

CHAPTER 12

General Organic Chemistry

Electronic effects:

The four electronic effects are,

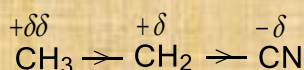
1. Inductive effect
2. Mesomeric effect
3. Electromeric effect
4. Hyper conjugation

Inductive effect (IE):

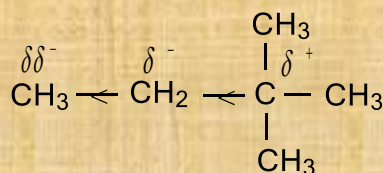
- The polarisation of σ bond caused by the polarization of adjacent σ bond.
- It is permanent effect & σ electrons are involved in it.
- The effect weakens steadily with increasing distance from the substituent & actually becomes negligible after two carbon atoms.

Inductive effect is of two types depending on substituent.

Ex. - I effect:



+I effect:



- The groups or atoms which withdraw electrons of the σ bond towards themselves are called electron withdrawing group & cause -I effect.

Ex. NO_2 , CN , $-\text{COOH}$, $-\text{COOR}$, $-\text{OR}$

- The groups or atoms which donate electrons to the carbon chain are called electron donating group and cause +I effect.

Ex. CH_3 , CH_2CH_3 , $(CH_3)_2CH$, $(CH_3)_3C$

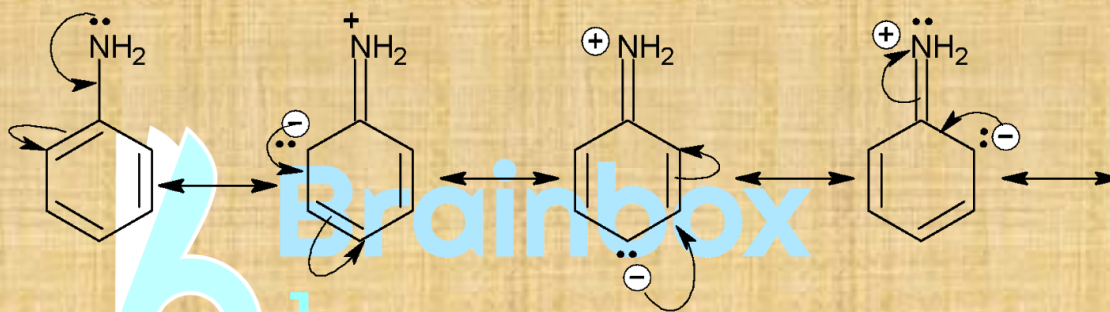
- It is responsible for high melting point, boiling point & dipole moment of polar molecules.

Mesomeric Effect (ME):

- The electron pair displacement caused by an atom or group along a chain in conjugated system is called ME.
- It is a permanent effect & π electrons & lone pairs are present in the conjugated system.
- Groups which donate electrons to the conjugate system are said to have + M effect.

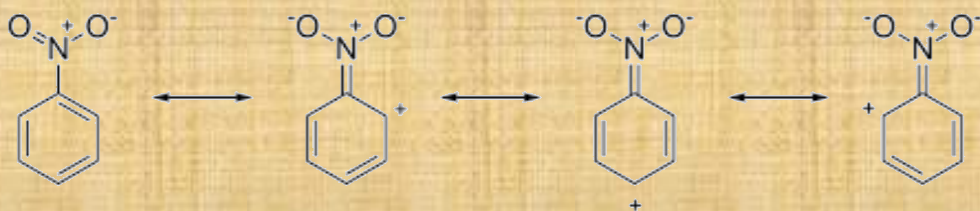
Ex. OH, NH_2 , OR, $-NR_2$

+ M effect:



- Groups which withdraw from the conjugated system are said to have $-M$ effect.

$-M$ effect:



- Mesomeric effect is also known as resonance effect.