

**Solutions to HWS-3
Home Worksheet-4**

Reactions of Aldehydes & Ketones**I. Typical (Direct) Nucleophilic Addition :**

1. Of Hydride ion (H^-) : $\text{LiAlH}_4/\text{ether}$ or $\text{NaBH}_4/\text{H}_2\text{O}$
2. Of Alkynide ion ($\text{R}-\text{C}\equiv\text{C}^--\text{Na}^+$)
3. Of $\text{H}_2\text{O}/\text{H}^+$ (Hydration)
4. (a) Of ROH/H^+ (b) Of Glycols (c) Of 1,3 Diols
5. Of HCN/KOH
6. Of NaHSO_3 (Bisulphate addition)
7. Of Grignard Reagent
8. Of Ylides (Wittig Reaction)
9. Of Ammonia & its derivatives
 - (a) of ammonia
 - (b) of Amines (RNH_2 & RNHR)
 - (c) of special derivatives (NH_2Y)
 - (d) Reductive amination

II. Special Reactions :

1. Beckmann Rearrangement
2. Cannizzaro Reaction
3. Tischenko Reaction
4. Reformatsky Reaction
5. Benzoin Condensation

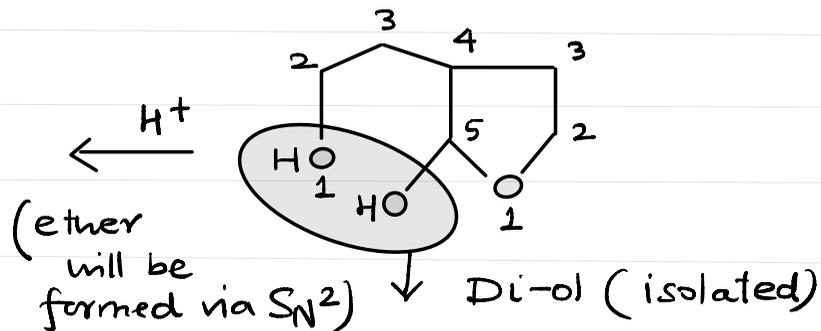
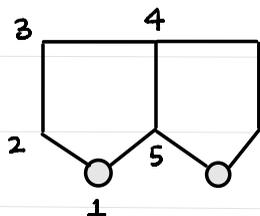
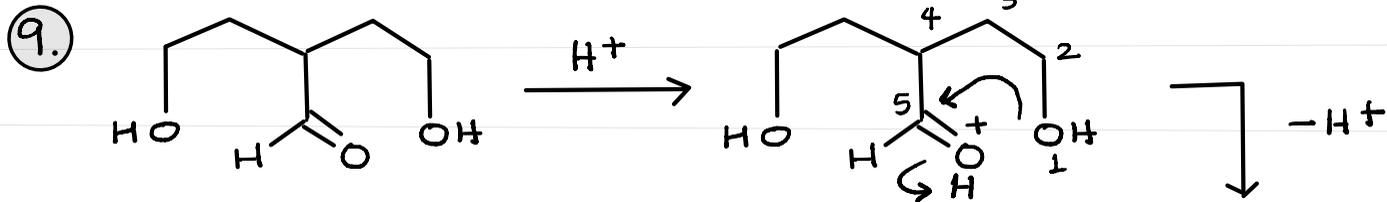
III. Aldol Reaction & Condensation

- (i) Self Aldol**
- (ii) Cross Aldol**
- (iii) Internal Aldol(Intramolecular)**

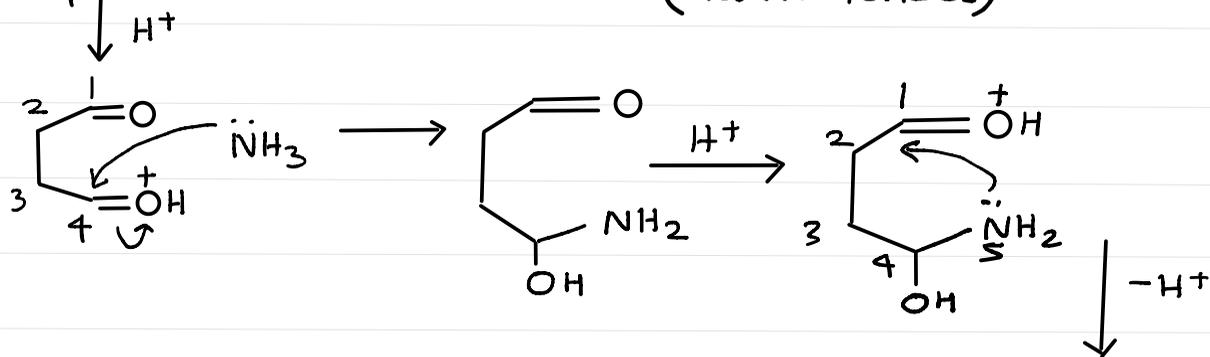
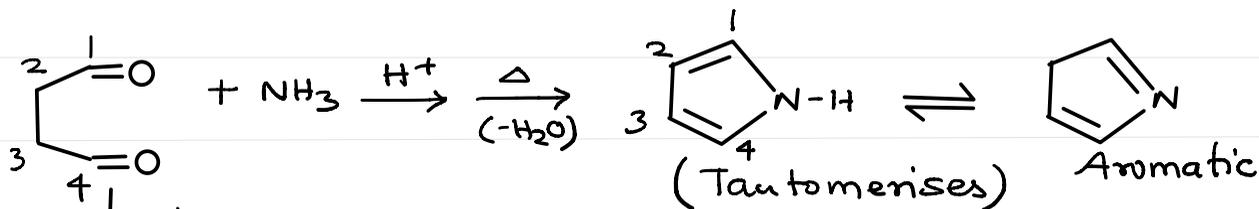
IV. Special Cross-Aldol type other Condensations

- 1. With Nitro-Alkanes**
- 2. With Alkyl Nitriles**
- 3. With Esters**
- 4. Perkin Condensation**
- 5. Knoevenagel Condensation**

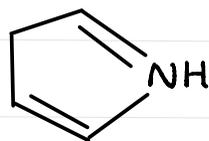
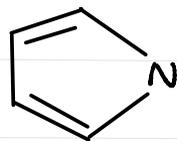
Correction: Tut-Sheet-2



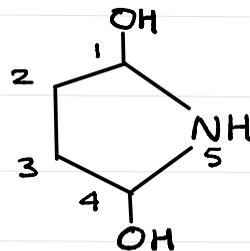
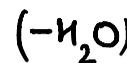
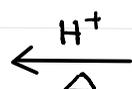
①.



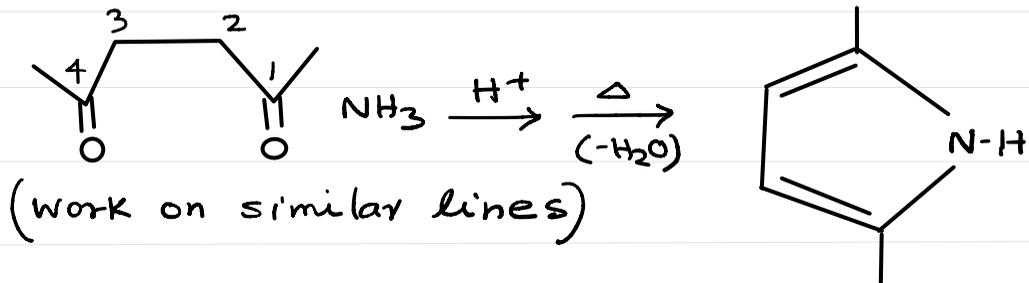
Pyrrole



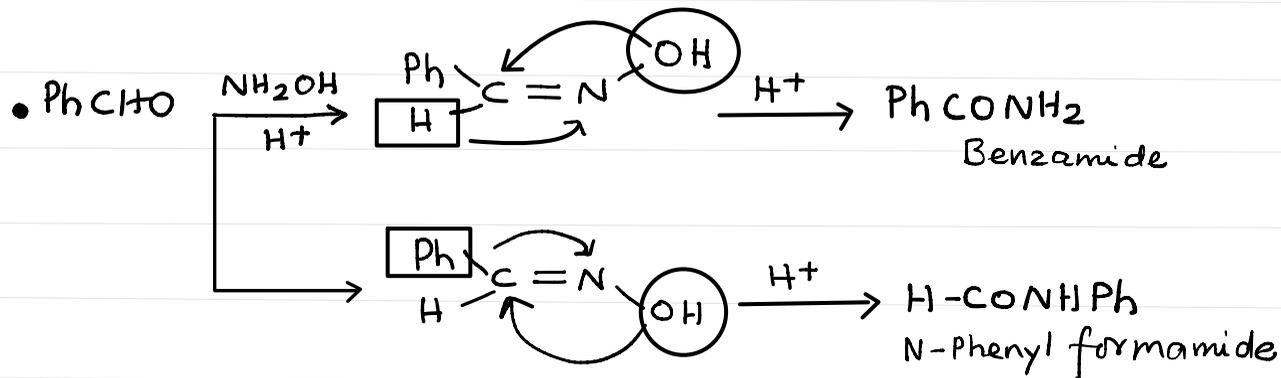
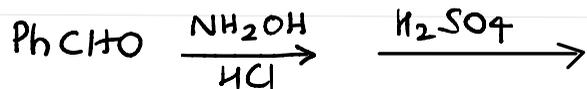
(Tautomerises)
(Aromatic)



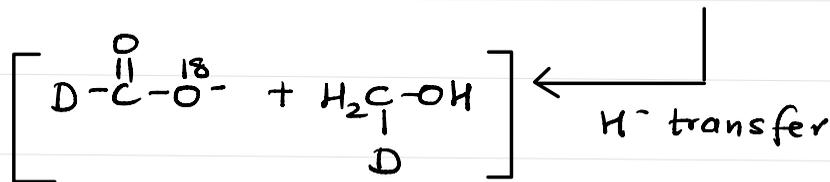
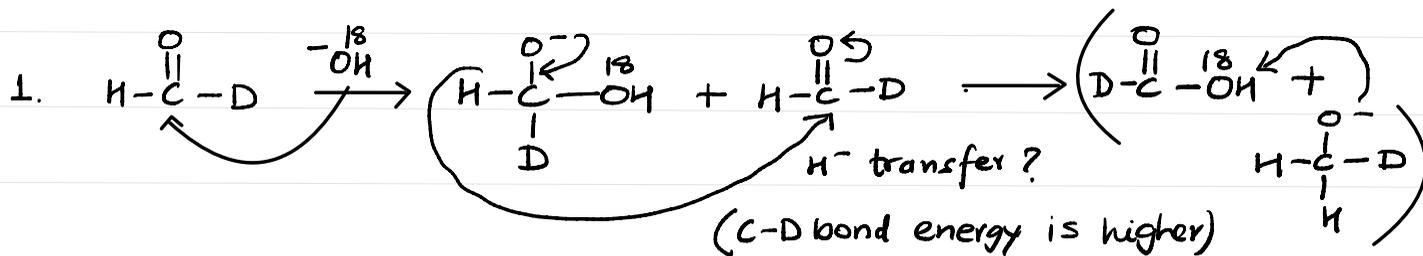
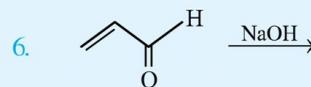
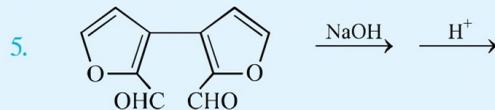
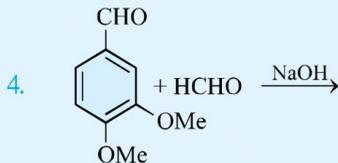
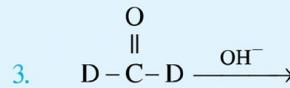
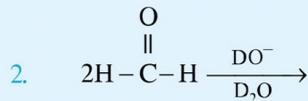
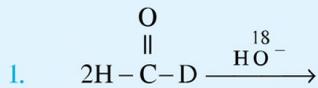
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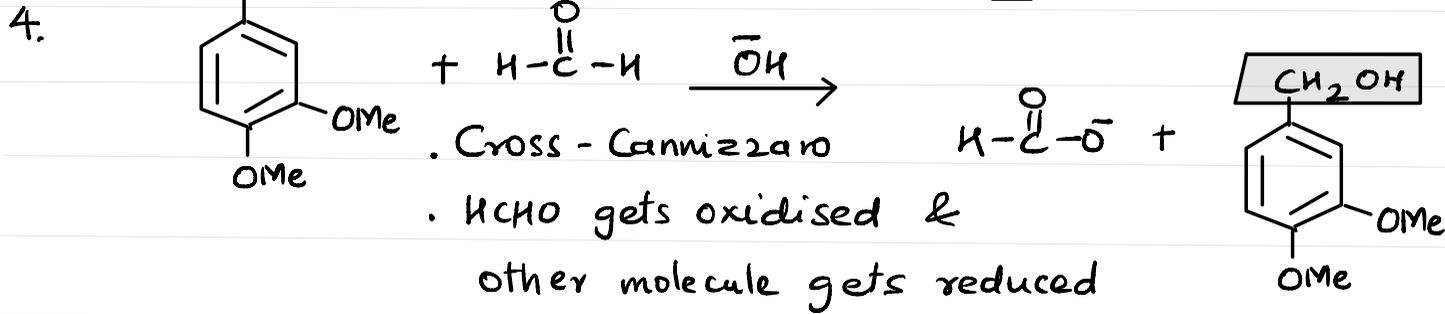
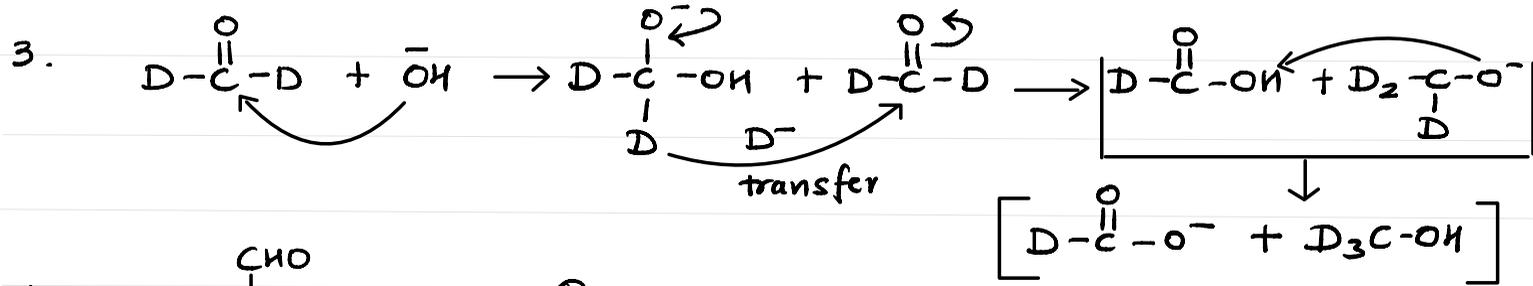
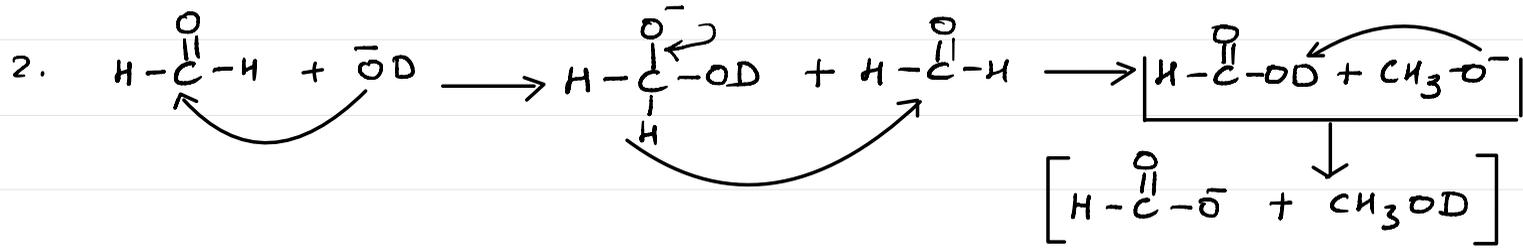


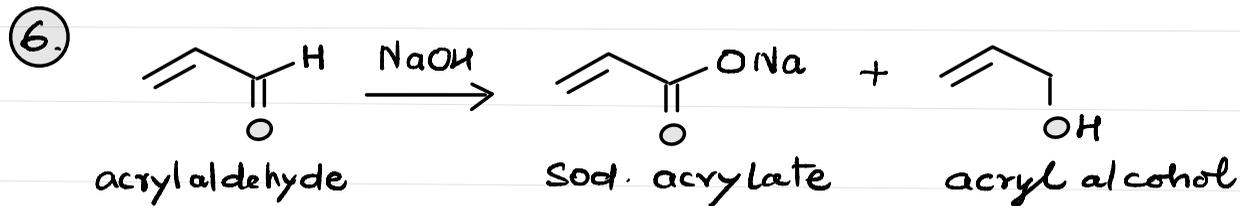
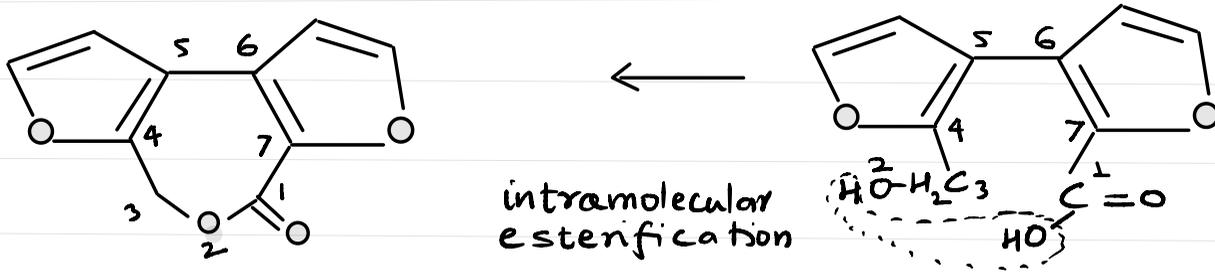
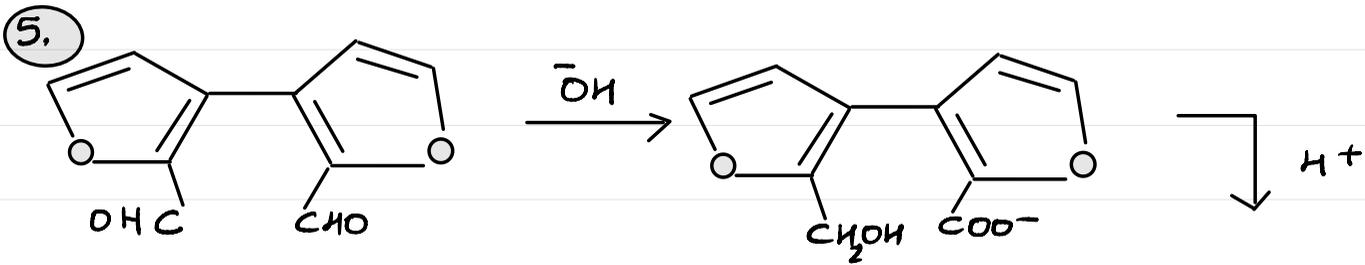
3.



⑥ Give the products (visualise Cannizzaro Reaction).







7.

Illustration - 7

Do the following transformations (in not more than four - five steps)

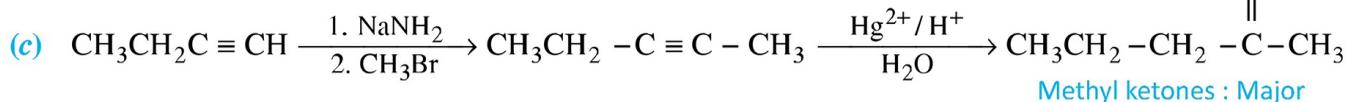
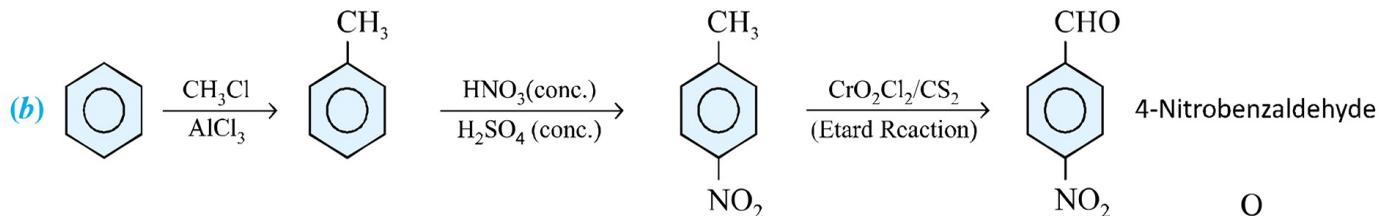
(a) Benzoic acid to cinnamaldehyde

(b) Benzene to 4-Nitrobenzaldehyde

(c) 1-Butyne to 2-Pentanone

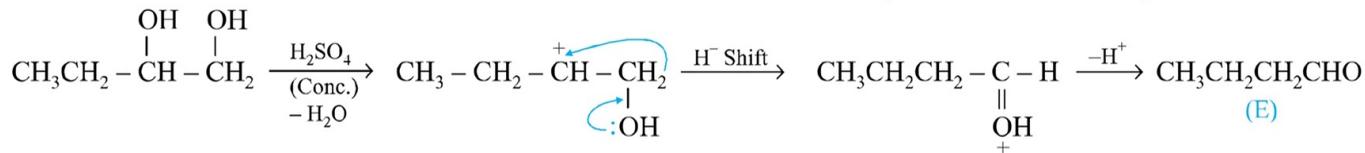
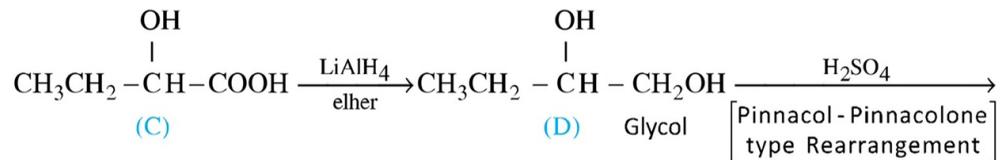
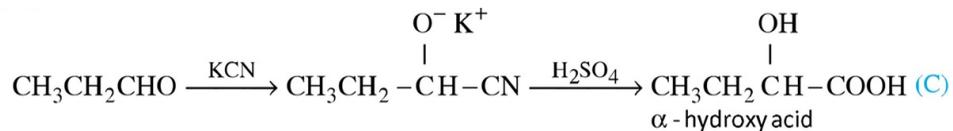
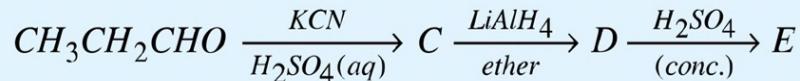
(d) Cyclohexanone to 2-methyl cyclohexanone

Note: (a) & (d) were based on aldol reaction.

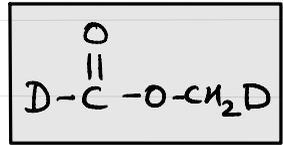
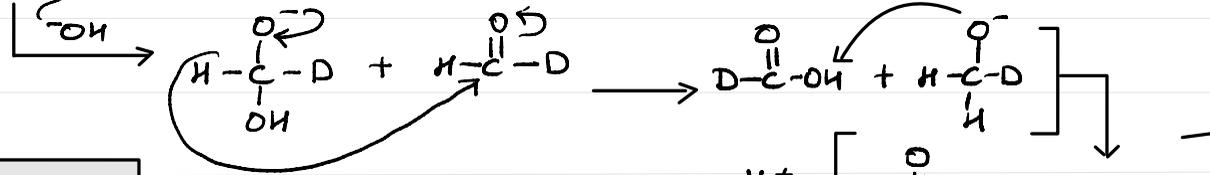
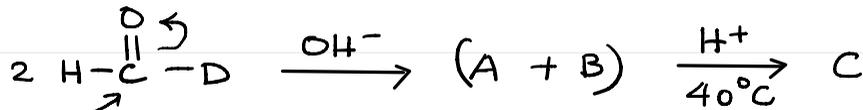


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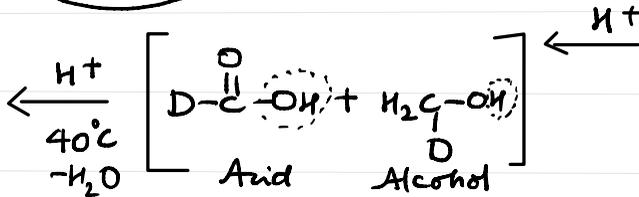
Write the structure of the major organic products in each of the following reaction setups.



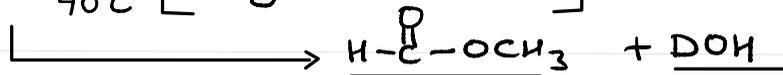
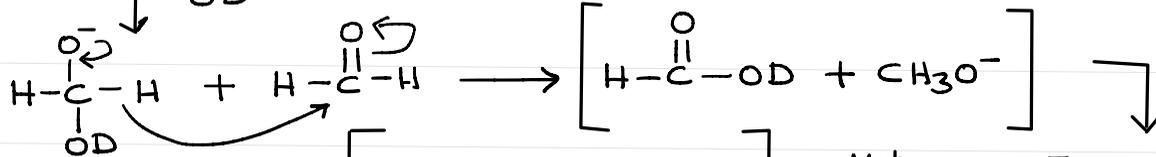
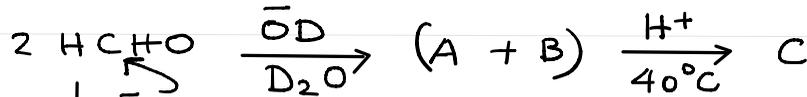
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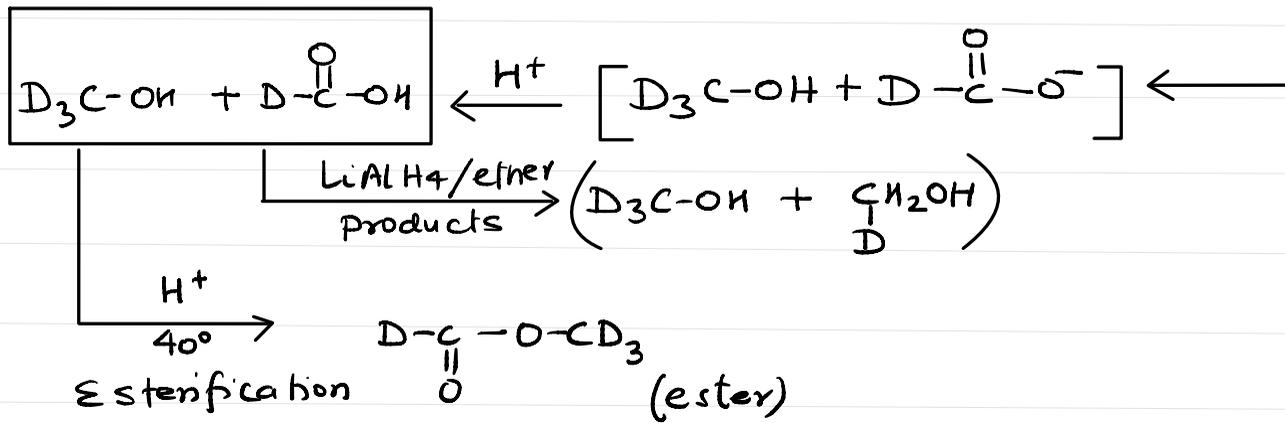
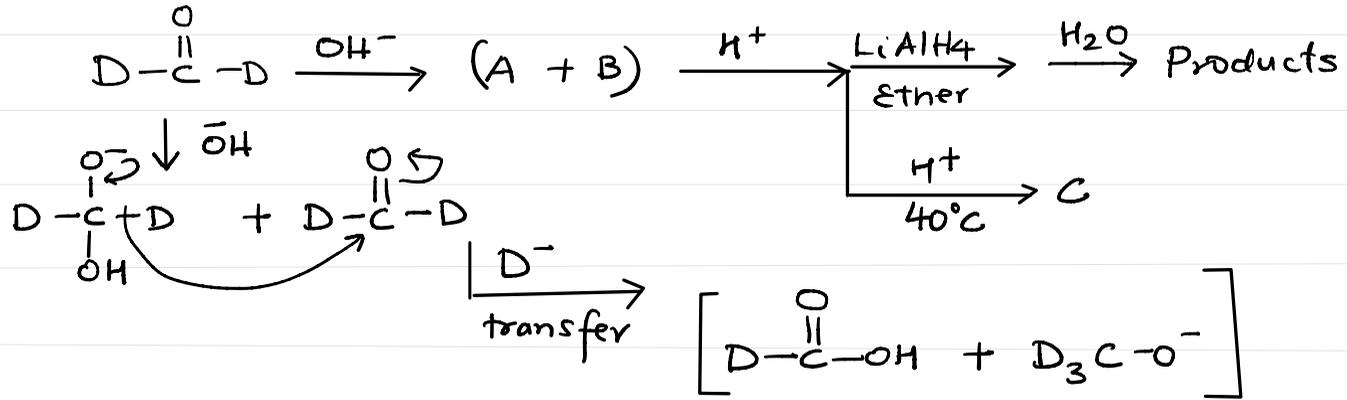
Esterification

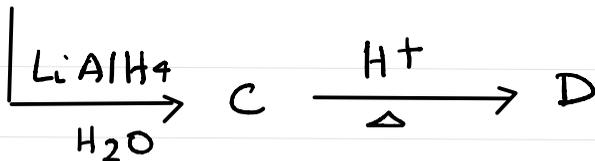
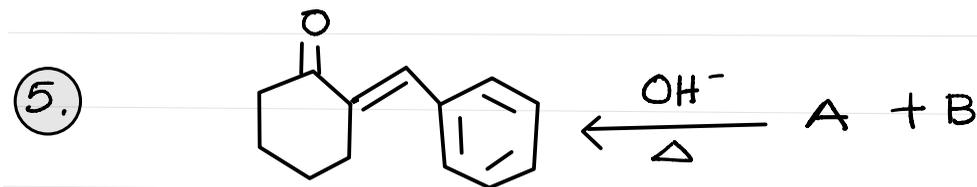
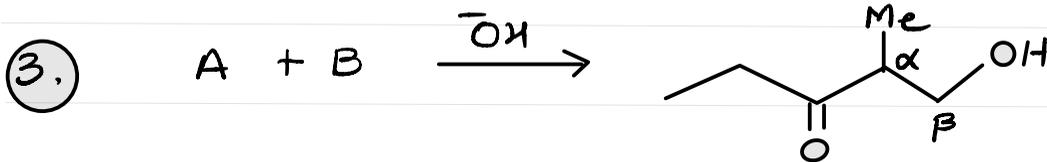
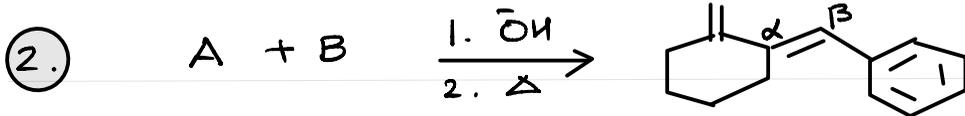


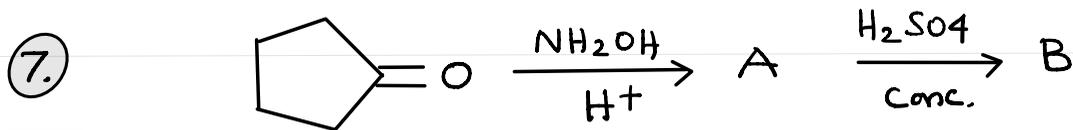
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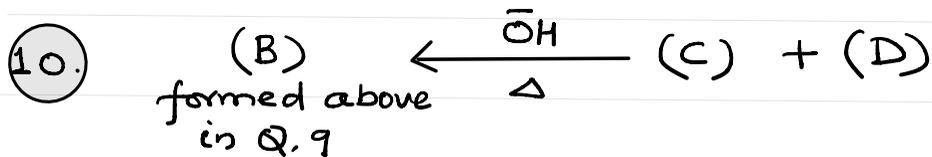
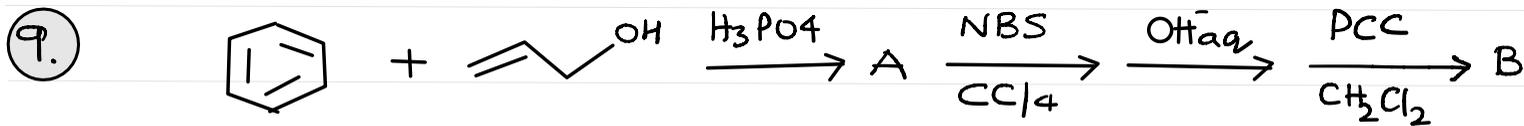
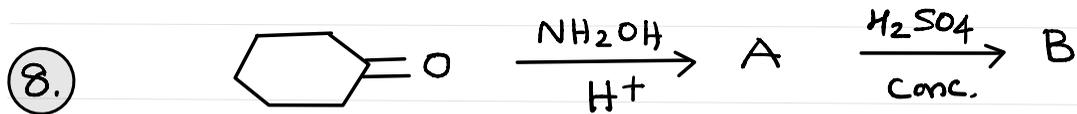
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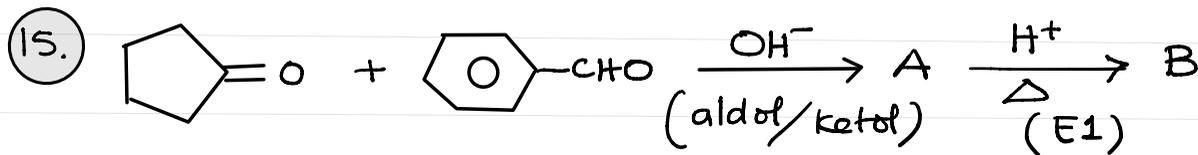
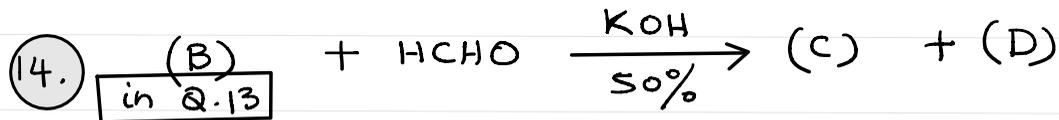
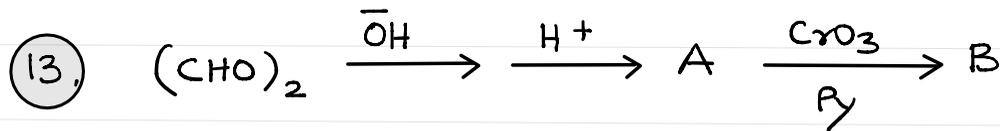
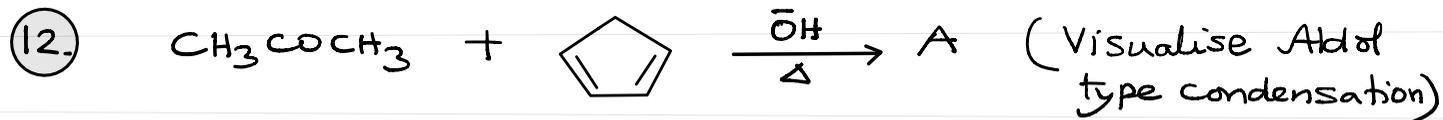
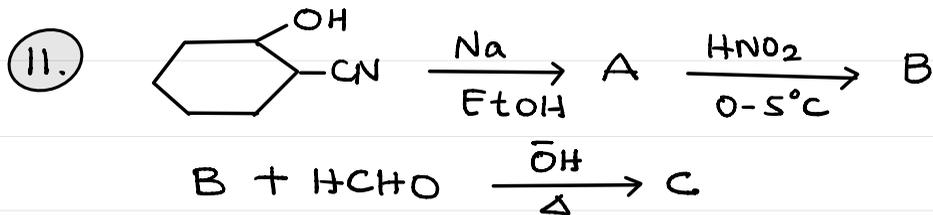


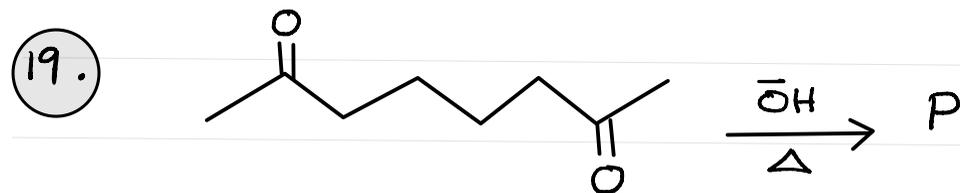
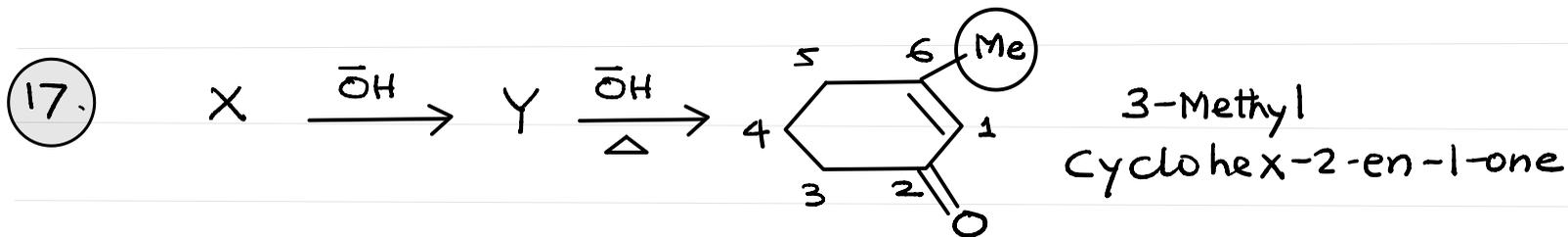
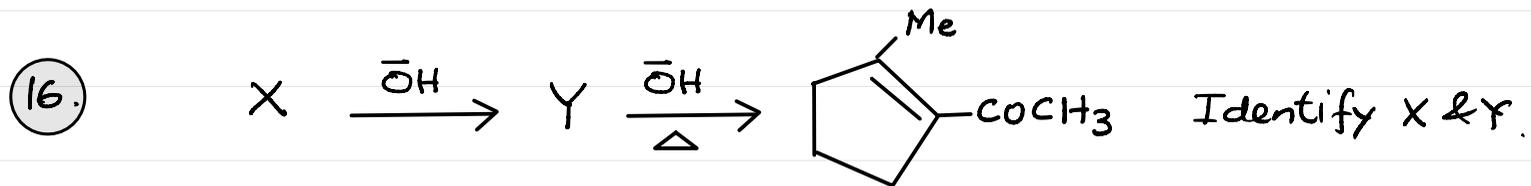




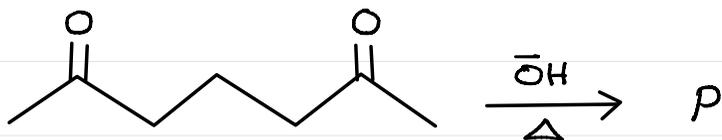
Visualise the ring expansion



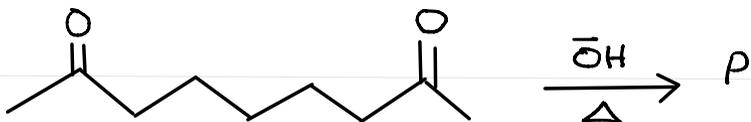




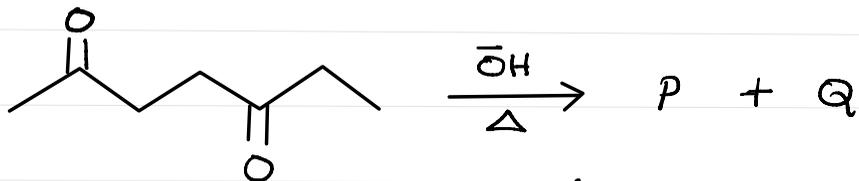
20.



21.



22.



(unsymmetric)

Think !! (Visualise RDS of Aldol Reaction)

_____ X _____ X _____

A wooden clothespin is attached to a piece of light-colored paper with a red and blue striped border. The paper is pinned to a dark wooden surface. The words "THANK YOU" are written in a bold, black, sans-serif font across the center of the paper.

THANK YOU