

Unit-8.

11

Aldehydes, ketones and carboxylic acid.

Inter Q NO 8.4. Arrange the following compounds in increasing order of their reactivity in nucleophilic addition.

(i) Ethanal, propanal, propanone, butanone

Ans. Butanone < propanone < propanal < Ethanal

(ii) Benzaldehyde, p-Tolualdehyde, p-nitrobenzaldehyde, Acetophenone

Ans Acetophenone < p-Tolualdehyde < Benzaldehyde < p-nitrobenzaldehyde.

Ex Q 8.12 Arrange the following compounds in increasing order of their property indicated.

(i) Acetaldehyde, Acetone, Di-tert-butyl ketone, Methyl-tert-butyl ketone, (increasing reactivity with HCN)

Ans: Di-tert-butyl ketone < Methyl-tert-butyl ketone < Acetone < Acetaldehyde.

(ii) $\text{C}_6\text{H}_5\text{C}_6\text{H}_4\text{C}_6\text{H}_4\text{COOH}$, $\text{C}_6\text{H}_5\text{C}_6\text{H}_4\text{COOH}$, $(\text{C}_6\text{H}_5)_2\text{CHCOOH}$, $\text{C}_6\text{H}_5\text{CH}_2\text{COOH}$. (increasing acidity)

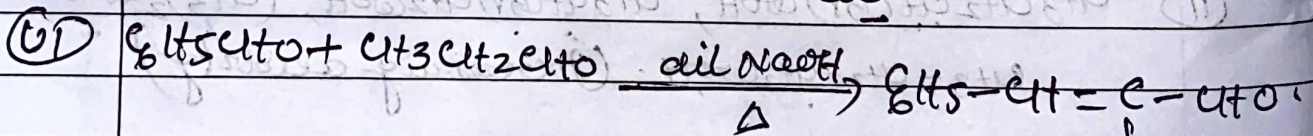
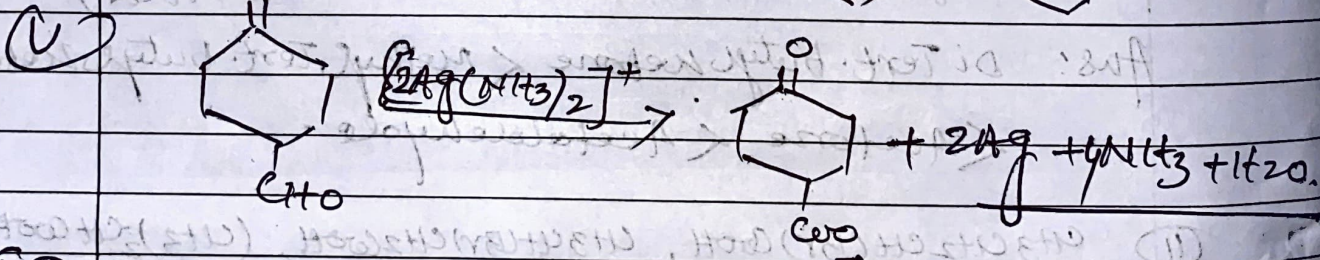
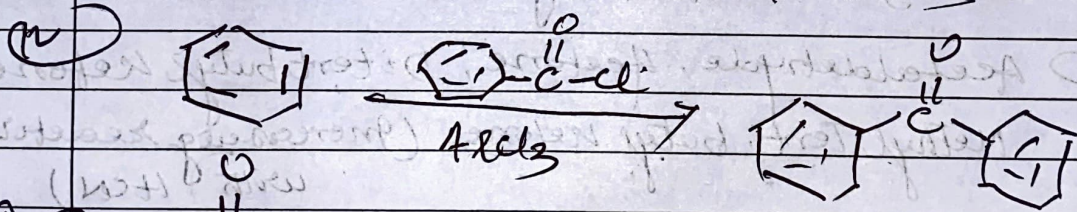
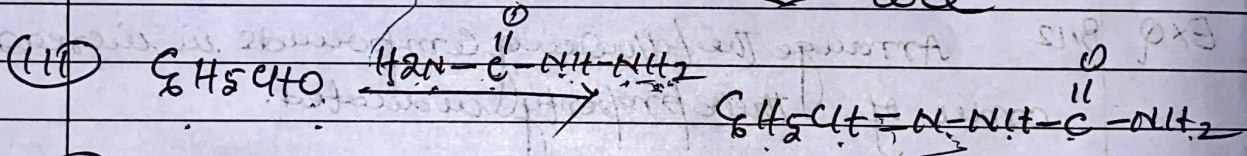
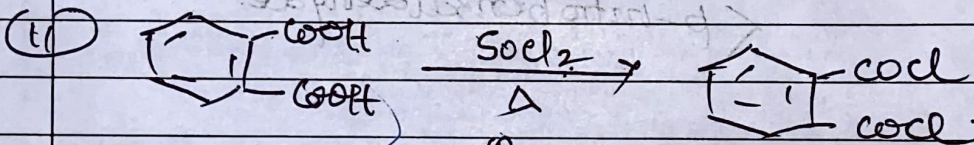
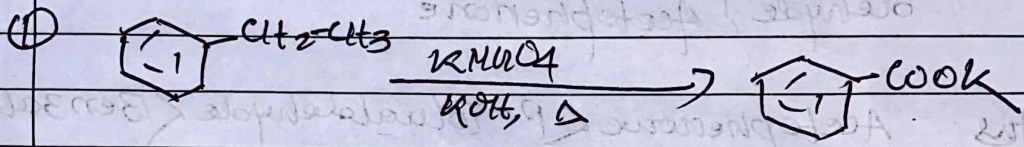
$(\text{C}_6\text{H}_5)_2\text{CHCOOH}$ < $\text{C}_6\text{H}_5\text{C}_6\text{H}_4\text{COOH}$ < $\text{C}_6\text{H}_5\text{C}_6\text{H}_4\text{C}_6\text{H}_4\text{COOH}$ < $\text{C}_6\text{H}_5\text{CH}_2\text{COOH}$.

(11) Benzoic acid, 4-nitrobenzoic acid,
3,4-dinitrobenzoic acid, 4-methoxybenzoic acid
(increasing acidity)

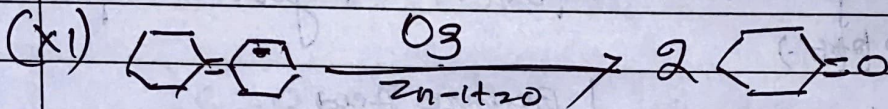
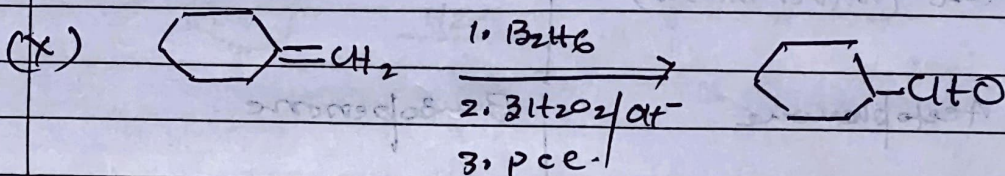
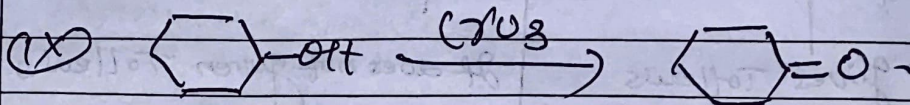
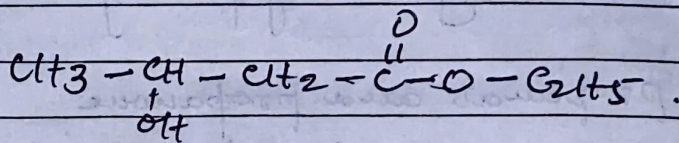
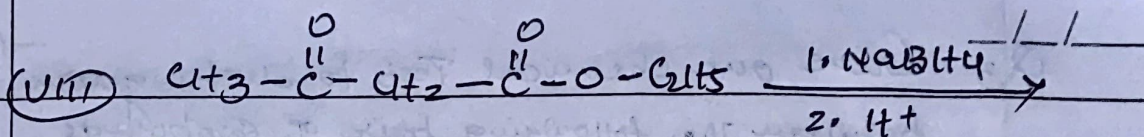
Ans: 4-methoxy benzoic acid < Benzoic acid

< 4-nitrobenzoic acid < 3,4-dinitrobenzoic acid.

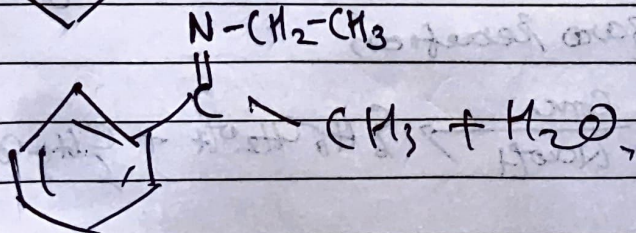
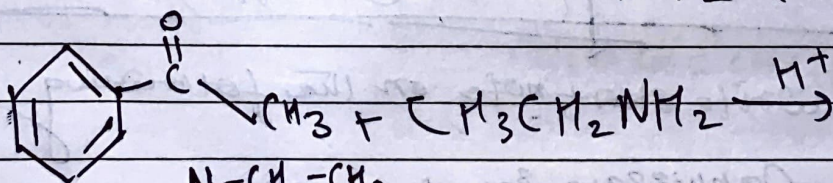
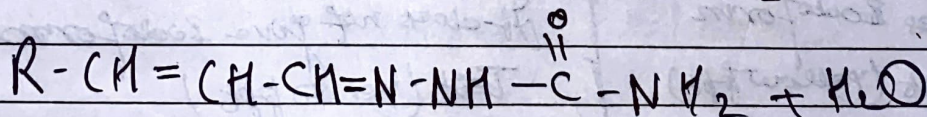
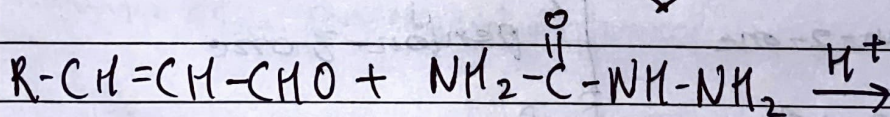
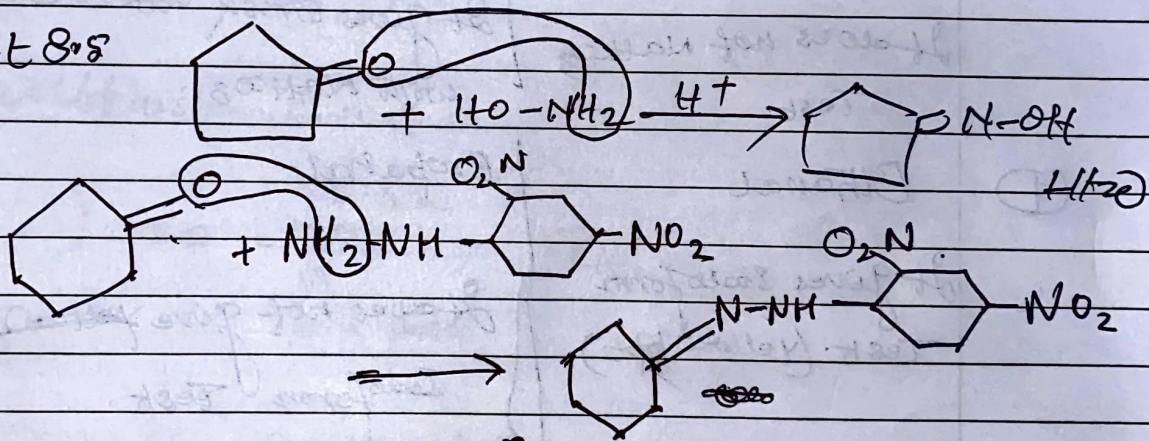
Ex Q 17 Complete each synthesis by giving missing starting material, reagent or product.



→ Cross Aldol Condensation ←



Interact 8:8



Q.3 Give one chemical test to distinguish between the following pair of compounds.

Ans (1) Propanal and propanone

<p>Propanal</p> <p>It gives Tollen's Test (silver mirror)</p>	<p>Propanone</p> <p>It does not give Tollen's Test</p>
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(2) Acetophenone

Benzophenone

It gives Iodoform Test (yellow ppt)

It does not give Iodoform Test

(3) Phenol

Benzoic Acid

It does not react with NaHCO_3 Test

It gives brisk effervescence with NaHCO_3

(4) Ethanal

Propanal

It gives Iodoform Test (yellow ppt)

It does not give ~~yellow~~ Iodoform Test

(5) Pentan-2-one

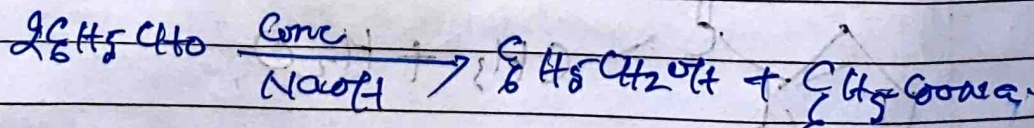
Pentan-3-one

It gives Iodoform test (yellow ppt)

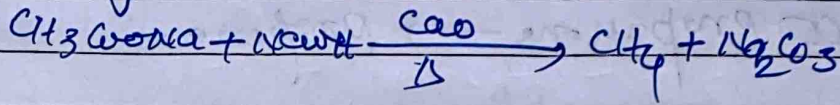
It does not give Iodoform Test (yellow ppt)

→ Type (4) Write short note on the following

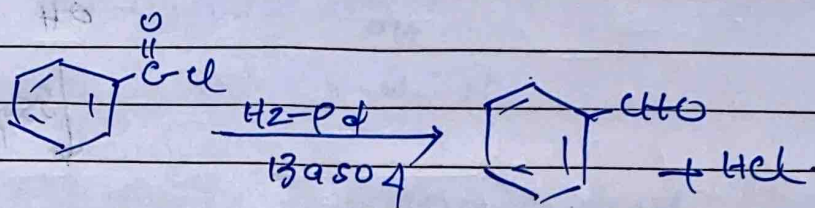
(1) Cannizzaro Reaction



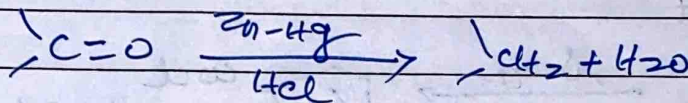
(11) Decarboxylation



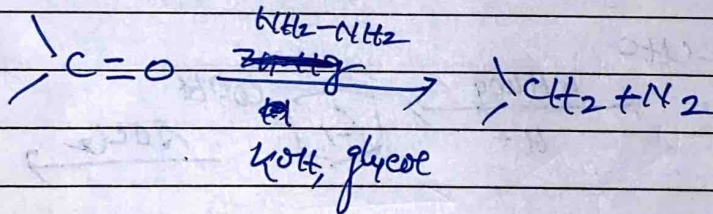
(12) Rosenmund Reduction



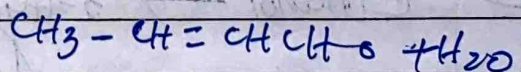
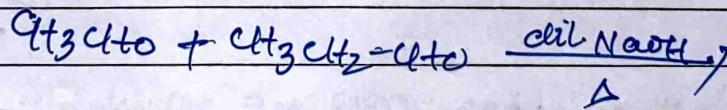
(13) Clemmensen Reduction



(14) Wolff-Kishner Reduction



(15) Cross Aldol Condensation

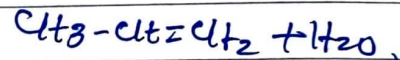
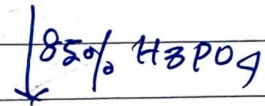
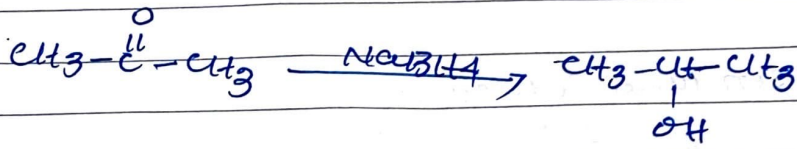


Conversion.

Q7

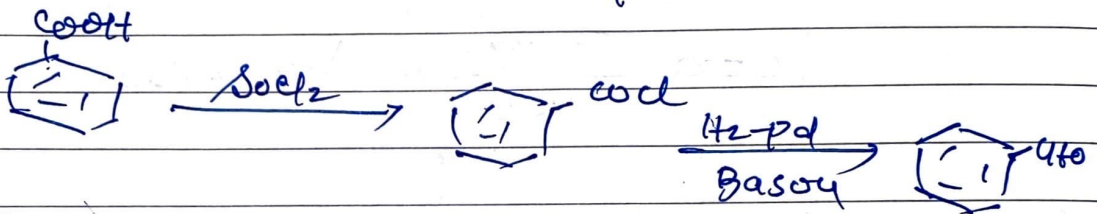
(i) Propanone \rightarrow Propan-2-ol.

Ans



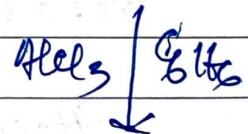
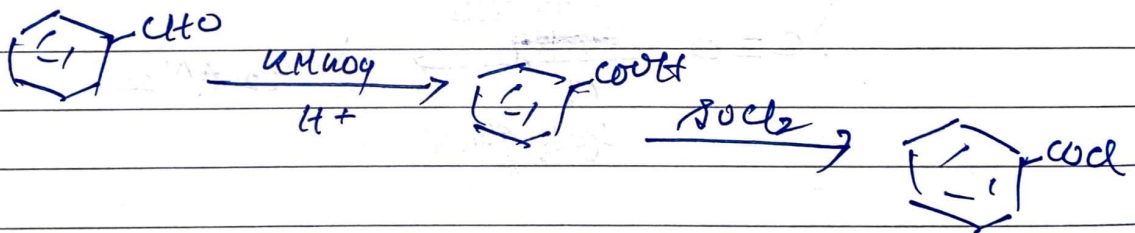
(ii)

Benzic acid \rightarrow Benzaldehyde.



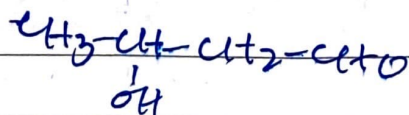
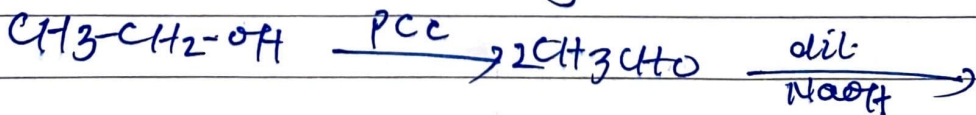
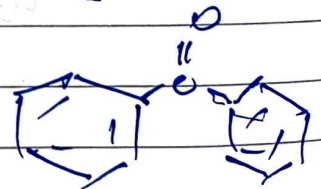
(iii)

Benzaldehyde \rightarrow Benzophenone.



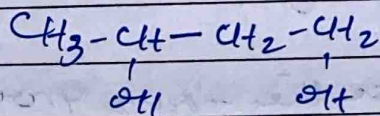
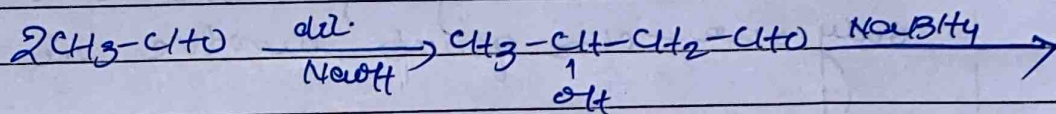
(iv)

Ethanol \rightarrow 3-Hydroxybutanal.



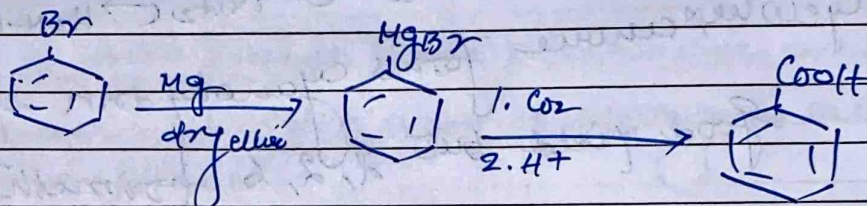
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(v) Ethanal \rightarrow Butan-1,3-di-ol

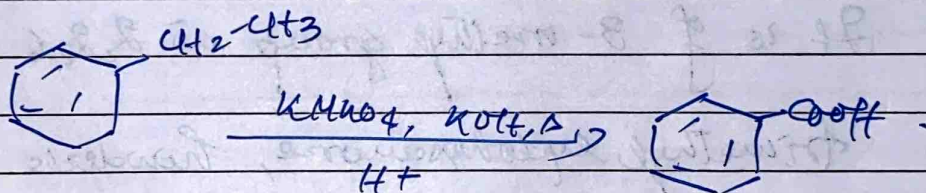


But-1,3-di-ol

(vi) Bromobenzene \rightarrow Benzoic Acid



(vii) Ethyl Benzene \rightarrow Benzoic Acid



Give reason:

Q, Aldehydes are more reactive than ketones towards the nucleophilic substitution reaction.

Ans: It is because of steric and electronic reason. Sterically two large substituents in ketone hinder the approach of nucleophile and make ketone less reactive.

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(ii) There are two $-NH_2$ groups in semicarbazide only one $-NH_2$ group involves in semicarbazone formation.

Ans. It is because the $-NH_2$ group close

to carbonyl carbon involve in resonance.

(iii) $H_2N-NH_2-\overset{\overset{O}{\parallel}}{C}-NH_2 \leftrightarrow H_2N-NH-\overset{\overset{O^-}{\parallel}}{C}-NH_2^+$
Cyclohexanone forms cyanohydrin in good yield but 2,2,6-trimethylcyclohexanone does not.

Ans. It is of 3-methyl group in 2,2,6

trimethylcyclohexanone, hinders the approach of incoming nucleophile and makes ~~ketone~~ it less reactive.

And include Ex Q 10, 11, 19, 20.

(d) Although phenoxide ~~base~~ ion has more number of resonance than carboxylate ion, ~~Expt~~ Explain why carboxylic acid is stronger acid than phenol.

Ans ~~Car~~ carboxylic acid forms carboxylate ion which can be stabilised by two equivalent resonance in which -ve charge is at more electronegative oxygen atom but in phenoxide, -ve charge is less electronegative carbon atom. i.e. carboxylate ion is more stable than phenoxide and is \therefore carboxylic acid is stronger acid than phenol.

