylate ion by stabilizing it ,hence the acidic strength increases ,e.g.



Mesomeric Effect

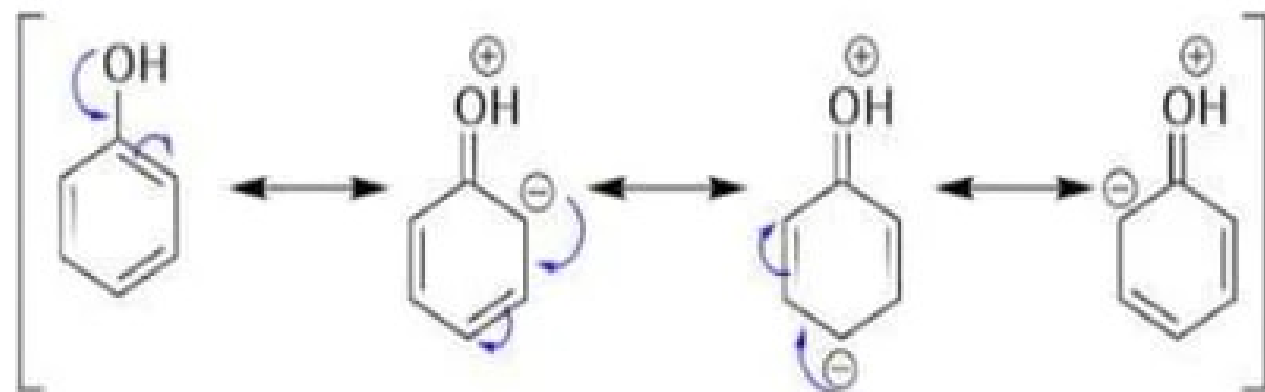
There are many molecules whose structure can not be explained by a single Lewis structure. To explain their behavior two or more structures may be proposed and the actual molecule is said to be **resonance hybrid** of these molecules.



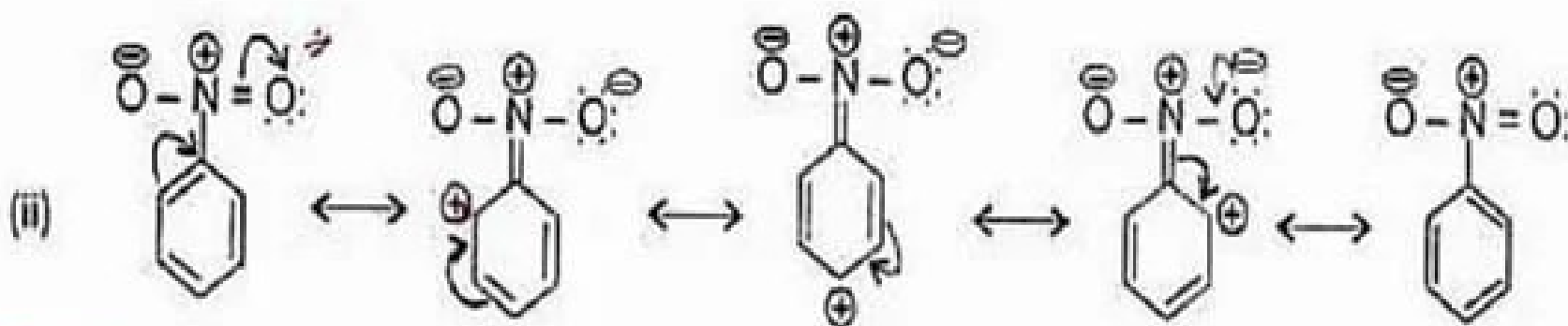
It refers to the polarity produced in a molecule as a result of interaction between two π -bonds or a π -bond and a lone pair of electrons.

- ▶ It involves π -electrons of double or a triple bond.
- ▶ It can be divided into two types, +M effect & -M effect.

- ▶ **+M effect:**-atoms or groups of atoms which lose electrons towards a carbon atom are said to have +M effect, e.g. NH_2 , Cl , Br , I , OH , etc.



- ▶ **-M effect:**-atoms or groups of atoms which draw electrons away from the carbon atom are said to have $-M$ effect, e.g. NO_2 , $\text{C}\equiv\text{N}$, $\text{C}=\text{O}$, etc.



Thanks To All OF You

