

UNIT 12 ALDEHYDES KETONES AND CARBOXYLIC ACIDS

1) What are aldehydes ? Aldehydes are the organic compounds containing carbonyl group, linked with one hydrogen and one alkyl /aryl group.	1
2) What are carboxylic acids? Carboxylic acids are the organic compounds containing carboxyl(-COOH) group/s	1
3) Between aldehyde and ketones which one is confirmed using Tollen's reagent. Aldehyde.	1
4) Between aldehyde and ketones which one is confirmed using Fehling's solution.. Aldehyde.	1
5) Write the IUPAC name of the compound. CHO-CH₂-CH(CHO)-CH₂-CHO. Propane-1,2,3-tricarbaldehyde.	1
6) The boiling point of aldehydes and ketones are higher than hydrocarbons and ethers of comparable molecular mass. Why. Because in aldehydes and ketones there is a weak molecular association arising out of dipole-dipole interaction.	1
7) Arrange the following compounds in the increasing order of their acidic strength. HCOOH, CH₃COOH, CH₃CH₂COOH. CH ₃ CH ₂ COOH < CH ₃ COOH < HCOOH.	1
8) Arrange the following compounds in the decreasing order of their acidic strength. HCOOH, CH₃COOH, C₆H₅COOH. HCOOH > C ₆ H ₅ COOH > CH ₃ COOH.	1
9) Arrange the following compounds in the increasing order of their acidic strength. Cl-CH₂COOH, Br-CH₂COOH, F-CH₂COOH Br-CH ₂ COOH < Cl-CH ₂ COOH < F-CH ₂ COOH .	1
10) Name the reagent used in the Stephen reaction. Stannous chloride in presence of HCl.	1
11) Explain the nature of carbonyl group in aldehydes and ketones.	2
	The carbon-oxygen double bond is polarised due to higher electronegativity of oxygen relative to carbon. Hence, the carbonyl carbon is an electrophilic and carbonyl oxygen is a nucleophilic centre.
12) Identify the product and name of the reaction.	2
<p style="text-align: center;">Benzoyl chloride Benzaldehyde</p>	Rosenmunds reduction

13) How do you prepare aldehydes from alkane nitrile? Write the general reaction and name of the reaction.

2

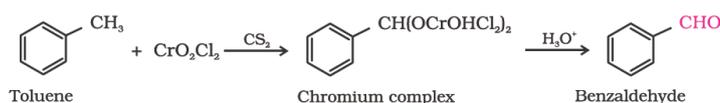


Stephen reaction

14) What happens when toluene treated with chromyl chloride in CS₂ solvent upon hydrolysis? Write chemical equation.

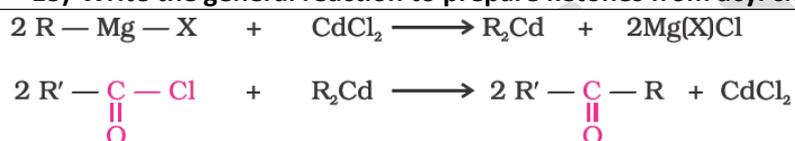
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Benzaldehyde is obtained



15) Write the general reaction to prepare ketones from acyl chloride.

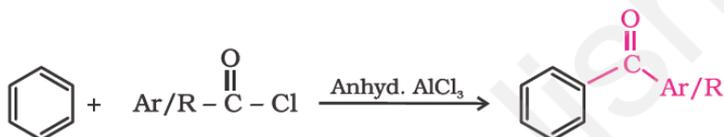
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16) Name the functional group obtained when benzene reacts with acetyl chloride in presence of anhydrous AlCl₃

2

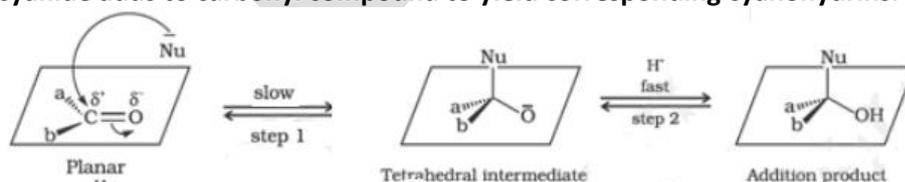
Functional group is Ketone



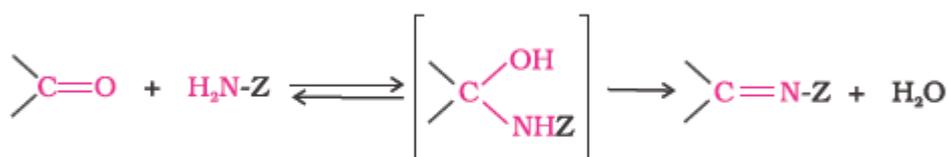
17) Explain the mechanism of addition of HCN to aldehyde .

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Aldehydes and ketones reacts very slowly with pure HCN. Hence, it is catalysed by base and generated cyanide adds to carbonyl compound to yield corresponding cyanohydrins.



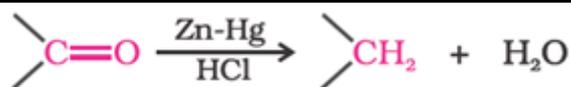
18) How do aldehydes and ketones react with ammonia/ hydroxylamine/ hydrazine/ phenyl hydrazine /semicarbazide? (Each one carries 2 marks.)



Z = Alkyl, aryl, OH, NH₂, C₆H₅NH, NHCONH₂.

19) Identify the following reaction.

1



Clemmenson's reduction

20) Name the products obtained when aldehydes are oxidized.

1

Carboxylic acid

21) Write Wolff-Kishner reduction equation.

2



22) What is Tollen's reagent.

1

Tollen's reagent is ammoniacal silver nitrate solution.

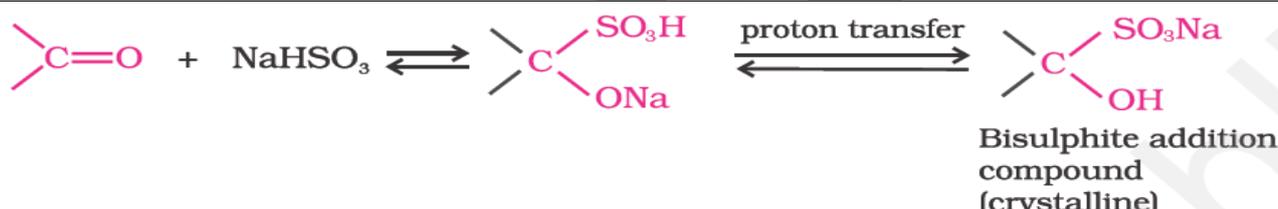
23) What is Fehling's solution.

1

Fehling's solution is a mixture of alkaline copper sulphate solution and sodium-potassium tartarate solution.

24) How do aldehydes and ketones react with sodium bisulphite?

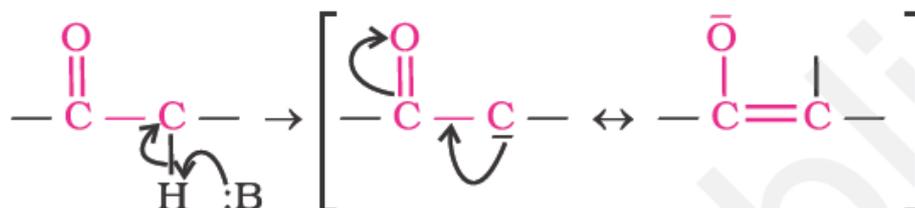
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2

Acidity of α -hydrogens of aldehydes and ketones: The aldehydes and ketones undergo a number of reactions due to the acidic nature of α -hydrogen.

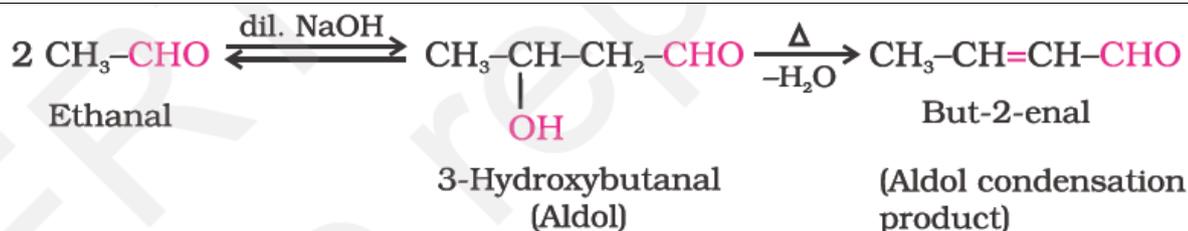
The acidity of α -hydrogen atoms of carbonyl compounds is due to the strong electron withdrawing effect of the carbonyl group and resonance stabilisation of the conjugate base.



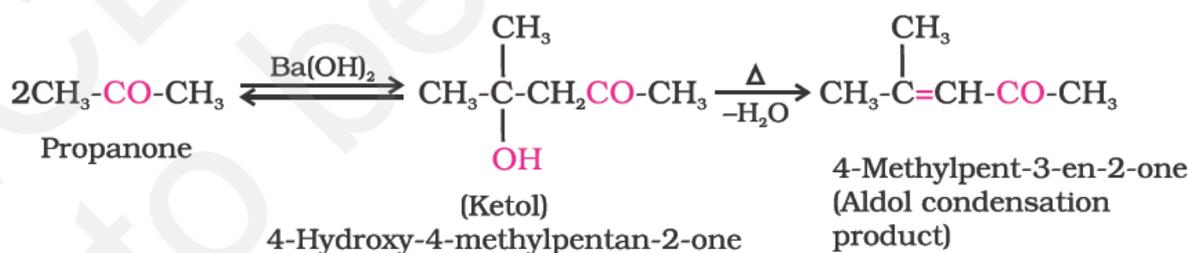
26) What is Aldol condensation reaction and explain this reaction by taking ethanol as example.

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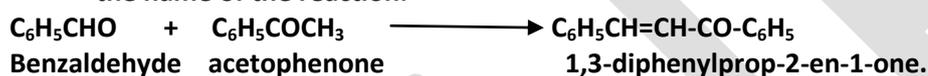
Aldol condensation: Aldehydes and ketones having at least one α -hydrogen undergo a reaction in the presence of dilute alkali as catalyst to form β -hydroxy aldehydes (aldol) or β -hydroxy ketones (ketol), respectively. This is known as **Aldol reaction**.



27) How is propanone converted into 4-methylpent-3-en-2-one? 2

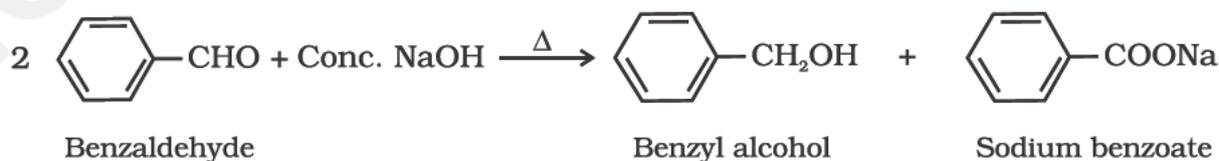
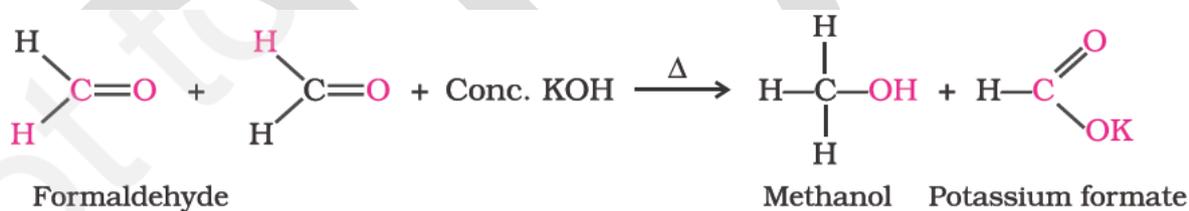


28) Explain the reaction between benzaldehyde and acetophenone in presence of dilute base and identify the name of the reaction. 3



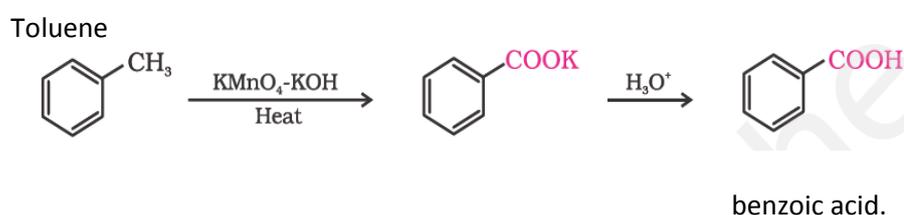
This reaction is called as cross-aldol condensation reaction.

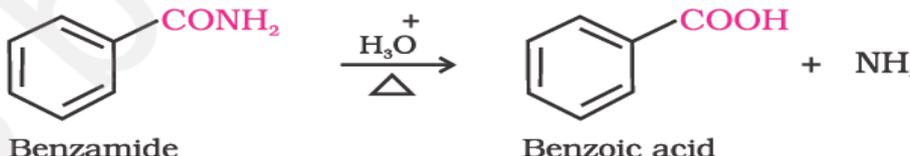
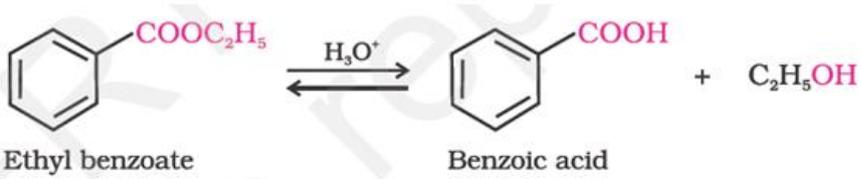
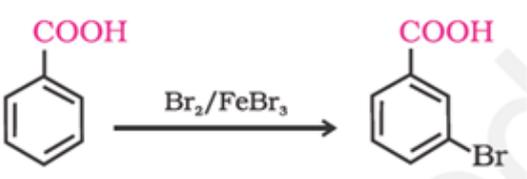
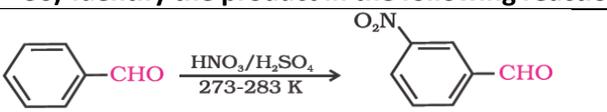
29) Write the reaction involved when two molecules of methanal reacted each other in presence of concentrated base. Name the reaction. 3

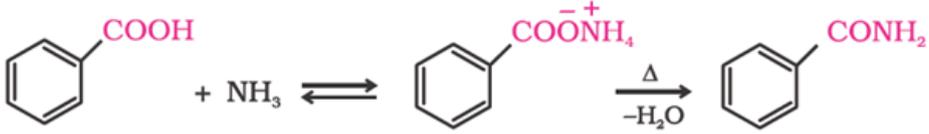
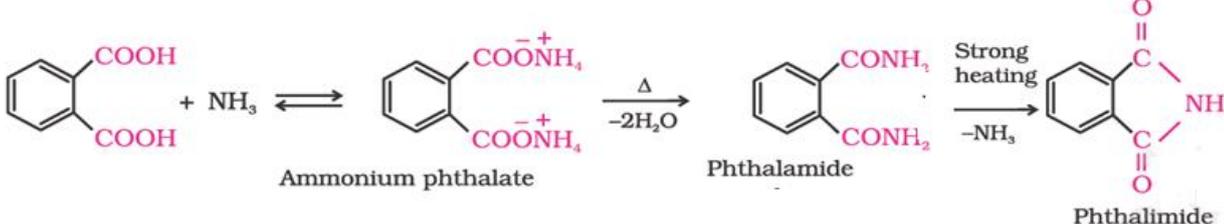
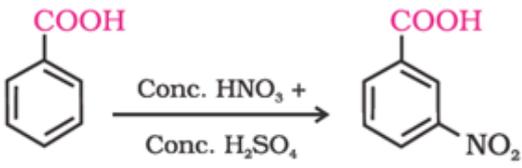


Cannizzaro's reaction

30) How is toluene/ propyl benzene converted into benzoic acid? 2

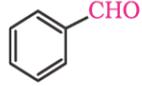
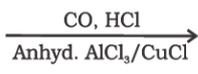


<p>31) How are carboxylic acids obtained from alkyl nitrile? Give example. 2</p>
<p> $R-CN \xrightarrow[H_2O]{\overset{+}{H} \text{ or } \overset{-}{O}H} R-\overset{\overset{O}{\parallel}}{C}-NH_2 \xrightarrow[\Delta]{\overset{+}{H} \text{ or } \overset{-}{O}H} RCOOH$ </p> <p> $\text{CH}_3\text{CONH}_2 \xrightarrow[\Delta]{\text{H}_3\text{O}^+} \text{CH}_3\text{COOH} + \text{NH}_3$ Ethanamide Ethanoic acid </p> <p>  Benzamide Benzoic acid + NH₃ </p>
<p>32) How do you prepare carboxylic acid obtained from Grignard reagent? 2</p>
<p> $R-Mg-X + O=C=O \xrightarrow{\text{Dry ether}} R-\overset{\overset{O}{\parallel}}{C}-O^-MgX^+ \xrightarrow{H_3O^+} RCOOH$ </p>
<p>33) How is benzoic acid obtained from ethyl benzoate? 2</p>
<p>  Ethyl benzoate Benzoic acid + C₂H₅OH </p>
<p>34) Identify the product in the following reaction. 1</p>
<p>  m-Bromobenzoic acid </p>
<p>35) Mention any two uses of acetic acid 2</p>
<p>Methanoic acid is used in rubber, textile, dyeing, leather and electroplating industries. Ethanoic acid is used as solvent and as vinegar in food industry. Hexanedioic acid is used in the manufacture of nylon-6, 6. Esters of benzoic acid are used in perfumery. Sodium benzoate is used as a food preservative. Higher fatty acids are used for the manufacture of soaps and detergents.</p>
<p>36) Identify the product in the following reaction. 1</p>
<p>  Benzaldehyde m-Nitrobenzaldehyde </p> <p>m-Nitrobenzaldehyde</p>
<p>37) What is formalin? Mention its uses. 2</p>
<p>40 % aqueous solution of formaldehyde is called as formalin. It is used for preservation of biological specimen</p>

38) How are carboxylic acids obtained from alcohols?	2
$RCH_2OH \xrightarrow[2. H_3O^+]{1. \text{alkaline } KMnO_4} RCOOH$	
39) What happens when carboxylic acid reacts with $PCl_5/PCl_3/SOCl_2$.	2
$RCOOH + PCl_5 \longrightarrow RCOCl + POCl_3 + HCl$	
$3RCOOH + PCl_3 \longrightarrow 3RCOCl + H_3PO_3$	
$RCOOH + SOCl_2 \longrightarrow RCOCl + SO_2 + HCl$	
40) How do acetic acid react with ammonia.	2
$CH_3COOH + NH_3 \rightleftharpoons CH_3COO^-NH_4^+ \xrightarrow[-H_2O]{\Delta} CH_3CONH_2$ <p style="text-align: center;">Ammonium acetate Acetamide</p>	
41) Write the equation involving the reaction between benzoic acid and ammonia.	2
 <p style="text-align: center;">Ammonium benzoate Benzamide</p>	
42) How do you convert benzene-1,2-dicarboxylic acid into phthalimide.	3
 <p style="text-align: center;">Ammonium phthalate Phthalamide Phthalimide</p>	
43) Name the product obtained when sodium acetate treated with sodalime.	1
Methane	
44) Write the general reaction of Hell-Volhard-Zelinsky reaction.	2
$R-CH_2-COOH \xrightarrow[(ii) H_2O]{(i) X_2/Red \text{ phosphorus}} R-\underset{\substack{ \\ X}}{CH}-COOH$ <p style="text-align: center;">$X = Cl, Br$ α - Halocarboxylic acid</p>	
45) Explain nitration reaction of benzoic acid.	2
 <p style="text-align: center;">m-Nitrobenzoic acid</p>	
46) Write the name of the following reaction.	1



Benzene



Benzaldehyde

Guterman-koch reaction

PROSE