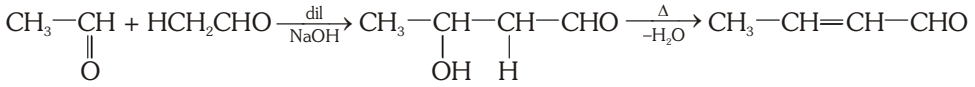
NAMED REACTION

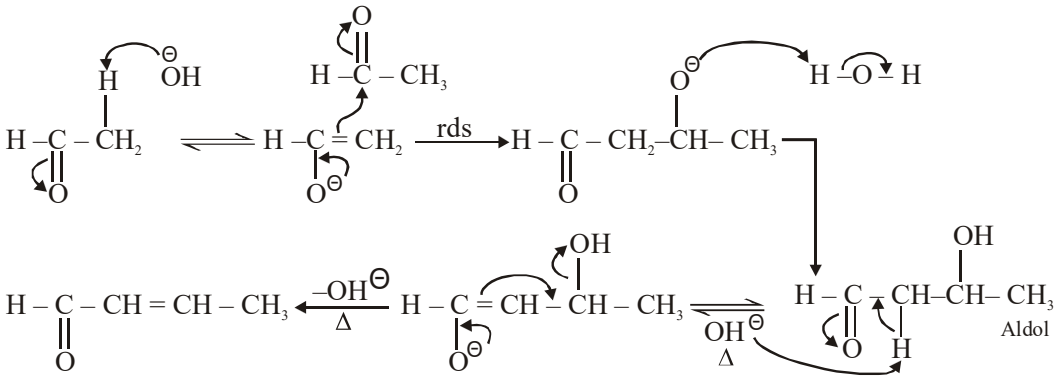
Aldol Condensation :

Two molecules of an aldehyde or a ketone undergo condensation in the presence of a base to yield a β-hydroxyaldehyde or a β-hydroxyketone. This reaction is called the aldol condensation. In general Carbonyl compounds which contain α-H atoms undergo aldol condensation with dil. NaOH. Aldol contains both alcoholic and carbonyl group.It may be acid catalysed.

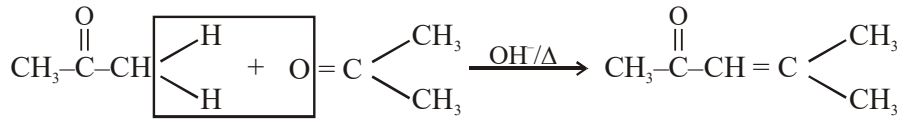


(Aldol reaction product) (Aldol condensation product)

Mechanism :



Aldols are stable and may be isolated. They, however can be dehydrated easily by heating the basic reaction mixture or by a separate acid catalyzed reaction.

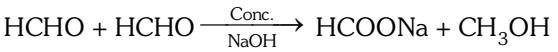
Trick : 

Cannizaro's reaction :

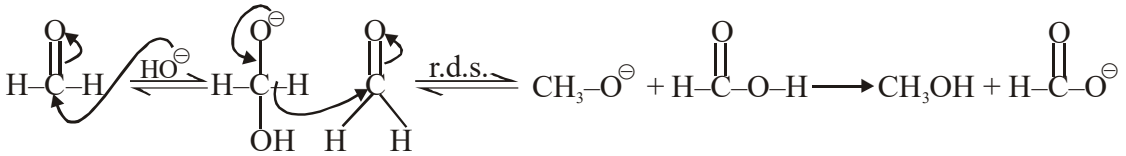
Those aldehydes which do not contain α-H atom can undergo cannizzaro reaction in presence of concentrated base like (NaOH or KOH); Products of this reaction are Salt of carboxylic acid & alcohol.

In this reaction one molecule of carbonyl compounds is oxidised to acid, while other is reduced to alcohol, such type of reactions are called disproportionation reaction. (Redox reaction).

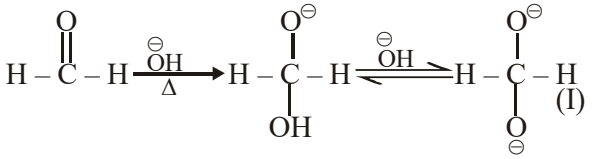
For Example:

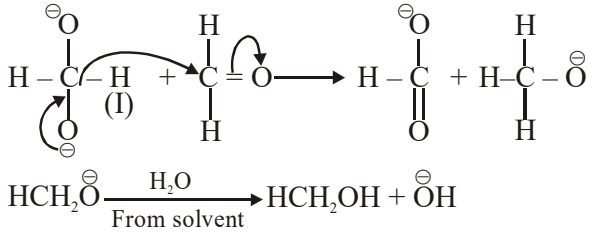


Mechanism :



In the presence of a very strong concentration of alkali, aldehyde first forms a doubly charged anion (I) from which a hydride anion is transferred to the second molecule of the aldehyde to form acid and an alkoxide ion. Subsequently, the alkoxide ion acquires a proton from the solvent.





Note : In cannizzaro reaction the transfer of hydride to the carbonyl group is the RDS of the reaction.

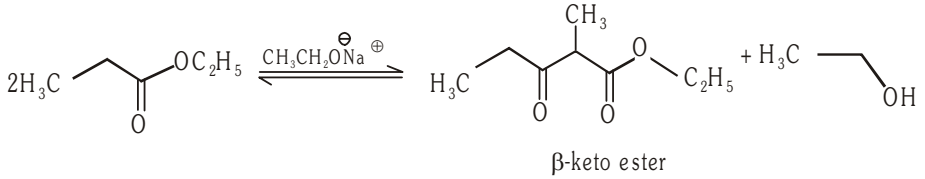
When molecules are same → Simple cannizaro reaction (Disproportionation reaction)
Two different molecules → Mixed cannizaro reaction (Simple redox)

❖ **In crossed Cannizaro reaction :** In crossed Cannizaro reaction more reactive aldehyde is oxidised and less reactive aldelyde is reduced.

$$HCHO + C_6H_5CHO \xrightarrow{NaOH} \underset{\text{Oxidized (Sodium formate)}}{HCOONa} + \underset{\text{Reduced (Benzyl alcohol)}}{C_6H_5CH_2OH}$$

Claisen condensation :

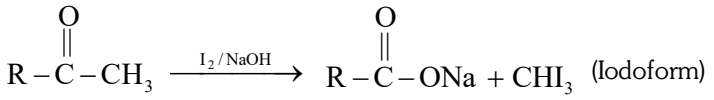
When two molecules of ester undergo a condensation reaction, the reaction is called Claisen condensation. The product of the claisen condensation is a β-keto ester.



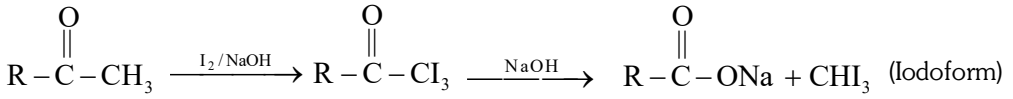
β-keto ester

Haloform reactions :

Acetaldehyde and methylalkyl ketones react rapidly with halogen (Cl_2, Br_2 or I_2) in the presence of alkali to give haloform and acid salt.



In this reaction $-CH_3$ of $CH_3-\overset{O}{\overset{\|}{C}}-$ group is converted into haloform as it contains acidic hydrogen atom and rest-part of alkyl methyl ketone give acid salt having carbon atom corresponding to alkyl ketone.



By Hoffmann's bromamide reaction (Hoffmann's Hypobromite reaction) :

This is a general method for the conversion of alkane amides into one carbon less primary amines.

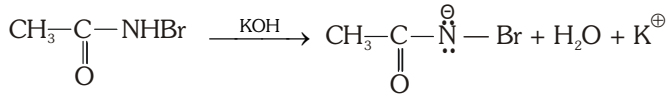
Example :

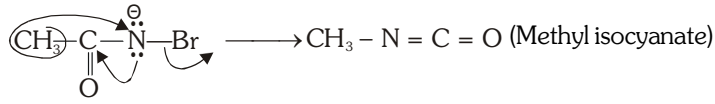
Ethanamide is heated with bromine and excess of KOH.

$$CH_3CONH_2 + Br_2 + 4KOH \longrightarrow CH_3NH_2 + K_2CO_3 + 2KBr + 2H_2O$$

Mechanism :

Step $CH_3—CONH_2 + Br_2 + KOH \longrightarrow \underset{\text{N–bromo ethanamide}}{CH_3CONHBr} + KBr + H_2O$

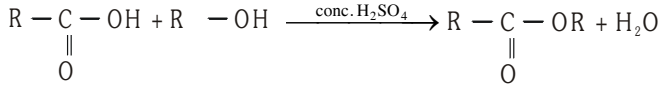
Step 

Step 

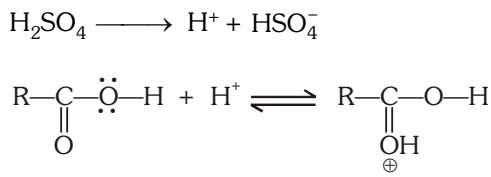
Step $CH_3 - N = C = O + 2KOH \rightarrow CH_3NH_2 + K_2CO_3$

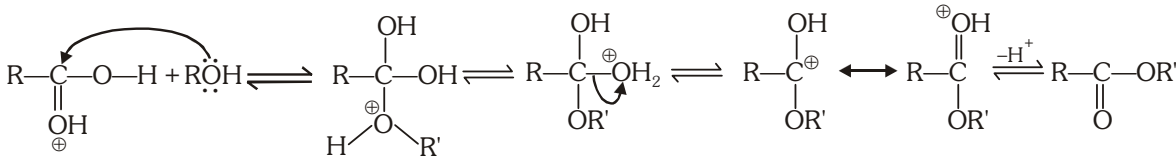
Esterification :

When carboxylic acid reacts with alcohol in the presence of conc. H_2SO_4 to form ester, it is known as esterification



Mechanism :





The relative reactivity of alcohol to ester formation markedly dependent on their structure. The greater the bulk of the substituents near the –OH group, the slower the reaction would be same facts is followed by acid as well

$CH_3OH > CH_3CH_2OH > (CH_3)_2\ CHOH > (CH_3)_3\ COH$

$H—COOH > CH_3COOH > (CH_3)_2CHCOOH > (CH_3)_3CCOOH$