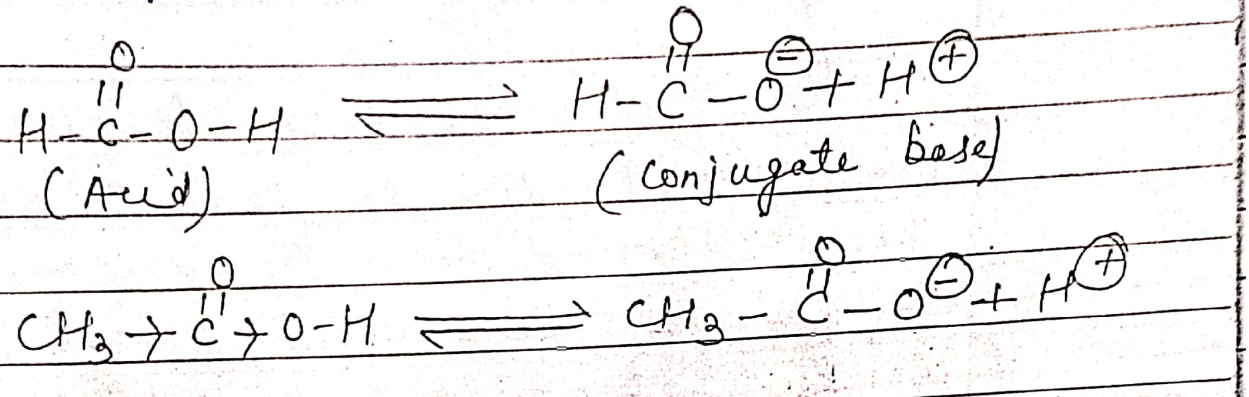
* Application: → (-I effect)

Page No.
Date: / /

(1). By inductive effect the acidic and basic strength of carboxylic acid and amines can be explained.

* e.g. (i). Formic acid is stronger than acetic acid : →



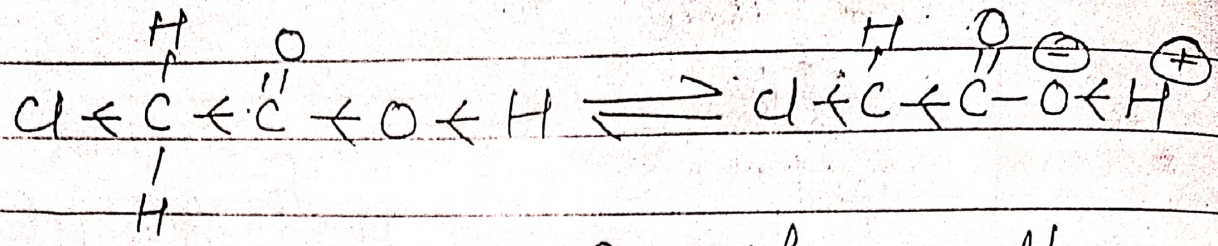
(Acid) (Conjugate base)

In case of acidic acid the electron density on oxygen atom of OH group becomes higher due to +I effect of the CH_3 group. So, O-H bond becomes stronger and release of H^+ decreases. It's conjugate base, acetate ion is also destabilised by this effect because of the high electron-density on -vely charged oxygen atom due to the +I effect of methyl group. So, equilibrium in this case mostly shifted towards L.H.S and its acidic strength is weaker.

In case of formic acid there is no +I effect. O-H becomes more polar and release of H^+ is more. It's conjugate base is also stablised by dissicipation of charged. So, equilibrium in this case mostly shifted towards R.H.S and it is stronger acid.

Date: / /

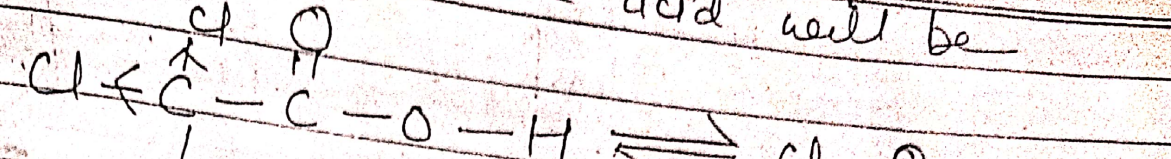
(11) * Chloroacetic acid is stronger than acetic acid →



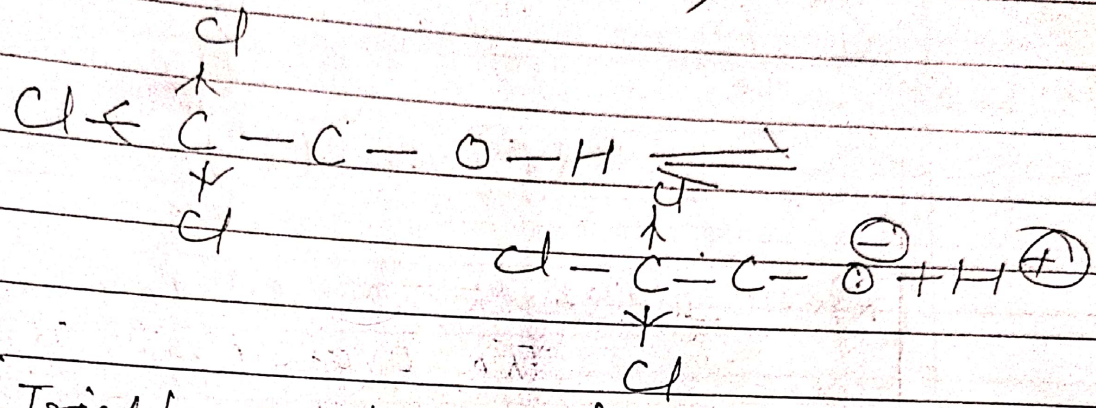
In case of monochloro-acetic acid due to the -I effect of the chlorine atom. The electron density on oxygen atom gets decreased and O-H bond becomes lengthned and weaker. So, release of H^+ is more and more. It's conjugate base is also stablised to a greater strength by the dissipation of -ve charged due to the +I effect of chlorine atom. So, equilibrium is shifted more towards R.H.S and it is a stronger acid.

Higher the strength of +I effect in a molecule higher will be its effect: Ex- in trichloro acetic acid the O-H bond length will be maxm its bond energy will be minimum and its conjugate base will also be stablised to a maxm extent so, its acidic strength will be maxm in this series. Dichloroacetic acid will be less acidic than trichloro due to lesser +I effect caused by two chlorine atoms only. Therefore, all acidic

Strength of these acid will be



(Dichloroacetic acid)

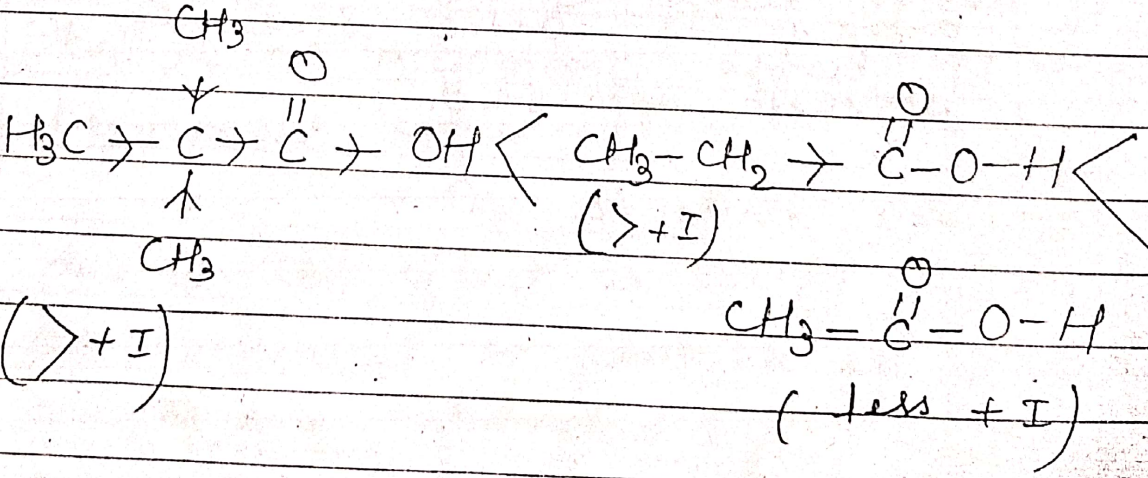


(Trichloroacetic acid)

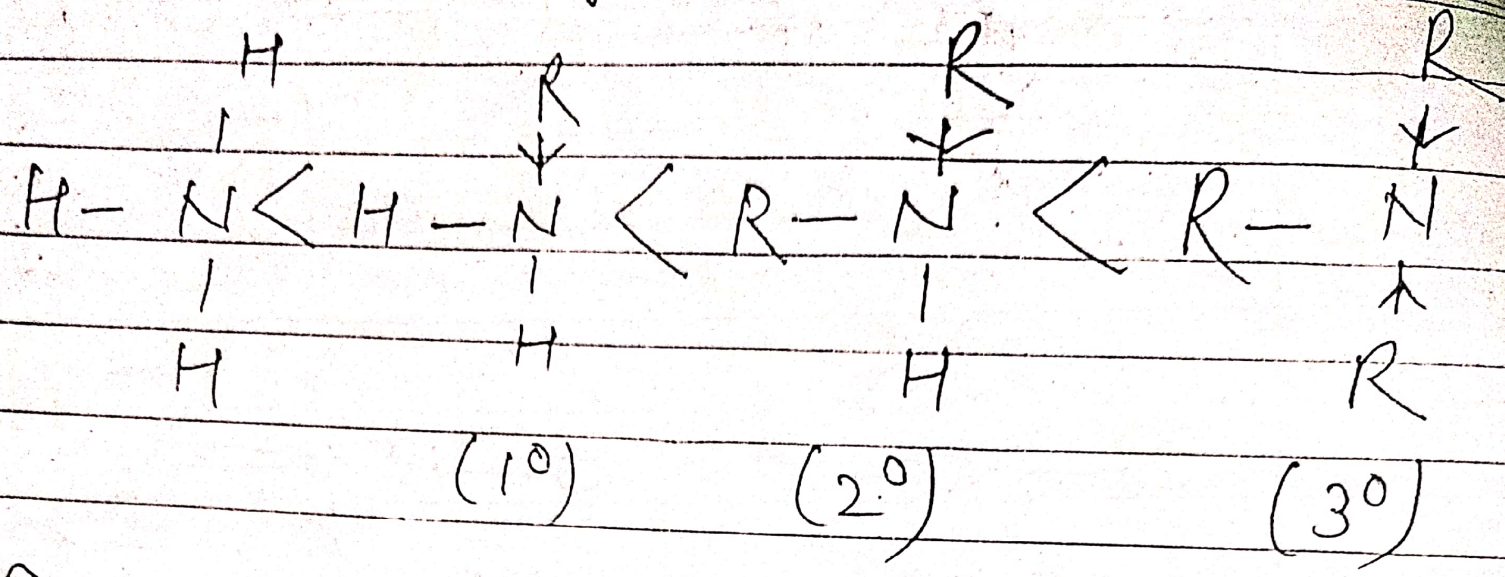
* T.C. Acetic acid > D.C. Acetic Acid > Monochloro Acetic Acid > Acetic acid

In similar way with increase in +I effect in a compound its acidic strength will decrease.

Ex-



* Basic Strength → Date: / /



(Basic strength should increase)

Application :→

The availability of electron pair on nitrogen atom in alkyl amines increase due to +I effect of the Alkyl group. So, its basic strength also increases. If the +I effect is more than its strength will also be high as shown in the above series. However, in case of amines the basic strength is solvent effected.