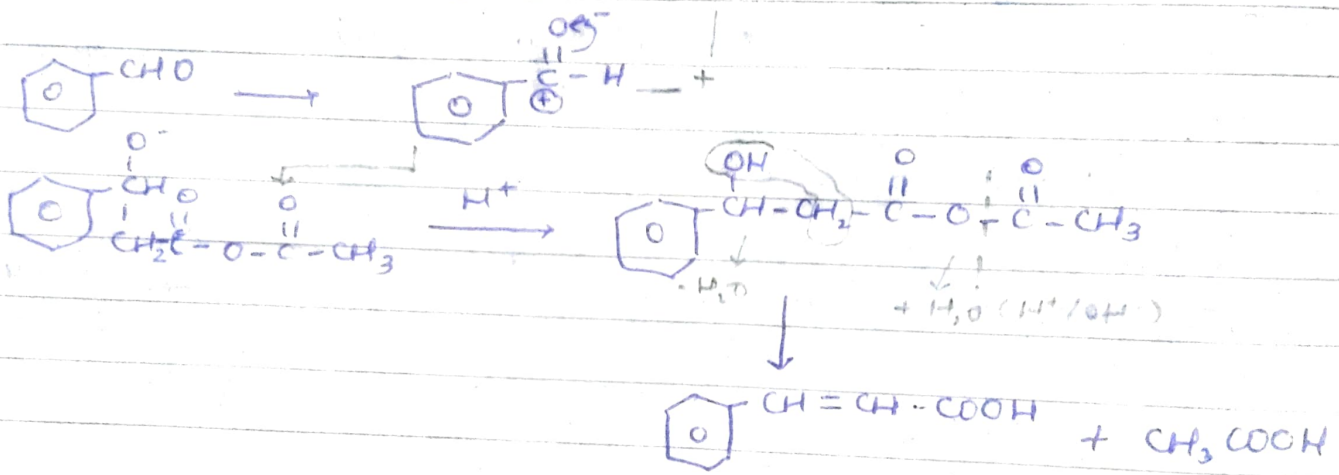
PERKIN CONDENSATION :

Reac^n of aromatic aldehyde with Acid anhydride and form α, β unsaturated acid and aliphatic acid

Acetic anhydride — cinnamic acid

Mechanism:

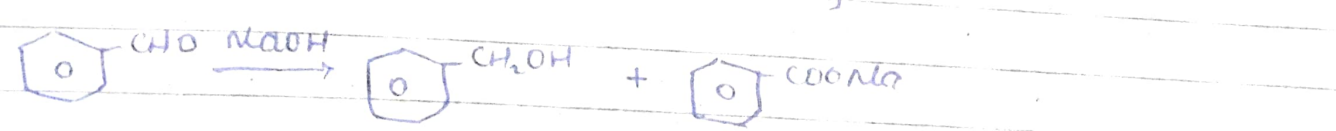
i) $CH_3-\overset{O}{\overset{\|}{C}}-O-\overset{O}{\overset{\|}{C}}-CH_3 \longrightarrow \overset{\ominus}{C}H_2-\overset{O}{\overset{\|}{C}}-O-\overset{O}{\overset{\|}{C}}-CH_3$



CANNIZZARO REACTION :

When the two ~~same~~ same molecule of aldehyde lacking α-hydrog react and undergo self-oxidation and self-reduction and gives product as Alcohols and acids in the presence of strong base. (NaOH / KOH)

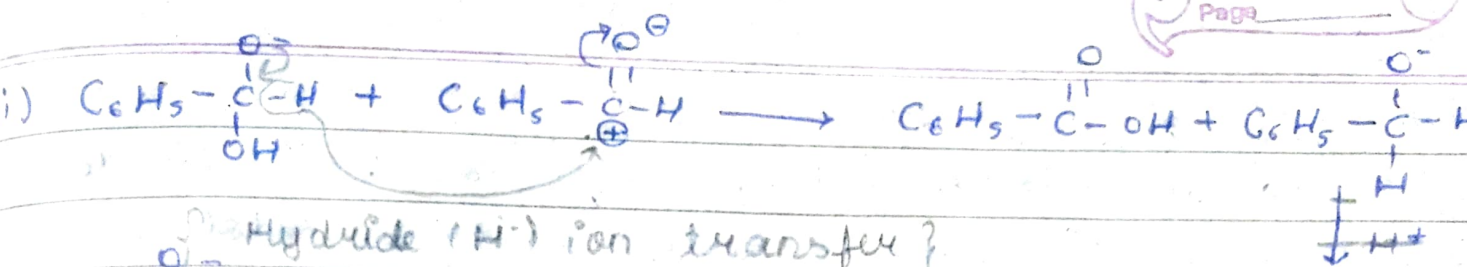
[$R-OH \xleftarrow[R]{O} R-CHO \xrightarrow[R]{O} R-COOH$]



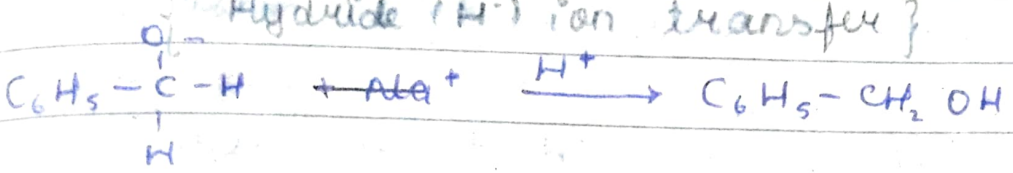
$2\,HCHO \xrightarrow{NaOH} CH_3OH + HCOONa \xrightarrow{H^+} HCOOH$

Mechanism: i) $NaOH \longrightarrow Na^+ + OH^-$

ii) $C_6H_5-\overset{O}{\overset{\|}{\underset{\oplus}{C}}}-H \xrightarrow{+OH^-} C_6H_5-\underset{OH}{\overset{O^-}{\overset{|}{C}}}-H$

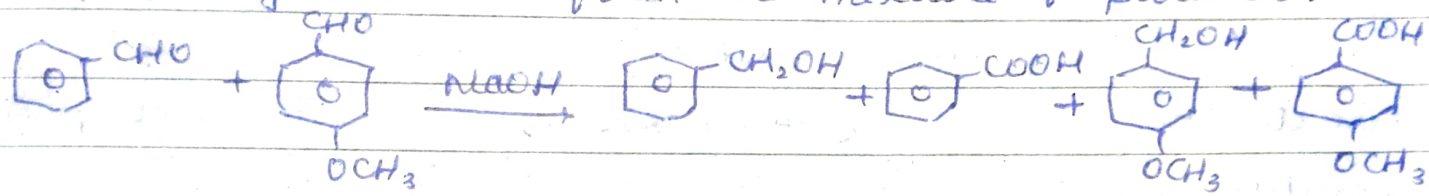
ii) 

Hydride (H^-) ion transfer }

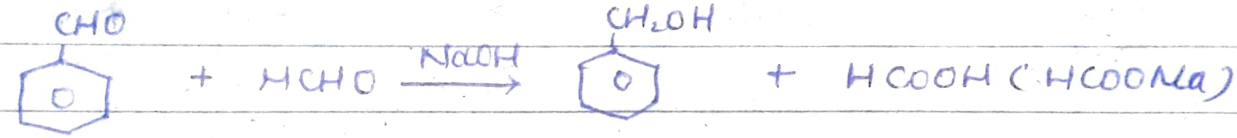


CROSSED CANNIZZARO REACTION:

When two different aldehyde having no α-hydrogen react in the presence of strong base and form the mixture of products.

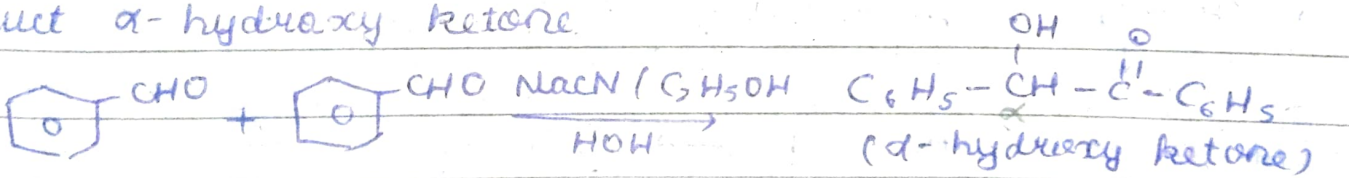


But if one of the reactant is Formaldehyde, then it gives oxidized product

i.e. 

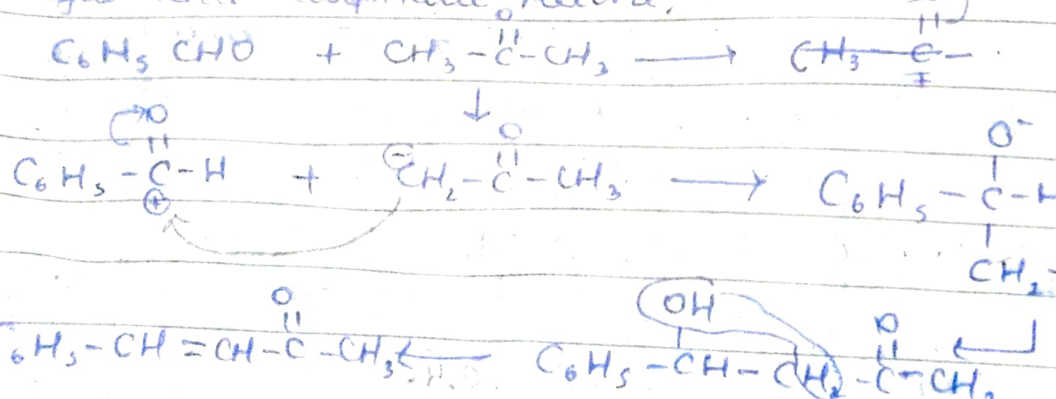
BENZOIN CONDENSATION:

It is a self condensation reaction given by aromatic aldehydes in the presence of NaCN / C_2H_5OH / H_2O or KCN and give the product α-hydroxy ketone.



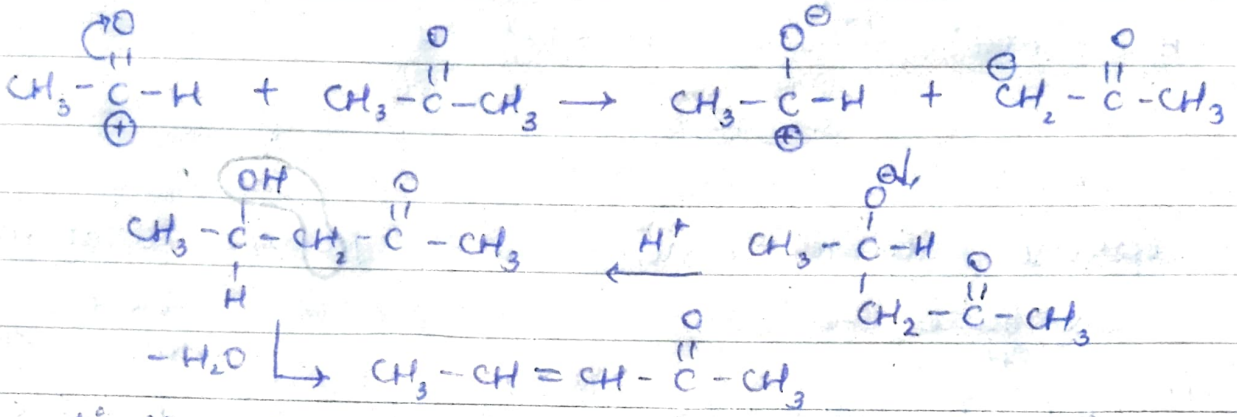
CLAISEN-SCHMIDT REACTION:

It is a type of crossed aldol condensation b/w aromatic aldehyde and aliphatic ketone.

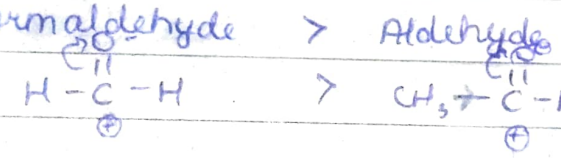


* Crossed Aldol condensation:

Reaction between different aldehydes / ketones or aldehyde and ketone having α-hydrogen is known as cross Aldol condensa

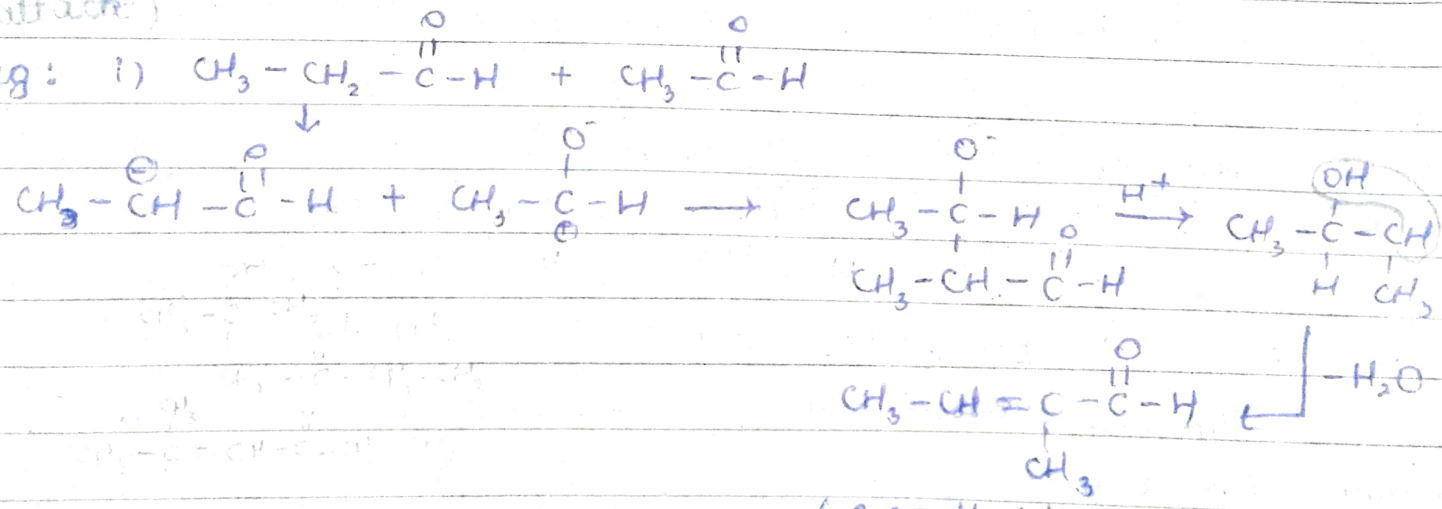


{ Reactivity of carbonyl compounds towards nucleophilic addition reaction:



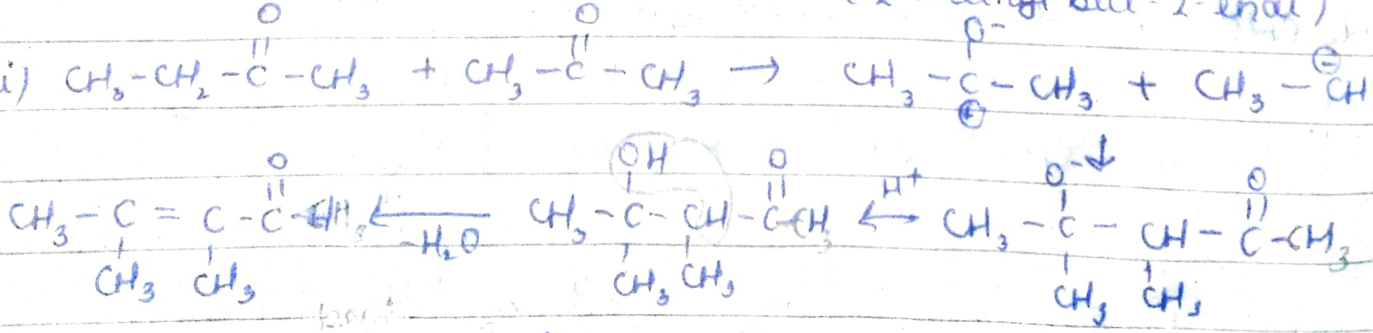
(Due to +I effect of alkyl group (push electrons), they stabilise the positive charge (decrease the +ve charge). Thus, greater no. of alkyl groups, lesser the +ve charge and less chance of nucleophile to attack.)

eg: i)



(2 Methyl but-2-enal)

ii)



(2,3 dimethyl but-2-enal)