

Reaction Mechanism in Org chemistry:-

Electronic Displacements in Organic chemistry:-

In Organic molecules different reactions depend on the electron density in their molecules. Since majority of attacking reagents are polar i.e. nucleophilic (or) electrophilic, hence in organic compounds permanent (or) temporary polarity is developed by temporary (or) permanent electron displacements.

The different electronic effects which operate in covalent bonds are

① Inductive effect

② Mesomeric effect

③ Electromeric effect

④ Hyperconjugation.

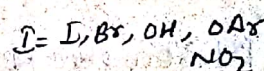
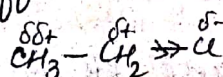
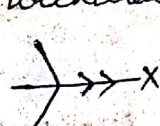
Inductive effect:-

Displacement of σ -electrons along a saturated carbon chain whenever an electron withdrawing group or electron donating group is present at the end of this the carbon chain is called inductive effect.

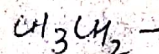
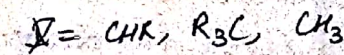
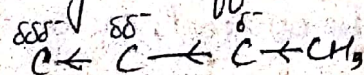
This effect weakens steadily with increasing distance from the substituent (electron withdrawing or electron donating group).

Two types of inductive effect.

(i) If the substituent attached at the end of carbon chain is electron withdrawing the effect is called $-I$ effect.



(ii) If the substituent attached at the end of carbon chain is electron donating, the effect is called $+I$ effect.



Characteristic features of inductive effect include.

① It is a permanent effect.

② This effect operates through σ bonds

③ It is observed for max. of upto second carbon atom of the chain and ceases to operate beyond fourth.

Being a permanent effect, inductive effect affects the physical & chemical properties of molecules. rate of rxn, acidic & basic characteristic.

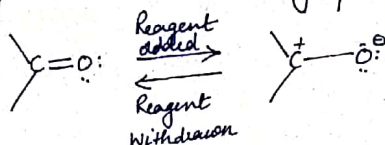
Electromeric Effect

It is another effect of electron movement within a molecule containing double bond or triple bond.

This is a temporary effect operating in unsaturated compounds only at the demand of a reagent. As soon as this attacking reagent is removed, the original condition is restored.

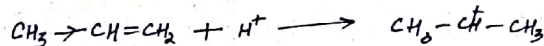
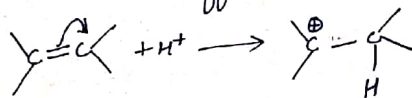
In this effect π (pi)-electrons flow to the more electronegative atom or to the attacking reagent.

It involves the complete transfer of π -electrons of multiple bond, because π bonds are loosely held and are easily polarisable.

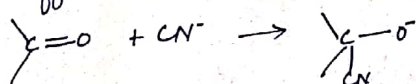


The complete transfer of shared pair of π -electrons of a multiple bond to the more electronegative atom of the bonded atoms at the requirement of an attacking reagent is called electromeric effect.

When the transfer of π -electrons takes place towards the attacking reagent the effect is called +E effect.



When the transfer of electrons takes place away from the attacking reagent, the effect is called -E effect.



Mesomeric effect or Resonance effect:-

The resonance effect (or mesomeric effect) is a permanent effect which involves delocalisation of π -electrons in a system. The electrons involved in delocalisation may be π -electrons of a double bond, or π -electrons of the aromatic system (as in benzene), or lone pair of electrons present on an atom.

In other words, delocalisation may involve

- (i) Overlap of p-orbitals involved in the formation of π bonds (π - π overlap)
- (ii) Overlap of p-orbital of an atom (vacant or filled) with p-orbitals involved in π -bond formation (p - π overlap)