

Inductive Effect

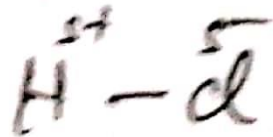
(1) Covalent bond is formed by sharing of electron. (1)



(2) If similar atoms involve electron pair remain in middle



(3) If dissimilar atoms involve electron pair shifted towards more electronegative atom.



⇒ shifting of electrons in covalent bond from lower electronegative atom to high electronegative atom.

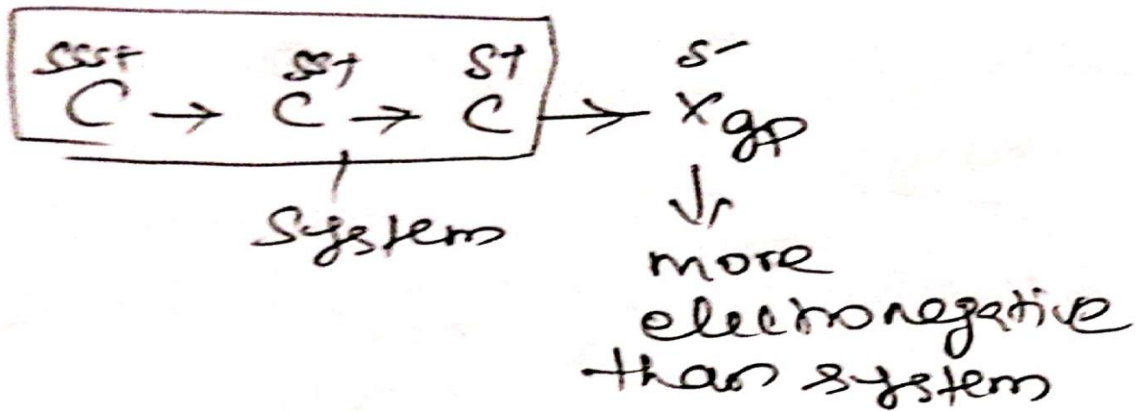


⇒ Always sigma (σ) electrons are displayed (only occur in σ bond)

⇒ It is permanent effect.

⇒ It is distance dependent (true when distance in \AA)

⇒ It is two type " which depends on type of group attached.

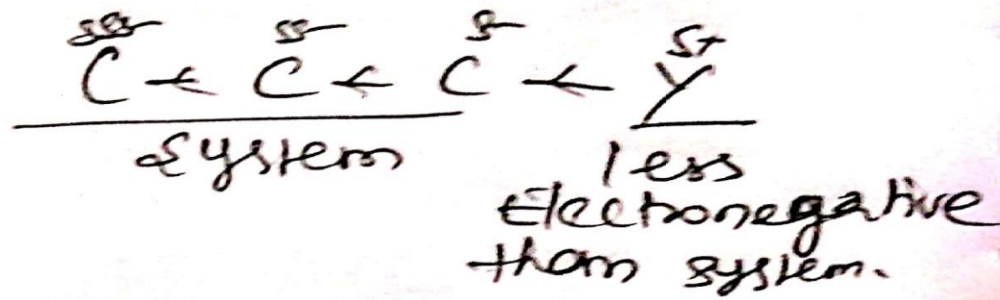
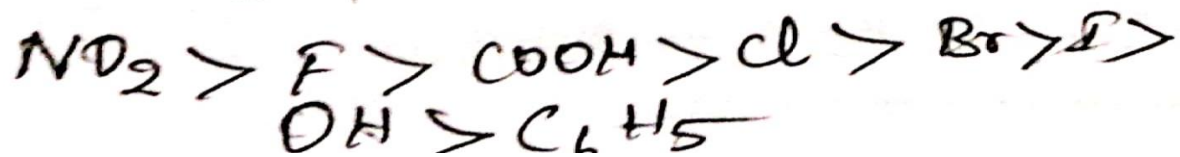
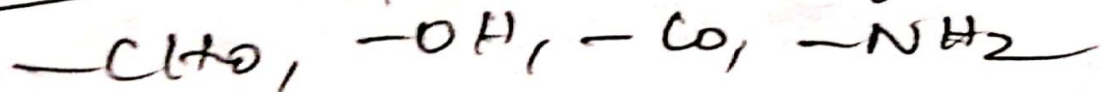


-I effect

X is called -I effect gp

Electron withdrawing gp

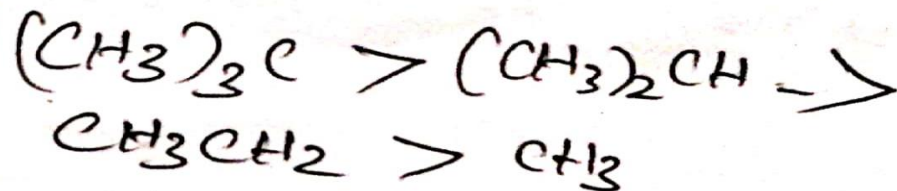
EX. All functional gps.



+I effect.

Electron donating group.

EX: Alkyl gps, isobutyl
 CH₃, C₂H₅, CH(C₂H₅)₂,
 -C(C₂H₅)₃ tert butyl



(4)

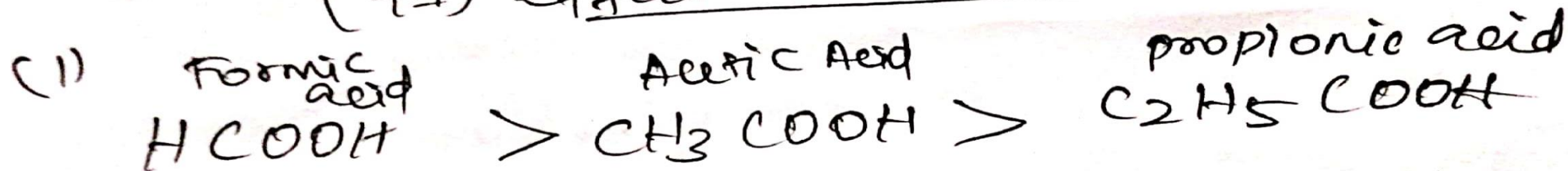
Application.

(1) Acid strength

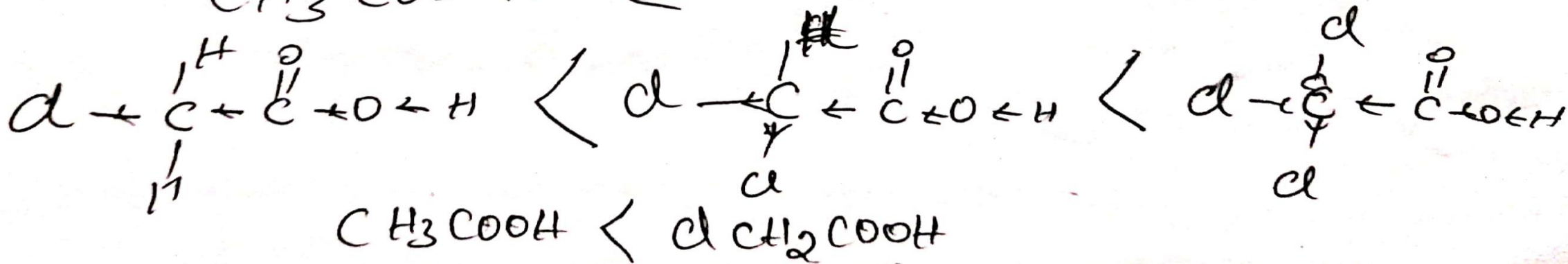
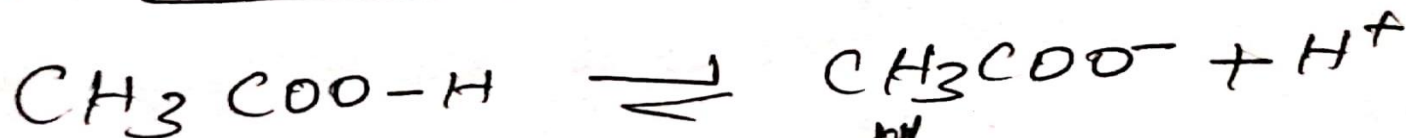
(2) Basic strength.

(1) Acid strength.

(+I) effect ↓ se the acid strength.



(2) (-I) effect ↑ se the acid strength.

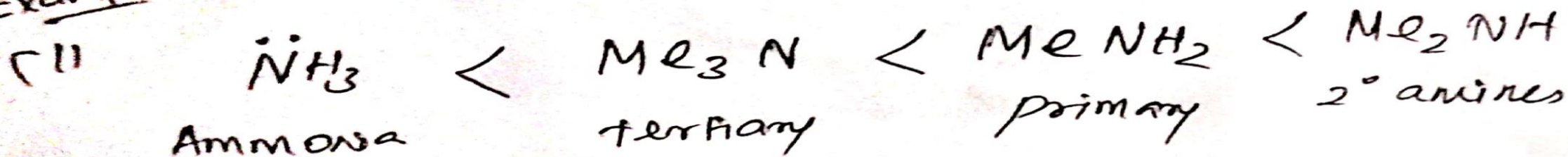


Basic strengths of
Aliphatic amines.

(1)

(1) Aliphatic Amines (+I Effect ↑se Basicity
↑se)

Example



Reason:

- (1) NOT KNOWN
- (2) Steric hindrance
- (3) Solvation.



(3) NH_4OH strongly basic than $\text{KOH} + \text{NaOH}$

University Questions (2)

- (1) Write notes on Inductive Effect.
- (2) Explain Inductive effect considering the following: $-C_3-C_2-C_1-C$
- (3) What do you know by +I effect and -I effect?
- (4) How would you differentiate b/w +I & -I eff?
- (5) Explain with reason: acetic acid is weaker than formic acid.
- (6) Chloroacetic acid is stronger than acetic acid why?
- (7) Explain Methyl amine is more basic than ammonia
- (8) Arrange the order of acidic strength.