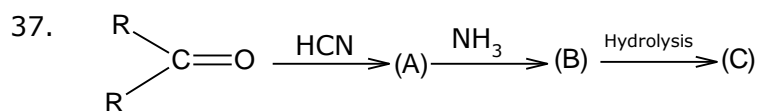


ALDEHYDES , KETONES & ACIDS-II PUC

- In aldehydes and ketones, carbon of the carbonyl group is
a) sp^3 -hybridized b) sp^2 -hybridized c) sp -hybridized d) unhybridized
- Which of the following types of isomerism is exhibited by pentanone?
a) Chain isomerism b) Position isomerism
c) Functional isomerism c) All of these
- Which one of the statements about $\text{HOH}_2\text{CCH}(\text{OH})\text{CHO}$ is not correct? It
a) is an isomer of 1, 3-dihydroxypropanone
b) contains a tertiary alcoholic group
c) has the same empirical formula as glucose
d) can show optical isomerism
- Ketones ($\text{R}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{R}'$) where $\text{R} = \text{R}'$ are alkyl group, can be obtained in one step by
a) hydrolysis of esters b) oxidation of 1°
c) oxidation of 2° alcohol d) reaction of alkyl halide with alcohols
- Which of the following reaction can produce $\text{R}-\text{CO}-\text{Ar}$?
a) $\text{ArCOCl} + \text{H}-\text{Ar} \xrightarrow{\text{AlCl}_3}$ b) $\text{RCOCl} + \text{ArMgX} \rightarrow$
c) $\text{ArCOCl} + \text{RMgX} \rightarrow$ d) $\text{RCOCl} + \text{H}-\text{Ar} \xrightarrow{\text{AlCl}_3}$
- Which of the following compounds does not react with sodium bisulphite?
a) Benzaldehyde b) Acetophenone c) Actone d) Acetaldehyde
- Which of the following will react with water
a) CHCl_3 b) Cl_3CCHO c) CCl_4 d) $\text{ClCH}_2\text{CH}_2\text{Cl}$
- Formaldehyde reacts with ammonia to give
a) Hexamethylene tetramine b) Formaldehyde-ammonia
c) Formalin d) Hydrobenzamide
- Which of the following products is formed when benzaldehyde is treated with CH_3MgBr and the addition product so obtained is subjected to acid hydrolysis?
a) A secondary alcohol b) A primary alcohol
c) Phenol d) tert-Butyl alcohol
- 1-Phenylethanol can be prepared by reaction of benzaldehyde with
a) Methylbromide
b) Ethyl iodide and magnesium
c) Methyl bromide and aluminium bromide
d) Methyl iodide and magnesium
- From which of the following tertiary butyl alcohol is obtained by the action of methyl magnesium iodide?
a) HCHO b) CH_3CHO c) CH_3COCH_3 d) CO_2
- Oxidation of acetaldehyde with selenium dioxide produces
a) Ethanoic acid b) Methanoic acid c) Glyoxal d) Oxalic acid
- Methyl ketones are usually characterized through
a) the Tollen's reagent b) the iodoform test
c) the Schiff's test d) the Benedict's reagent
- $(\text{CH}_3)_2\text{C} = \text{CHCOCH}_3$ can be oxidised to $(\text{CH}_3)_2\text{C} = \text{CHCOOH}$ by
a) Chromic acid b) NaOI c) Cu at 300°C d) KMnO_4

15. Which does not give iodoform test?
 a) CH_3COCH_3 b) CH_3OH c) $\text{CH}_3\text{CH}_2\text{OH}$ d) CH_3CHO
16. The reaction of $\text{C}_6\text{H}_5\text{CH}=\text{CHCHO}$ with NaBH_4 gives
 a) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ b) $\text{C}_6\text{H}_5\text{CH}=\text{CHCH}_2\text{OH}$
 c) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{CHO}$ d) $\text{C}_6\text{H}_5\text{CH}_2\text{CHOHCH}_3$
17. If 3-hexanone is reacted with NaBH_4 followed by hydrolysis with D_2O , the product will be
 a) $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{CH}_2\text{CH}_3$ b) $\text{CH}_3\text{CH}_2\text{CD}(\text{OH})\text{CH}_2\text{CH}_3$
 c) $\text{CH}_3\text{CH}_2\text{CH}(\text{OD})\text{CH}_2\text{CH}_2\text{CH}_3$ d) $\text{CH}_3\text{CH}_2\text{CD}(\text{OD})\text{CH}_2\text{CH}_2\text{CH}_3$
18. Pinacolone is
 a) 2, 3-Dimethyl-2, 3-butanediol b) 3, 3-Dimethyl-2-butanone
 c) 1-Phenyl-2-propanone d) 1, 1 Diphenyl -1, 2-ethandiol
19. Which of the following will respond to Cannizzaro's reaction
 a) 2, 2-Dimethylpropanal b) Acetaldehyde
 c) Propionaldehyde d) Cinnamaldehyde
20. $\text{CH}_3\text{CHO} + \text{HCHO} \xrightarrow[\text{heat}]{\text{dil. NaOH}}$ A $\xrightarrow[\text{H}_3\text{O}^+]{\text{HCN}}$ B. The structure of compound B is
 a) $\text{H}_2\text{C}=\text{CH}-\underset{\text{OH}}{\text{CH}}-\text{COOH}$ b) $\text{H}_2\text{C}=\text{CH}-\underset{\text{CN}}{\text{CH}}-\text{OH}$
 c) $\text{H}_2\text{CH}_3\text{C}-\underset{\text{CN}}{\text{CH}}-\text{OH}$ d) $\text{H}_3\text{C}-\underset{\text{OH}}{\text{CH}}-\text{COOH}$
21. Aromatic aldehydes, in the presence of cyanide ion as catalyst, are converted to acyloins, This reaction is called
 a) Perkin reaction b) Cannizzaro reaction
 c) Benzoin condensation d) Claisen condensation
22. The product/s of the following reaction,
 $\text{CHO} - \text{CHO} \xrightarrow{\text{OH}^-} ?$ is/are:
 a) CH_3OH b) $\text{HOCH}_2 - \text{COO}^-$ c) $\text{CH}_3\text{OH} + \text{HCOOH}$ d) $^- \text{OOC} - \text{COO}^-$
23. Predict the product 'B' in the sequence of reactions
 $\text{CH} \equiv \text{CH} \xrightarrow[\% \text{HgSO}_4]{30\% \text{H}_2\text{SO}_4} \text{A} \xrightarrow{\text{NaOH}} \text{B}$
 a) CH_3COONa b) CH_3COOH c) CH_3CHO d) $\text{H}_3\text{C}-\underset{\text{OH}}{\text{CH}}-\text{CH}_2\text{CHO}$
24. The reaction of acetaldehyde with HCN followed by hydrolysis gives a product which exhibits
 a) Metamerism b) Tautomerism c) Enantiomerism d) Geometrical isomerism
25. In the reaction sequence
 $\text{Glycerol} \xrightarrow{\text{KHSO}_4 / \Delta} \text{X} \xrightarrow{\text{Zn-Hg/conc HCl} / \Delta} \text{Y} \xrightarrow{\text{NBS} / \text{CCl}_4} \text{Z}$; (Z) will be
 a) 1-Bromopropane b) 2-Bromopropane
 c) 3-Bromopropane d) 1, 2- Dibromopropane

26. A substance $C_4H_{10}O$ yields on oxidation a compound, C_4H_8O which gives an oxime and a positive iodoform test. The original substance on treatment with conc. H_2SO_4 gives C_4H_8 . The structure of the compound is
 a) $CH_3CH_2CH_2CH_2OH$ b) $CH_3CHOHCH_2CH_3$
 c) $(CH_3)_3COH$ d) $CH_3CH_2-O-CH_2CH_3$
27. Reaction between $(C_2H_5)_2Cd$ and CH_3COCl leads to the formation of
 a) acetaldehyde b) diethyl ketone
 c) dimethyl ketone d) ethyl methyl ketone
28. The compound having least solubility in water is
 a) acetaldehyde b) acetone c) acetophenone d) methanal
29. Ethylidene chloride is hydrolysed with aqueous $NaOH$. The product formed is
 a) ethane b) ethanal c) ethyl chloride d) ethanol
30. Crotonaldehyde ($CH_3CH = CHCHO$) can be easily oxidised to crotonic acid ($CH_3CH = CHCOOH$) by using
 a) Tollen's reagent b) HNO_3 c) alkaline $KMnO_4$ d) acidic $K_2Cr_2O_7$
31. Aldehydes react with alcohols in presence of dry HCl gas to form
 a) acetals b) ketols c) ketals d) aldols
32. $CH_3 - CHO \xrightarrow{HCN} X \xrightarrow{H_2O/H^+} Y$. Here, Y is:
 a) propanoic acid b) ethanoic acid c) lactic acid d) pyruvic acid
33. Brady's reagent (2, 4-dinitrophenyl hydrazine) gives coloured precipitates on reacting with carbonyl compounds.
 a) white b) black c) red d) yellow-orange
34. In the reaction :
 $CH_3CHO + CH_2(COOH)_2 \xrightarrow{\Delta, Pyridine} A$, the compound A is
 a) $CH_3CH = CHCOOH$ b) $COOHCH = CHCOOH$
 c) CH_3COOH d) C_2H_5COOH
35. $(CH_3)_2CO \xrightarrow[(HCl)]{NaCN} A \xrightarrow{H_3O^+} B$
 in the above sequence of reactions A & B are
 a) $(CH_3)_2C(OH)CN$, $(CH_3)_2CHCOOH$ b) $(CH_3)_2C(OH)CN$, $(CH_3)_2C(OH)_2$
 c) $(CH_3)_2C(OH)CN$, $(CH_3)_2C(OH)COOH$ d) $(CH_3)_2C(OH)CN$, $(CH_3)_2C = O$
36. Carboxylic acids are reduced by red P and HI to
 a) alkanes b) alcohols c) alkenes d) aldehydes


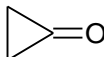


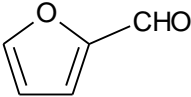
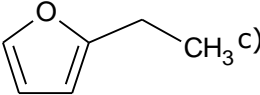
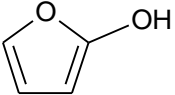
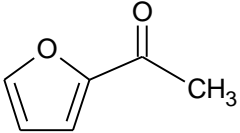
Compound (C) in above reaction is

- a) α - amino alkanol
 b) α - amino acid
 c) α - amino β - hydroxy acid
 d) α - hydroxy acid
38. When acetic acid reacts with phosphorus pentoxide the product obtained is
 a) acetic anhydride and pyro phosphoric acid
 b) acetic anhydride and phosphorus trioxide
 c) acetic anhydride and meta phosphoric acid
 d) acetic anhydride and ortho phosphoric acid
39. Which of the following compounds would have the smallest value for pK_a ?
 a) $\text{CHF}_2\text{CH}_2\text{CH}_2\text{COOH}$
 b) $\text{CH}_3\text{CH}_2\text{CF}_2\text{COOH}$
 c) $\text{CH}_2\text{FCHFCH}_2\text{COOH}$
 d) $\text{CH}_3\text{CF}_2\text{CH}_2\text{COOH}$
40. Name the end product in the following series of reactions

$$\text{CH}_3\text{COOH} \xrightarrow{\text{NH}_3} \text{A} \xrightarrow{\text{Heat}} \text{B} \xrightarrow[\Delta]{\text{P}_4\text{O}_{10}} \text{C}$$

 a) CH_3OH b) CH_4 c) $\text{CH}_3\text{COONH}_4$ d) CH_3CN
41. The formation of cyanohydrin from acetone is which type of reaction?
 a) Electrophilic substitution
 b) Electrophilic addition
 c) Nucleophilic addition
 d) Nucleophilic substitution
42. When acetyl chloride reacts with sodium propionate, the product formed is
 a) acetic anhydride
 b) acetic Propionic anhydride
 c) n-propyl acetate
 d) Pentane-2, 4-diene
43. Oxidation of benzyl chloride with an aqueous solution of lead nitrate in a current of CO_2 gives
 a) benzaldehyde
 b) bezyl alcohol
 c) p-nitrobenzyl chloride
 d) benzyl nitrate
44.
$$\text{HC} \equiv \text{N} + \text{HCl} \xrightarrow[\text{AlCl}_3]{\text{Anhyd.}} \text{A} \xrightarrow[\text{Anhyd. AlCl}_3]{\text{C}_6\text{H}_6} \text{B} \xrightarrow{\text{H}_2\text{O}} \text{C}$$

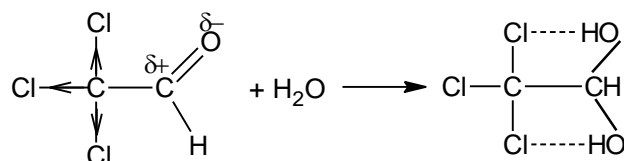
 In the above sequence of reactions, A, B and C respectively are:
 a) $\text{CHCl} = \text{NH}$, $\text{C}_6\text{H}_5\text{Cl}$, $\text{C}_6\text{H}_5\text{OH}$
 b) $\text{CHCl} = \text{NH}$, $\text{C}_6\text{H}_5\text{CH} = \text{NH}$, $\text{C}_6\text{H}_5\text{CHO}$
 c) $\text{CHCl} = \text{NH}$, $\text{C}_6\text{H}_5\text{Cl}$, $\text{C}_6\text{H}_5\text{OH}$
 d) CH_2O , $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$, $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$
45. The most suitable reagent for conversion of $\text{RCOOC}_2\text{H}_5 \longrightarrow \text{RCHO}$ is
 a) $\text{LiAlH}(\text{O}-t\text{-Bu})_3$ b) DIBAL-H c) SnCl_2/HCl d) NaBH_3CN
46. Arrange the following in increasing tendency of hydrate formation on addition of H_2O ?
 I.  II.  III. $(\text{CH}_3)_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{C}(\text{CH}_3)_3$
 a) I < II < III b) III < I < II c) II < I < III d) II < III < I

47. In the Cannizzaro reaction given below, $2\text{Ph} - \text{CHO} \xrightarrow{\text{OH}^-} \text{Ph} - \text{CH}_2\text{OH} + \text{PhCO}_2^-$, the slowest step is
- the attack of OH^- at the carbonyl group
 - the transfer of hydride ion to the carbonyl group
 - the abstraction of a proton from the carboxylic acid
 - the deprotonation of $\text{Ph} - \text{CH}_2\text{OH}$
48. Aldol condensation, between which of the following compounds followed by dehydration gives methyl vinyl ketone?
- Formaldehyde and acetone
 - Formaldehyde and acetaldehyde
 - Two molecules of acetaldehyde
 - Two molecules of acetone
49. The cross aldol product formed when propanal acts as the electrophile and butanal as nucleophile is
- 3-hydroxy-2-methylpentanal
 - 3-hydroxy-2-methylhexanal
 - 2-ethyl-3-hydroxypentanal
 - 2-ethyl-3-hydroxyhexanal
50. A compound on treatment with 50% aqueous NaOH gives 2-furoic acid and furfuryl alcohol. What is the structure of the parent compound?
- 
 - 
 - 
 - 

Key ans & solutions

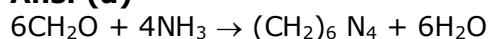
- Ans: (b)**
Aldehydes and ketones have $\text{C} = \text{O}$ in which C is sp^2 hybridised.
- Ans: (d)**
 $\text{CH}_3\text{COCH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{COCH}(\text{CH}_3)\text{CH}_2\text{CH}_3$ are chain isomers.
 $\text{CH}_3\text{COCH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_3$ are position isomers or metamers.
 $\text{CH}_3\text{COCH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$ are functional isomers.
- Ans: (b)**
It has 1° and 2° alcoholic group, but not 3°
- Ans: (c)**
 - $\text{RCOOR}' \xrightarrow{\text{H}_2\text{O}} \text{RCOOH} + \text{R}'\text{OH}$
 - $\text{RCH}_2\text{OH} \xrightarrow{\text{Oxidation}} \text{RCHO}$
 - $\text{R}_2\text{CHOH} \xrightarrow{\text{Oxidation}} \text{R}_2\text{CO}$
 - $\text{RX} + \text{HOR} \rightarrow \text{ROR}' + \text{HX}$
- Ans: (a)**
 ArCOR' can be prepared by the combination of $\text{ArH} + \text{R}'\text{COCl}$ and not by $\text{ArCOCl} + \text{RMgX}$ because here the ArCOR formed will further react with RMgX to form 3° alcohol, $\text{ArC}(\text{OH})\text{R}_2$ as the final products.
- Ans: (b)**
In acetophenone ($\text{C}_6\text{H}_5\text{COCH}_3$) carbonyl carbon is sterically hindered.
- Ans: (b)**

Three electron withdrawing chlorine atoms increase the positive charge on the carbonyl carbon with the result chloral readily adds weak nucleophile (H_2O) to form chloral hydrate.



Further, once chloral hydrate is formed intramolecular H-bonding between Cl and H atoms of the OH group stabilizes the chloral hydrate molecule

8. **Ans: (a)**



9. **Ans: (a)**

Aldehydes, other than formaldehyde, when treated with RMgX give 2° alcohols

10. **Ans: (d)**

1-Phenylethanol ($\text{C}_6\text{H}_5\text{CH}_2\text{CHOH}$) is a 2° alcohol and can be prepared by the reaction of benzaldehyde with Grignard reagent CH_3MgI .

11. **Ans: (c)**

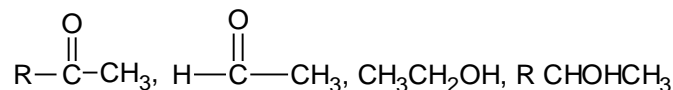
tert- Alcohols are prepared by the action of Grignard reagent (CH_3MgI) with ketones (CH_3COCH_3)

12. **Ans: (c)**

Selenium dioxide oxidises aldehydes and ketones at α -position to carbonyl group.
 $\text{CH}_3\text{CHO} \rightarrow \text{OHC}\cdot\text{CHO}$

13. **Ans: (b)**

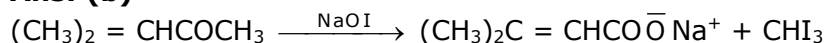
Iodoform test (haloform test) is given by following types of compounds



Methyl ketones acetaldehyde ethanol 2° alcohols having at least one R as C_3

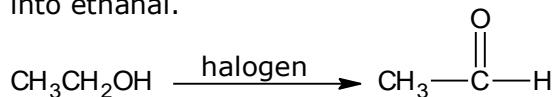
when these are treated with NaOH or KOH and halogen or with sodium or potassium hypohalites (NaOX)

14. **Ans: (b)**



15. **Ans: (b)**

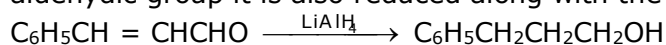
Among 1° alcohols, only $\text{CH}_3\text{CH}_2\text{OH}$ gives haloform test because only it can be converted into ethanal.



Methanol on oxidation gives methanal (HCHO), having no $-\text{COCH}_3$ grouping.

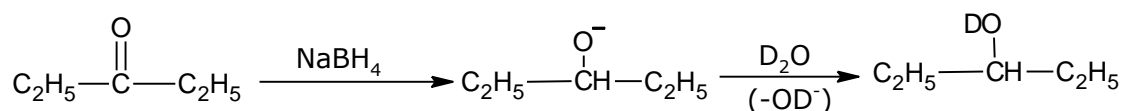
16. **Ans: (a)**

Normally NaBH_4 as well as LiAlH_4 reduce only-CHO group without effecting carbon-carbon double bond, however when it is present in conjugation with benzene ring and aldehydic group it is also reduced along with the reduction of-CHO group.



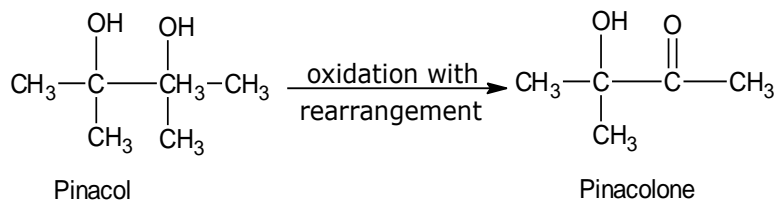
17. **Ans: (c)**

Remember that during reduction with NaBH_4 , a hydride ion is transferred by NaBH_4 to carbonyl carbon and a proton (or deuteron) is transferred from the solvent (in the second step) to carbonyl oxygen.



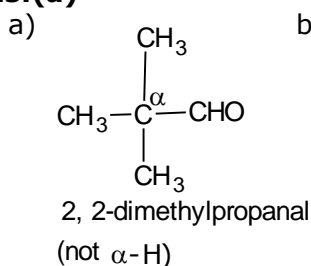
18. **Ans: (b)**

Pinacolone is oxidation product of pinacol.

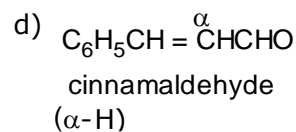
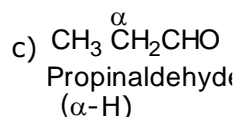


3, 3-dimethyl -2-butanone

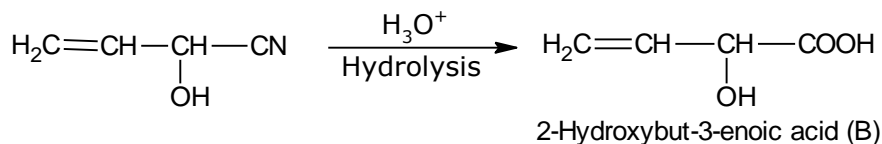
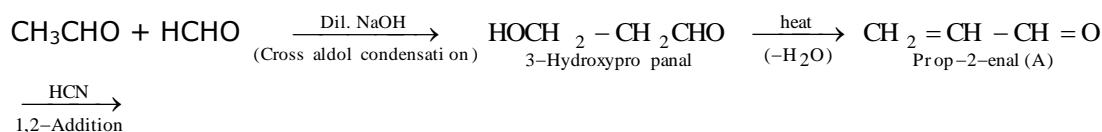
19. **Ans: (a)**



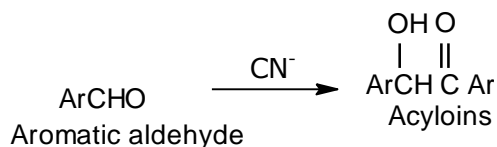
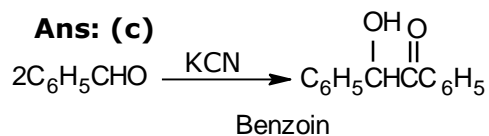
b)



20. **Ans: (a)**

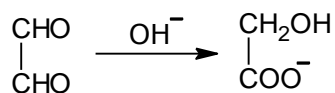


21. **Ans: (c)**



22. **Ans: (b)**

It is an example of intramolecular Cannizzaro reaction.



23. **Ans: (d)**



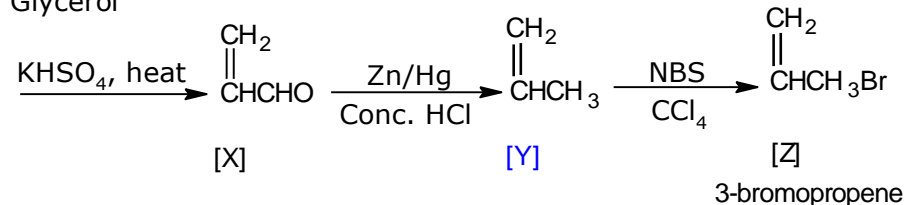
24. **Ans: (c)**



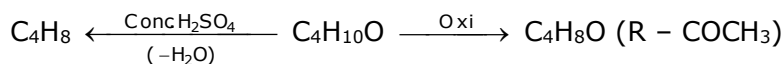
Since the product (lactic acid) has a chiral carbon atom, hence it shows enantiomerism.

25. **Ans: (c)**

Glycerol

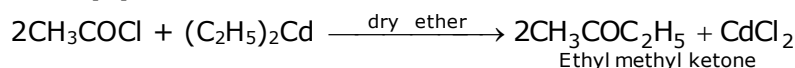


26. **Ans: (b)**



Thus $\text{C}_4\text{H}_8\text{O}$ should be $\text{CH}_3\text{CH}_2\text{COCH}_3$, hence $\text{C}_4\text{H}_{10}\text{O}$ should be $\text{CH}_3\text{CH}_2\text{CHOHCH}_3$

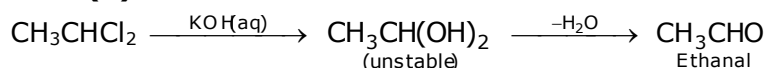
27. **Ans: (d)**



28. **Ans: (c)**

Acetophenone is least soluble because of its extremely low tendency to form H-bonds with water molecules.

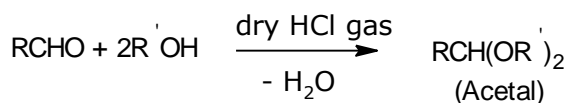
29. **Ans: (b)**



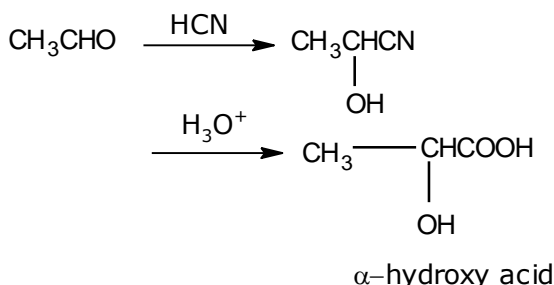
30. **Ans: (a)**

Crotonaldehyde reduces tollen's reagent to black precipitate of silver and undergo oxidation to form crotonic acid.

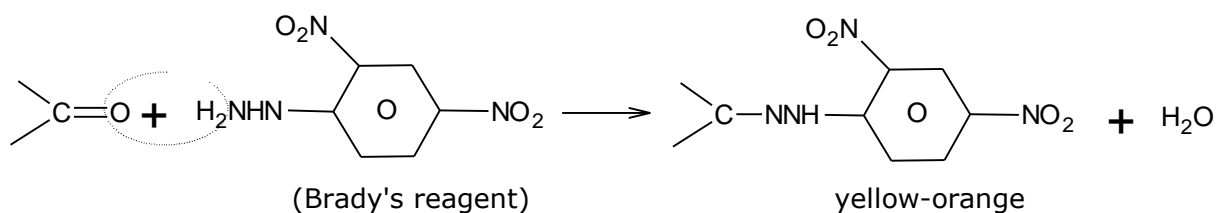
31. **Ans: (a)**



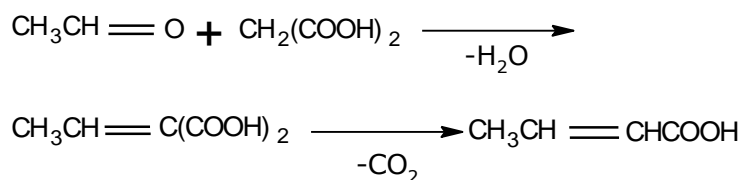
32. **Ans: (d)**



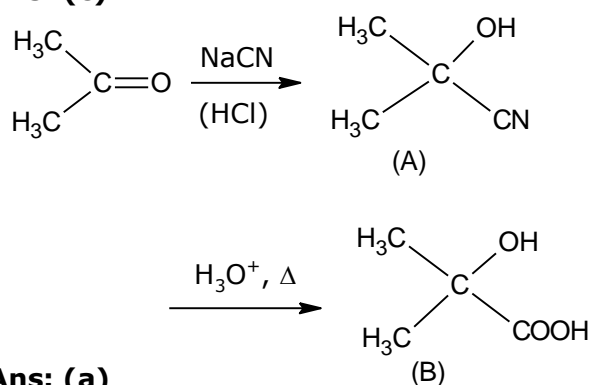
33. Ans: (d)



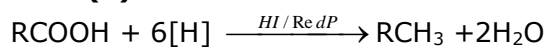
34. Ans: (a)



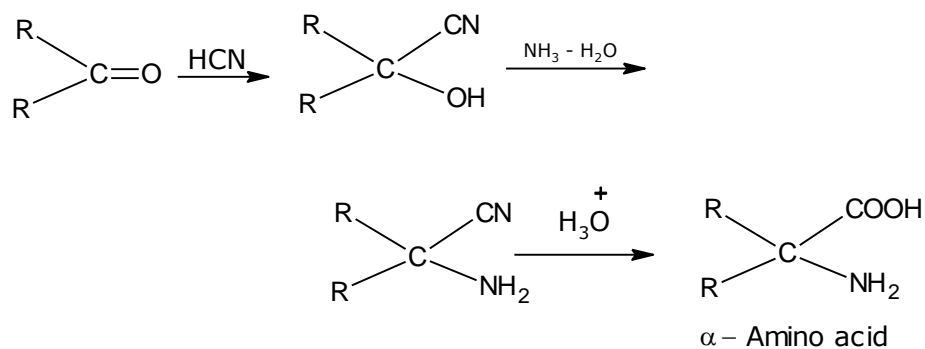
35. Ans: (c)



36. Ans: (a)

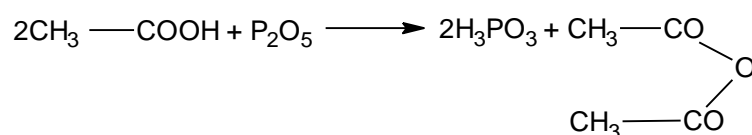


37. Ans: (b)



38. Ans: (c)

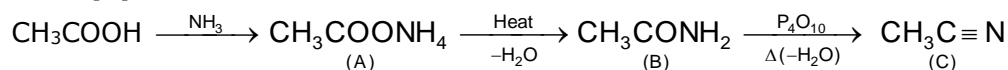
When acetic acid is heated P_2O_5 dehydration takes place to give acetic anhydride.



39. Ans: (b)

Smallest value of pK_a means strongest acid, -I-effect of F is maximum in $\text{CH}_3\text{CH}_2\text{CF}_2\text{COOH}$ and hence (b) is correct.

40. Ans: (d)



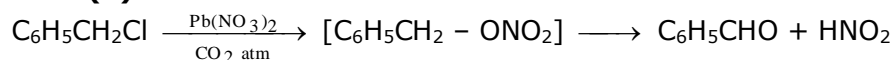
41. Ans: (c)

Nucleophilic addition reaction

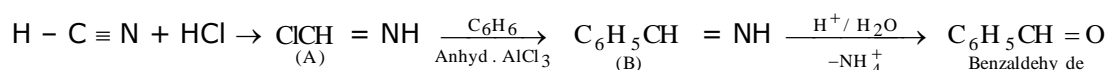
42. Ans: (b)



43. Ans: (a)

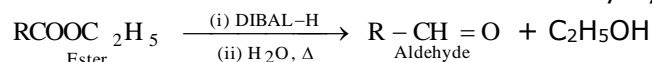


44. Ans: (b)



45. Ans: (b)

Reduction of esters with DIBAL-H followed by hydrolysis directly gives aldehydes.



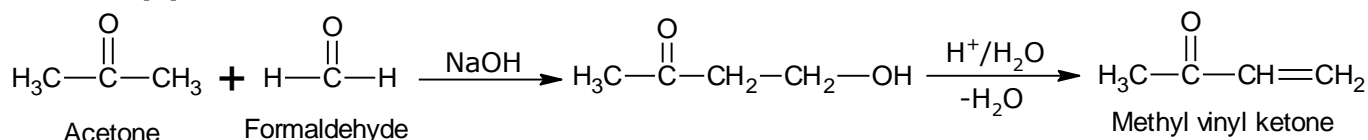
46. Ans: (b)

Due to steric hindrance, the tendency of ketone (III) for hydrate formation is minimum. Further, due to greater angle strain cyclopropane (II) forms hydrate more readily than cyclobutanone (IV). Thus, option (b) is correct.

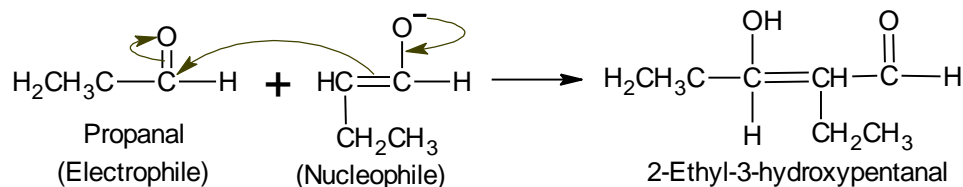
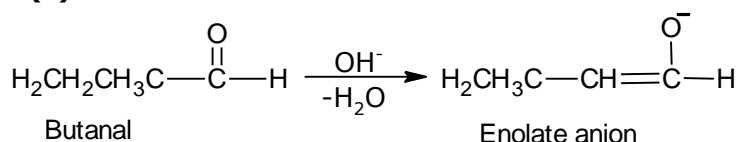
47. Ans: (b)

Transfer of hydride ion to the carbonyl group is the slowest or the rate-determining step.

48. Ans: (a)



49. Ans: (c)



50. Ans: (a)

