



**TRINITY COLLEGE FOR WOMEN
NAMAKKAL**

Department of Chemistry

Electromeric effects

Mrs.T.GOMATHI

AP/CHEMISTRY

General chemistry

Electromeric effects

- Electrophile
- Nucleophile
- Electromeric effects
- -E effect
- +E Effect
- Example
- Application
- Inductive effects vs electromeric effects

ELECTROMERIC EFFECT

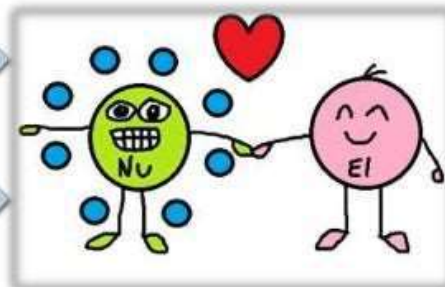


ELECTROPHILE

• ELECTRON LOVING SPECIES

NUCLEOPHILE

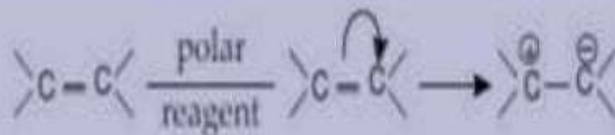
• NUTRON LOVING SPECIES



	Electrophile	Nucleophile
Definition	Positively charged or neutral but electron deficient atom or group of atoms is called electrophile.	Negatively charged or neutral but electron rich atom or group of atoms is called nucleophile.
Example	Neutral but electron deficient species: BF ₃ , AlCl ₃ , SO ₃ , FeCl ₃ etc.	Neutral but electron rich species: H ₂ O, R-O-H, R-O-R, :NH ₃ , :NH ₂ R, :NHR ₂ , :NR ₃ , R-S-H etc.
	Positively charged species: H ⁺ (proton), H ₃ O ⁺ (hydronium ion), ⁺ CH ₃ (carbonium ion), ⁺ NO ₂ (nitronium ion), Cl ⁺ (chloronium ion), Br ⁺ (bromonium ion), I ⁺ (iodonium ion), NH ₄ ⁺ (ammonium ion) etc.	Negatively charged species: Cl ⁻ (chloride ion), Br ⁻ (bromide ion), I ⁻ (iodide ion), HO ⁻ (hydroxide ion), CN ⁻ (cyanide ion), NO ₂ ⁻ (nitrite ion) etc.

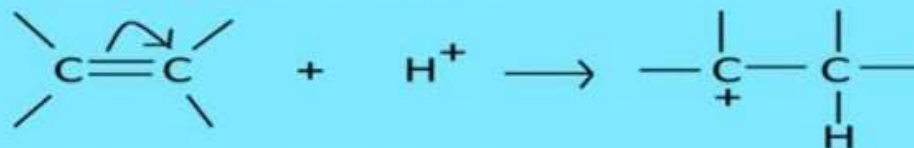
ELECTROMERIC EFFECT

- Electrons of *pi bond are loosely held* (due to sideways overlap) and easily polarisable.
- therefore., when a compound having pi bond *approached by* a charged reagent (*electrophile or nucleophile*) the electrons of the *bond are completely polaraised or displaced* towards the one of the constituent atoms.

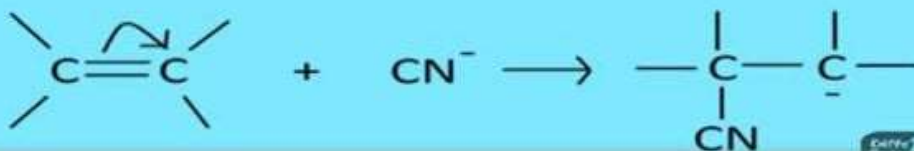


- This is a *temporary effect* operating in unsaturated compounds only.
- It involves *complete transfer of pi electrons* of multiple bond.

Positive electromeric effect



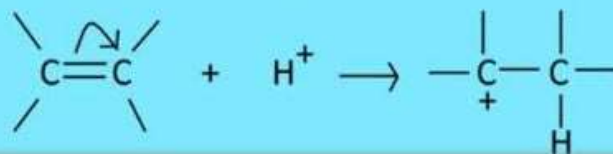
Negative electromeric effect



+E effect :

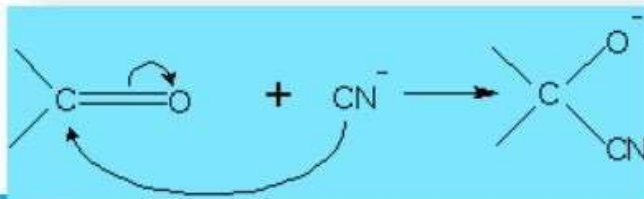
When the *transfer of pi electrons* takes place *towards the attacking reagent* (electrophile).this effect is called +E effect.

Positive electromeric effect



-E effect :

When the *transfer of pi electrons* occurs *away from the attacking reagent* (nucleophile).this effect is called -E effect.



APPLICATION

1) Electrophilic addition reaction of unsaturation compounds

- the polarisation of the carbon – carbon double bond in the presence of attacking electrophile like H^+ etc.,
- *electrophilic addition involving +E effect*

2) Nucleophilic addition reaction of carbonyl compounds

- the polarisation of the carbon – oxygen double bond in the presence of attacking nucleophile
- *nucleophilic addition involving -E effect*

3) Ring polarisation

polarisation and the attack by electrophile may actually take place concurrently in a concerted mechanism.

INDUCTIVE EFFECT vs ELECTROMERIC EFFECT

INDUCTIVE EFFECT	ELECTROMERIC EFFECT
It is a permanent effect involving only the displacement of electrons	It is a temporary effect involving a complete transfer of pi electrons.
This has no such requirements	It is operate only under the influence of a suitable attacking reagent
This requires only a polar covalent bond	This effect is shown only by compounds containing one or more multiple bonds
Electron transfer shown by arrow head midway	Electron transfer shown by curved arrow

THANK YOU

<http://www.trinitycollegenkl.edu.in/>