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class - B.Sc. Part II (Honours)
subject - chemistry
Paper - III C
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Cannizzaro reaction

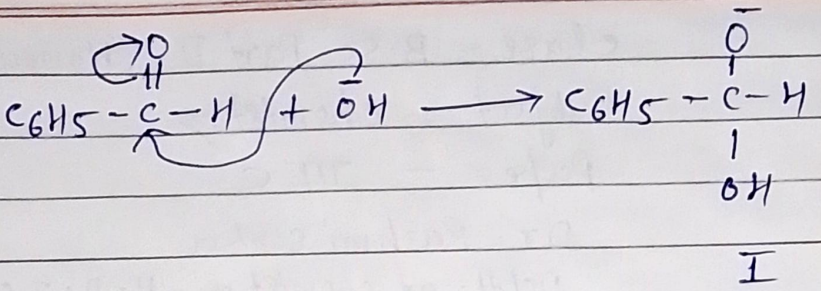
This reaction involves the treatment of an aldehyde (without an α-hydrogen atom) with concentrated NaOH or KOH. The aldehyde undergoes self oxidation - reduction to form salt of an acid and a primary alcohol is known as cannizzaro reactⁿ.

e.g.:- when Benzaldehyde is heated with concⁿ. NaOH to give a mixture of ~~Benz~~ Benzyl alcohol and Sodium Benzoate.

$$\underset{\text{Benzaldehyde}}{2\,C_6H_5CHO} \xrightarrow[\Delta]{NaOH} \underset{\text{Benzyl alcohol}}{C_6H_5CH_2OH} + \underset{\text{Sod. Benzoate}}{C_6H_5COONa}$$

In the above reaction one molecule of the aldehyde is oxidised to the salt of a carboxylic acid, while the second one is reduced to the corresponding alcohol.

Mechanism:-



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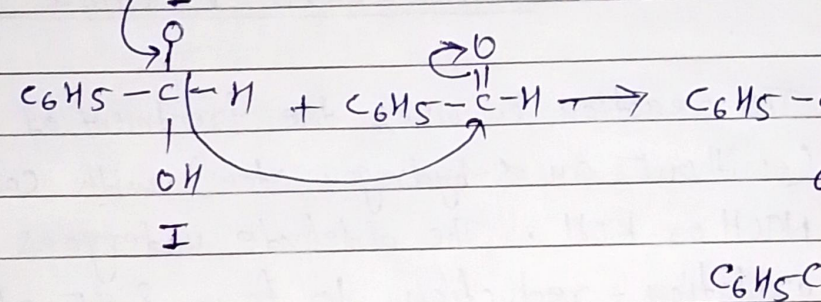
Step II Transfer of hydride-ion



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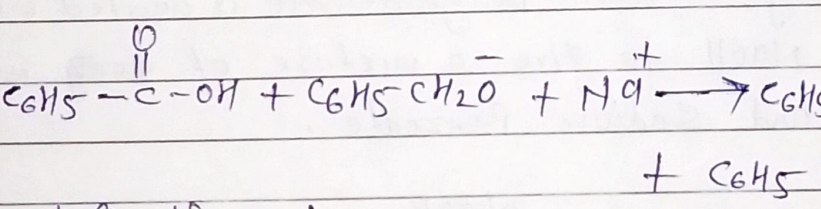
$C_6H_5CH_2O^-$

Step III Acid-Base reaction



Applications :-

(i) crossed cannizzaro reaction :-

The cannizzaro reaction can also take place between two different aldehydes and is known as crossed cannizzaro reaction.
e.g :- when Benzaldehyde is heated with Formaldehyde in presence of NaOH to give a mixture of Benzyl alcohol and Sodium formate

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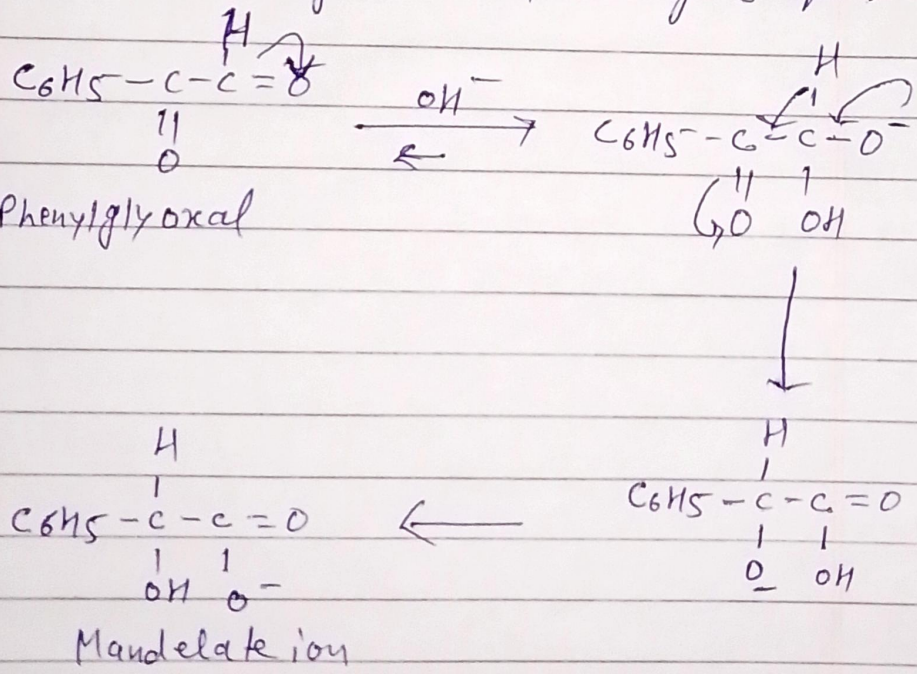
$$C_6H_5CHO + HCHO \xrightarrow[\Delta]{NaOH} C_6H_5CH_2OH + HCOONa$$

Benzaldehyde Formaldehyde → Benzyl alcohol, Sod. formate

(ii) <u>Intramolecular cannizzaro reaction</u> :- The carbonyl compounds like α-ketoaldehydes and 1,2-dialdehydes, when treated with a strong base, undergoes internal cannizzaro-reaction. Thus Phenylglyoxal when treated with alkali give the salt of mandelic-acid according to the following steps :-



Similarly,