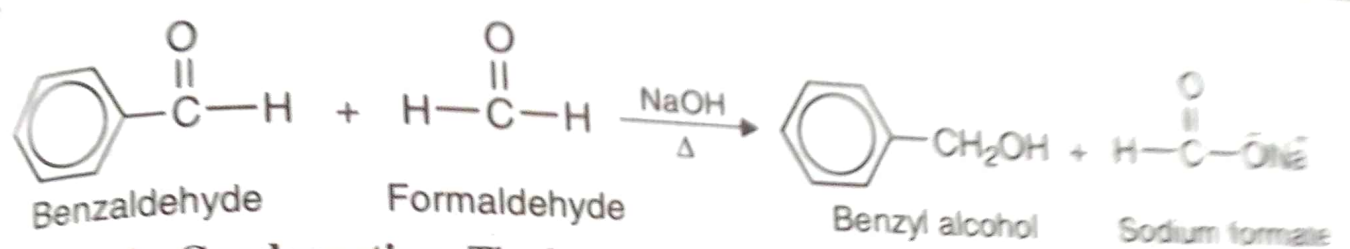
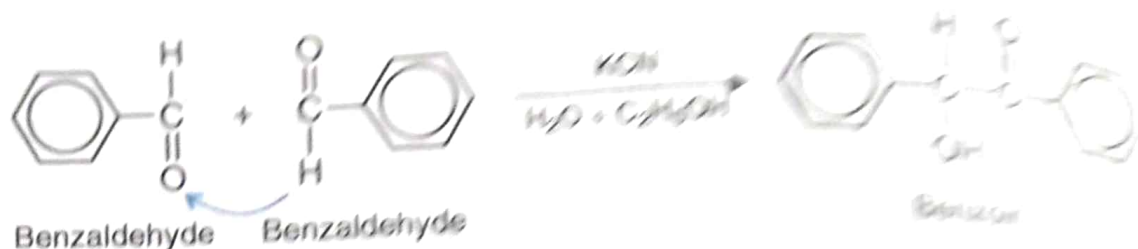


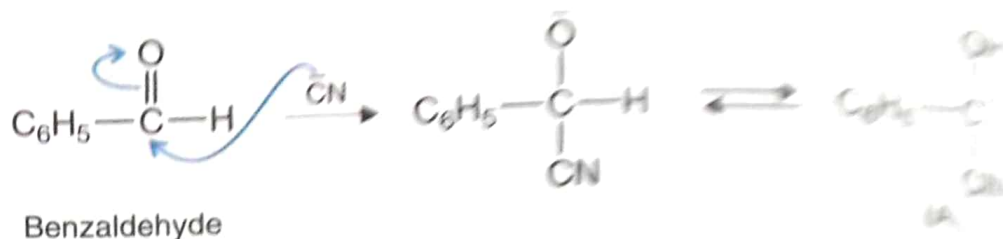
Crossed Cannizzaro Reaction. Two different aldehydes, each lacking α -hydrogens, engage in a Cannizzaro reaction when heated in alkaline solution. For example, when benzaldehyde is heated with formaldehyde in the presence of NaOH, a mixture of benzyl alcohol and sodium formate is formed.



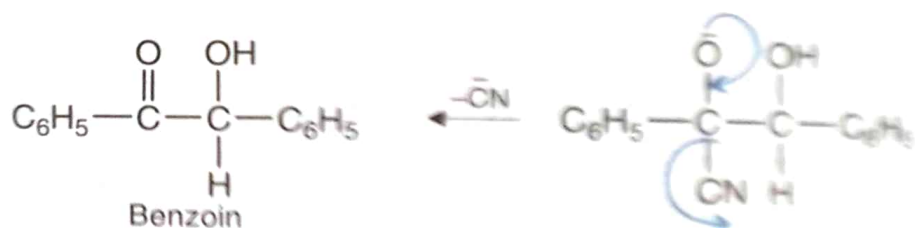
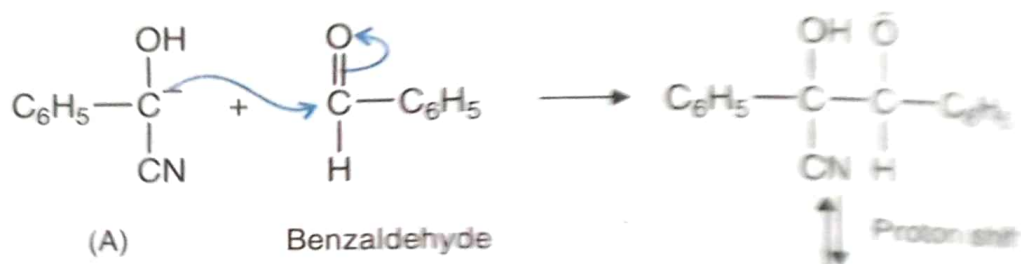
(13) Benzoin Condensation. The benzoin condensation involves the treatment of an aromatic aldehyde with aqueous alcoholic KCN (or NaCN). The products are α -hydroxy ketones. For example, benzaldehyde reacts with alcoholic KCN to form benzoin. Notice that two molecules of benzaldehyde take part in the reaction.



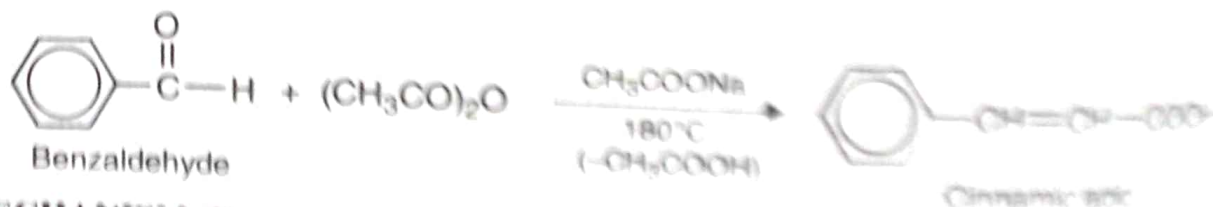
MECHANISM. The above reaction takes place as follows: The cyanide ion attacks the carbonyl carbon of benzaldehyde, and enables the formation of carbanion (A).



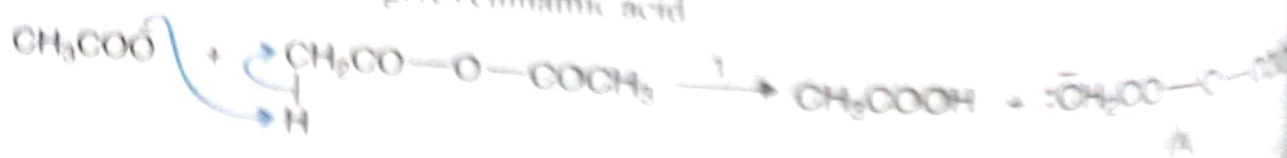
The carbanion (A) can then react with another benzaldehyde molecule. Subsequent proton transfer and loss of the cyanide ion gives benzoin.

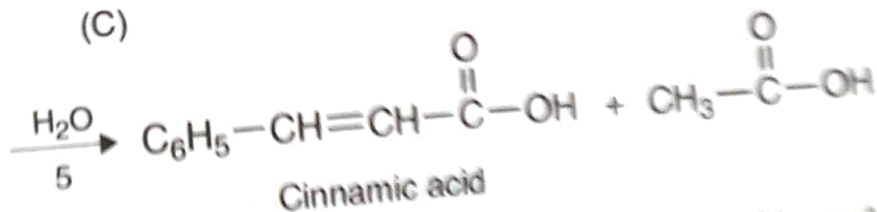
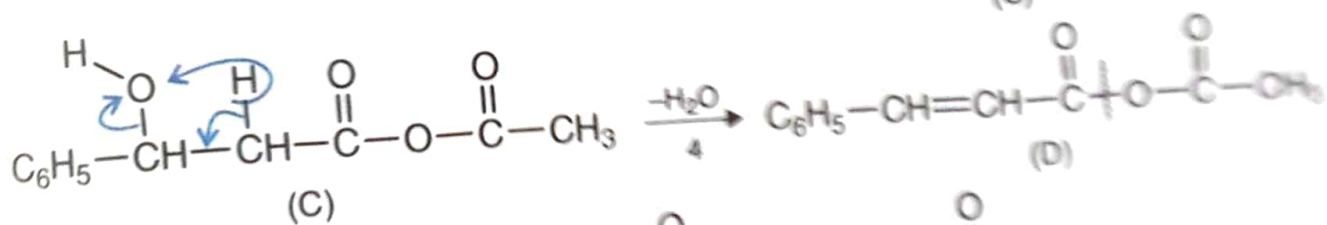
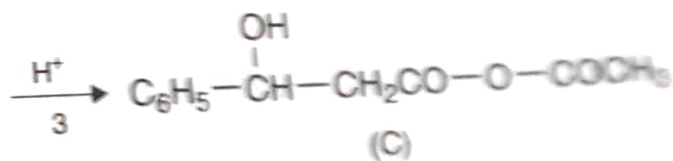
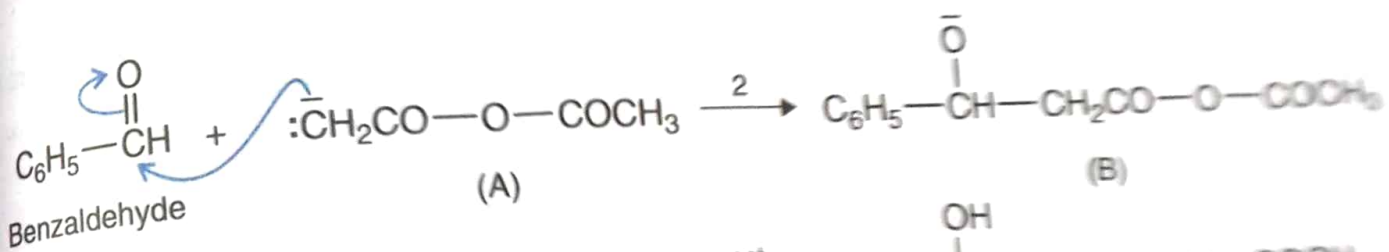
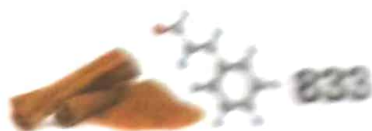


(14) **Perkin Reaction.** The Perkin reaction involves the treatment of an aromatic aldehyde with acetic anhydride of an aliphatic acid and the sodium salt of that acid. Products are α,β -unsaturated acids. For example, benzaldehyde reacts with acetic anhydride in the presence of sodium acetate to form cinnamic acid.



MECHANISM. The Perkin reaction involves the following steps: (1) Formation of the acetic anhydride (A); (2) Addition of (A) to benzaldehyde gives (B). Notice that the acetic anhydride attacks the carbonyl carbon of benzaldehyde; (3) Protonation of (B) gives (C). The proton is supplied by acetic acid from step (1); (4) Internal proton transfer in (C) followed by elimination of water molecule gives (D); and (5) Hydrolysis of (D) gives cinnamic acid.





... of benzaldehyde with aliphatic