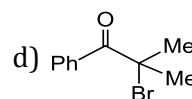
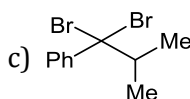
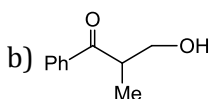
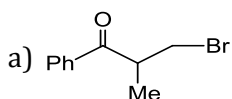
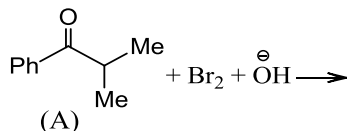


12. ALDEHYDES, KETONES AND CARBOXYLIC ACIDS

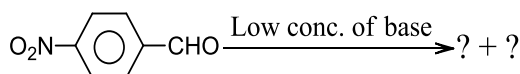
Single Correct Answer Type

1. When an acyl chloride is heated with Na salt of a carboxylic acid, the product is an
 a) ester b) Anhydride c) Alkene d) Aldehyde

2. The major product of the reaction is:

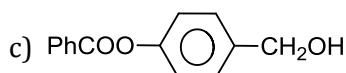
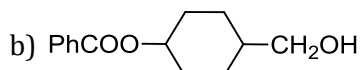
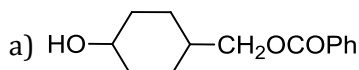
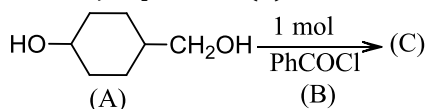


3. For the Cannizzaro reaction in



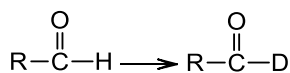
which of the statements is true regarding order and molecularity of the reaction?

- a) $R = K[\text{Ald}]^2[\text{OH}^-]^2$, 4th order, bimolecular
 b) $R = K[\text{Ald}]^2[\text{OH}^-]$, 3rd order, bimolecular
 c) $R = K[\text{Ald}]^2[\text{OH}^-]^2$, 4th order, tetramolecular
 d) $R = K[\text{Ald}]^2[\text{OH}^-]$, 3rd order, trimolecular
4. Mark the correct order of increasing reactivity
 a) $\text{CH}_3\text{CONH}_2 < \text{CH}_3\text{COOC}_2\text{H}_5 < \text{CH}_3\text{COCl}$
 b) $\text{CH}_3\text{COOC}_2\text{H}_5 < \text{CH}_3\text{COCl} < \text{CH}_3\text{CONH}_2$
 c) $\text{CH}_3\text{COCl} < \text{CH}_3\text{CONH}_2 < \text{CH}_3\text{COOC}_2\text{H}_5$
 d) $\text{CH}_3\text{COOC}_2\text{H}_5 < \text{CH}_3\text{CONH}_2 < \text{CH}_3\text{COCl}$
5. The major product (C) in the reaction is:

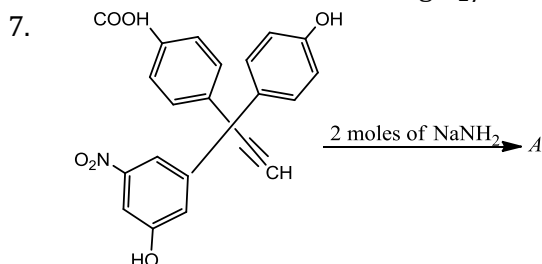


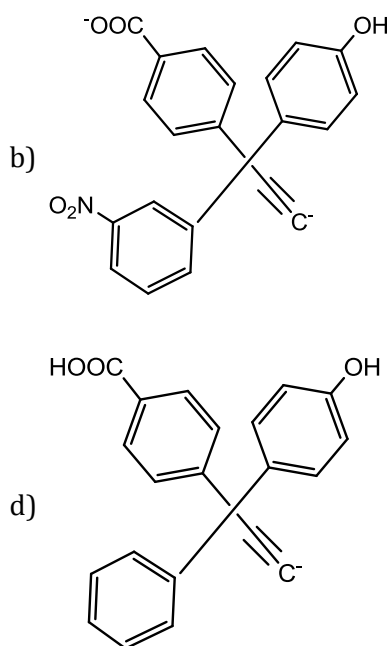
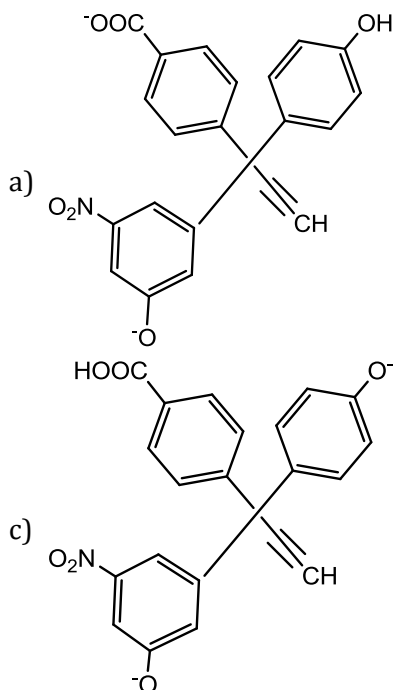
d) All

6. Which of the following reagents can be used for the given reaction?

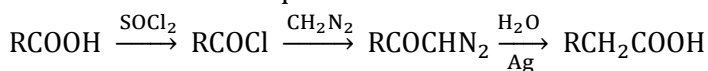


- a) i. $\text{D}_2\text{O}/\text{D}_3\text{O}^+$ ii. $\text{Cl}_2 + \text{AcOH}$ iii. $\text{NaBH}_4/\text{H}_2\text{O}$
 b) i. $\text{Cl}_2 + \text{AcOH}$ ii. D_2O iii. $\text{LAH}/\text{H}_2\text{O}$
 c) i. , PhLi (Base) ii. D_2O iii. $\text{HgCl}_2/\text{CdCO}_3/\text{H}_2\text{O}$
 d) i. Base (PhLi), ii. $\text{HgCl}_2/\text{CdCO}_3 - \text{H}_2\text{O}$ iii. D_2O





8. Name the reaction sequence



a) Arndt-Eistert synthesis

b) Wolff's reaction

c) Reppe's process

d) Wacker's process

9. Clemmensen's reduction will convert cyclohexanone into:

a) Cyclopentanone

b) Cyclohexane

c) *n*-Hexane

d) Benzene

10. An organic liquid of the composition $\text{C}_4\text{H}_4\text{O}_2$ yields a sodium salt of an acid $\text{C}_3\text{H}_6\text{O}_2$ and methanol on boiling with NaOH solution. The given liquid is:

a) $\text{CH}_3\text{CH}_2\text{COOCH}_3$

b) $\text{CH}_3\text{COOC}_2\text{H}_5$

c) HCOOC_3H_7

d) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$

11. Acetamide is treated separately with the following reagents. Which one of these would give methyl amine?

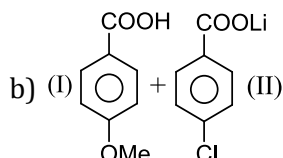
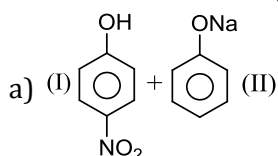
a) PCl_5

b) $\text{NaOH} + \text{Br}_2$

c) Soda line

d) Hot conc. H_2SO_4

12. Which of the following reactions is not possible?



c) (I) $\text{CH}_3\text{OH} + \text{C}_2\text{H}_5\text{ONa}$ (II)

d) (I) $\text{ClCH}_2\text{COOH} + \text{CH}_3\text{COONa}$ (II)

13. On treatment of acetone with dilute $\text{Ba}(\text{OH})_2$, the product formed is:

a) Aldol

b) Phorone

c) Propionaldehyde

d) 4-Hydroxy-2-pentanone

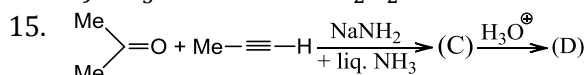
14. Which of the following is the best method for the synthesis of ester (I) ($\text{Me}_3\text{C} - \text{COOMe}$)?

a) $\text{Me}_3\text{C} - \text{COCl} + \text{MeOH} \rightarrow$

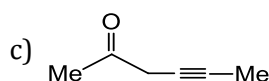
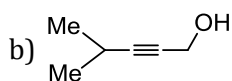
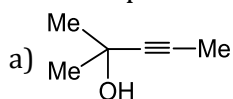
b) $\text{Me}_3\text{C} - \text{COOH} + \text{MeOH} \rightarrow$

c) $\text{Me}_3\text{C} - \text{COOH} + \text{CH}_2\text{N}_2 \rightarrow$

d) $\text{Me}_3\text{C} - \text{COCl} + \text{MeONa} \rightarrow$



The final product (D) is:



d) All

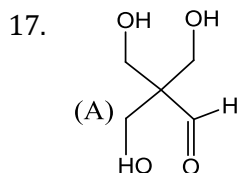
16. Westrosol $\xrightarrow{90\% \text{H}_2\text{SO}_4}$ (X) $\xrightarrow{\text{NH}_3}$ (Y). Here, Y is:

a) Acrylic acid

b) Glycine

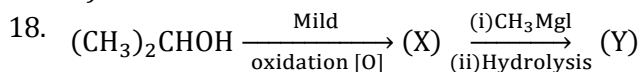
c) Anthracene

d) Pyruvic acid



(C) can also be obtained from (A) by:

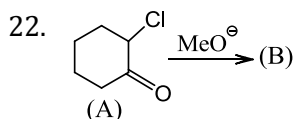
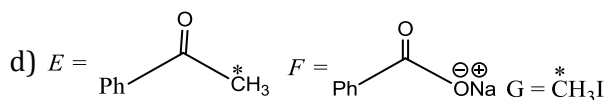
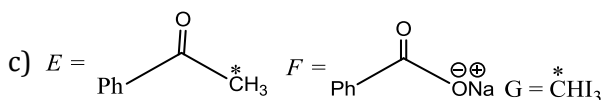
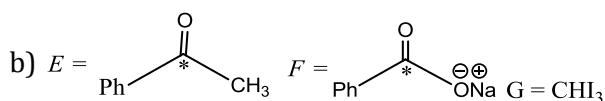
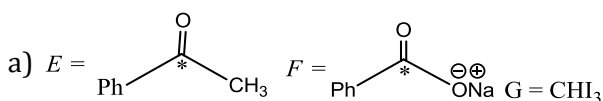
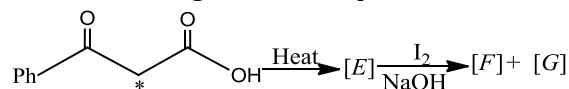
- Claisen-Schmidt reaction with HCHO
- Cross Cannizzaro reaction with HCHO
- Aldol reaction with CH₃CHO
- None



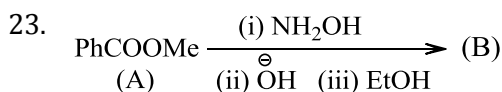
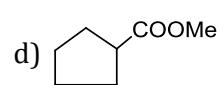
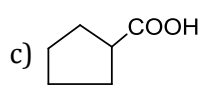
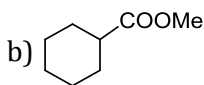
In the above sequence of reaction, (Y) is:

- Isobutyl alcohol
 - n*-Butyl alcohol
 - Tertiary butyl alcohol
 - isobutylene
19. Which of the following will react with water?
- CHCl₃
 - Cl₃C. CHO
 - CCl₄
 - ClCH₂CH₂Cl
20. Which of the following is basic?
- CH₃CH₂OH
 - H - O - O - H
 - HO - CH₂ - CH₂ - OH
 -

21. In the following reaction sequence, the correct structures of E, F and G are



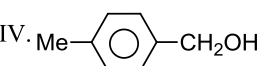
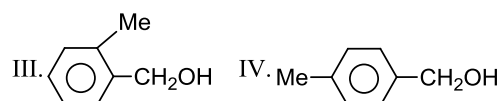
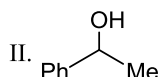
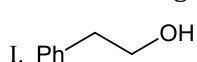
Product (B) is:



Product (B) is:

- PhNH₂
- MeNH₂
- PhNHCOOEt
- PhNHCOOMe

24. The decreasing order of ester formation with benzoic acid in presence of H⁺ is:

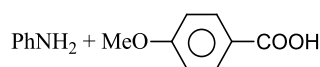
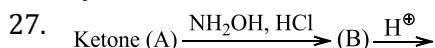


- (I) > (II) > (III) > (IV)
- (I) > (II) > (IV) > (III)
- (IV) > (III) > (II) > (I)
- (III) > (IV) > (II) > (I)

25. The addition of HBr to CH₂ = CHCOOH results in the formation of

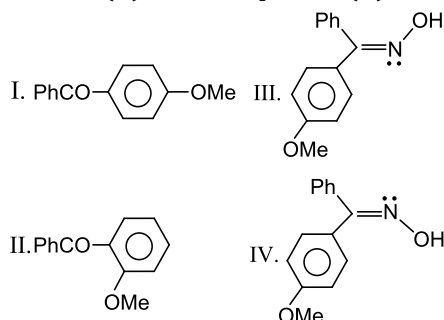
- α-Bromopropanoic acid
- β-Bromopropanoic acid as the major product

- c) None of the above
 d) Both (a) and (b) in equal proportion
26. The chemical reaction of acetaldehyde and ammonia results in:
 a) Ethylamine
 b) Hexamethylene tetra amine
 c) Acetic acid
 d) Acetaldehyde ammonia

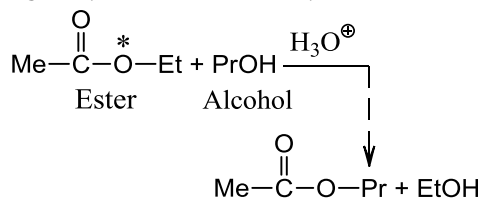


The ketone (A) and compound (B), respectively, are:

Ketone (A) Compound (A)

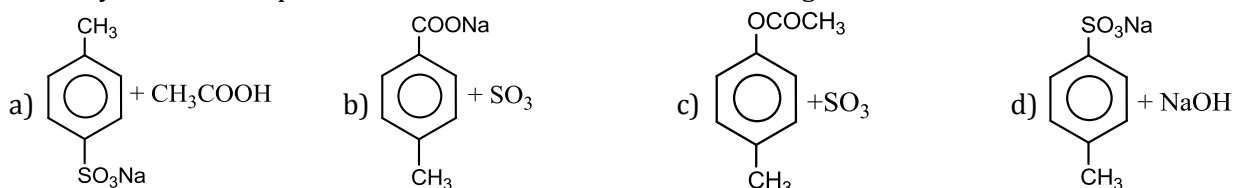


- a) (I), (III) b) (I), (IV) c) (II), (III) d) (II), (IV)
28. Two moles of HCHO and 1 mol of PhCHO react with conc. NaOH . What are the products quantitatively?
 a) 1 mol of PhCH_2OH , 2 mol of CH_3OH , and 1 mol of HCOONa
 b) 1 mol of PhCH_2OH , 1.5 mol of CH_3OH , and 0.5 mol of HCOONa
 c) 1 mol of PhCH_2OH , 0.5 mol of CH_3OH , and 1.5 mol of HCOONa
 d) 1.5 mol of PhCH_2OH , 1 mol of CH_3OH , and 1 mol of HCOONa
29. Which of the following statements is **wrong** about the transesterification reaction, catalysed by H_3O^+ (H_2SO_4 or dry HCl) or RO^- (EtONa)?



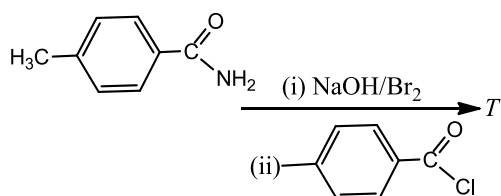
- a) Alcohol (PrOH) is taken in excess to shift the equilibrium to R.H.S
 b) It involves tetrahedral intermediate in which the hybridisation of C of the ($\text{C}=\text{O}$) group changes from sp^2 to sp^3
 c) Isotopic oxygen is present in the new alcohol (EtOH^*) formed
 d) Rate of transesterification is dependent on the concentration of ester only
30. When propionic acid is treated with aqueous sodium bicarbonate, CO_2 is liberated. The C of CO_2 comes from:
 a) Methyl group b) Carboxylic acid group c) Methylene group d) Bicarbonate group

31. 4-methyl benzene sulphonic acid reacts with sodium acetate to give

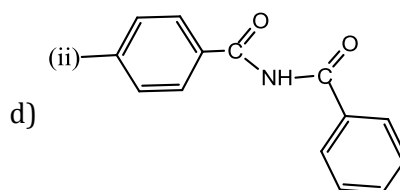
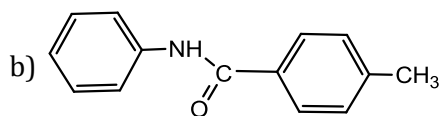
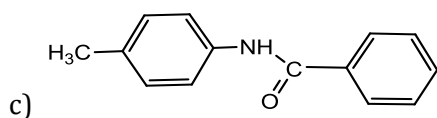
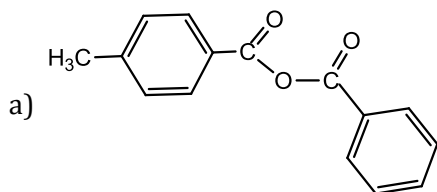


32. Fifty-nine grams of amide is obtained from the carboxylic acid. RCOOH on heating with alkali gave 17 gm of ammonia. The acid is:
 a) Formic acid b) Acetic acid c) Propionic acid d) Benzoic acid
33. Which of the following has the most acidic hydrogen?
 a) 3-Hexanone b) 2,4-Hexanedione c) 2,5-Hexanedione d) 2,3-Hexanedione

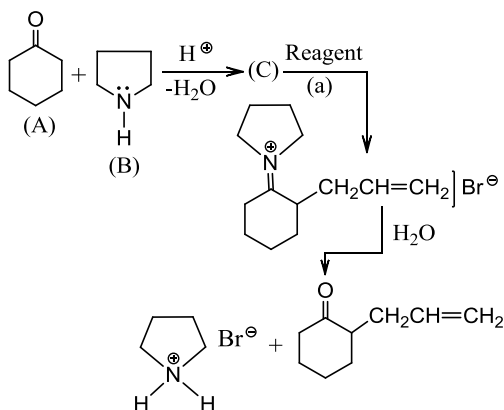
34. In the reaction



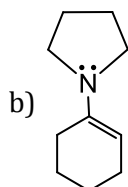
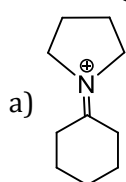
The structure of the product *T* is



35.



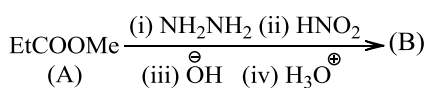
Product (C) is:



c) Both (a) and (b)

d) None

36.



The product (B) is:

a) MeNH_2

b) EtNH_2

c) MeCONH_2

d) EtCONHMe

37. The reaction between carbonyl compound and α -bromoesters in the presence of metal Zn to give β -hydroxy ester is known as:

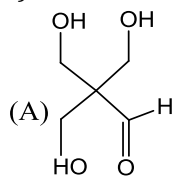
a) Clemmensen reduction

b) Reformatsky reaction

c) Wolff-Kishner reaction

d) Grignard reaction

38.

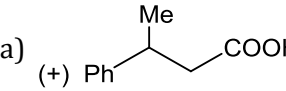
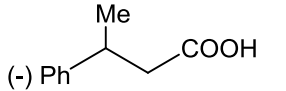
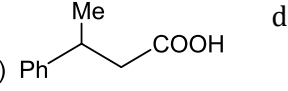
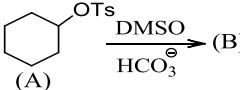
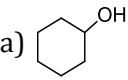
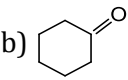
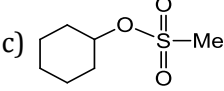
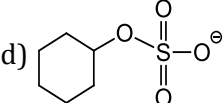
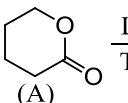
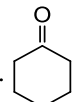
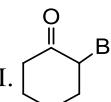
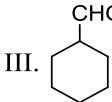
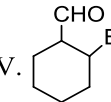


$2(\text{A}) \xrightarrow{\text{OH}^+} (\text{B}) + (\text{C})$. The product (C) finds application in:

a) An explosive when it is converted to tetranitrate ester

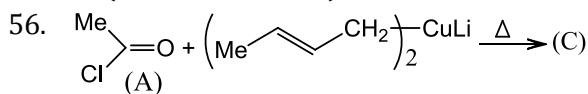
b) Detergents

- c) Both
d) None
39. Which H atom in the following ester is most acidic?
- $\begin{array}{ccccccc} & & \text{O} & & \text{O} & & \\ & & || & & || & & \\ \text{CH}_3 - & \text{CH}_2 - & \text{C} - & \text{CH}_2 - & \text{C} - & \text{O} - & \text{CH}_2\text{CH}_3 \\ 1 & 2 & 3 & 4 & 5 \end{array}$
- a) 1 b) 2 c) 3 d) 4
40. $\text{CH} \equiv \text{CH} \xrightarrow[\text{H}_2\text{SO}_4]{\text{HgSO}_4} (\text{X}) \xrightarrow{\text{LiAlH}_4} (\text{Y}) \xrightarrow{\text{P}_4/\text{Br}_2} (\text{Z})$
In this sequence of reaction, the (Z) is:
a) Ethylene bromide b) Ethanol c) Ethyl bromide d) Ethylidene bromide
41. Which of the following reactions would give a good yield of hydrocarbon product?
a) $\text{RCOOK} \xrightarrow[\text{oxidation}]{\text{Electrolytic}}$ b) $\text{RCOOAg} \xrightarrow{\text{I}_2}$ c) $\text{CH}_3\text{CH}_3 \xrightarrow{\text{Cl}_2/h\nu}$ d) $\text{Me}_3\text{C}-\text{Cl} \xrightarrow{\text{C}_2\text{H}_5\text{OH}}$
42. When glycolic acid is subjected to reduction with HI, the product formed is:
a) Acetic acid b) Formic acid c) Iodoacetic acid d) None of the above
43. $\begin{array}{c} \text{O} \\ || \\ \text{R}-\text{C}-\text{Cl} \\ (\text{A}) \end{array} \xrightarrow{\text{NH}_3} \text{NH}_4\text{Cl} + (\text{B}) \xrightarrow[\Delta]{\text{P}_4\text{O}_{10}} (\text{C}) \xrightarrow[(\text{ii}) \text{H}_2\text{O}]{(\text{i}) \text{DiBAL-H}} (\text{D})$
The compound (D) is:
a) RCOOH b) RCH_2OH c) $\text{R}-\text{C} \equiv \text{N}$ d) RCHO
44. $\text{PhCONH}_2 \xrightarrow{\text{KOBrcr}} (\text{B}) \xrightarrow{\text{MeOH}} (\text{C})$
Product (C) is:
a) PhNH₂ b) PhNHCOOMe c) PhNHCOOPh d) None
45. $\text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{CHO} \xrightarrow{\text{Low conc. of base}} ? + ?$
The products are:
a) $\text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{COO}^\ominus + \text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{CH}_2\text{OH}$ b) $\text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{COOH} + \text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{CH}_2\text{O}^\ominus$
c) $\text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{COO}^\ominus + \text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{CH}_2\text{O}^\ominus$ d) $\text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{COOH} + \text{O}_2\text{N}-\text{C}_6\text{H}_4-\text{CH}_2\text{OH}$
46. Which of the following is the best method for the synthesis of α-hydroxy butyric acid (I)?
 $\left(\begin{array}{c} \text{Me} \quad 3 \quad 2 \quad 1 \\ | \quad | \quad | \\ \text{CH}_3 - \text{CH} - \text{CH} - \text{COOH} \\ | \\ \text{OH} \end{array} \right) ?$
a) $\text{Me}-\text{CH}_2-\text{CH}(\text{Br})-\text{OH} \xrightarrow[(\text{ii}) \text{H}_3\text{O}^+]{(\text{i}) \text{KCN}}$ b) $\text{MeCH=CH}_2 \xrightarrow[\text{Cold}]{\text{Br}_2 + \text{H}_2\text{O}} \xrightarrow[\text{H}_3\text{O}^+]{\text{KCN}}$
c) $\text{Me}-\text{CH}_2-\text{CHO} \xrightarrow[(\text{ii}) \text{H}_3\text{O}^+]{(\text{i}) \text{HCN}}$ d) $\text{Me}-\text{CH}_2-\text{CH}_2-\text{Br} \xrightarrow[(\text{ii}) \text{CO}_2, \text{H}_3\text{O}^+]{(\text{i}) \text{Mg/Ether}}$
47. $\text{PhMe} \xrightarrow[\Delta, \text{H}_3\text{O}]{\text{KMnO}_4/\text{OH}} (\text{B}) \xrightarrow[\text{PCl}_5]{\text{SOCl}_2 \text{ or }} (\text{C}) \xrightarrow{\text{PhCOONa}} (\text{D})$
Compound (D) is:
a) PhCOCl b) PhCONH₂ c) PhCOOH d) (PhCO)₂O
48. $\begin{array}{c} \text{Me} \\ | \\ \text{Ph}-\text{CH}-\text{COOH} \\ (\text{A}) \end{array} \xrightarrow[(\text{iv}) \text{H}_2\text{O}]{(\text{i}) \text{SOCl}_2, (\text{ii}) \text{CH}_2\text{N}_2, (\text{iii}) \text{Ag}_2\text{O/Pt}} (\text{B})$
(-) Form
Compound (B) is

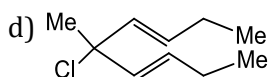
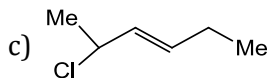
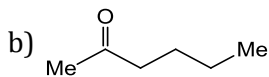
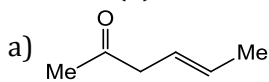
49. a)  b)  c)  d) None
49.  $\xrightarrow[\text{HCO}_3^-]{\text{DMSO}}$ (B)
Product (B) is:
- a)  b)  c)  d) 
50. For the Hunsdiecker decarboxylation reaction, which of the following is false:
a) It involves reaction between silver salt of an acid and Br_2
b) It is used to prepare alkyl bromide
c) Is of the type:
 $\text{RCH}_2\text{COOAg} + \text{Br}_2 \rightarrow \text{RCH}_2\text{Br} + \text{CO}_2 + \text{AgBr}$
d) It is of the type:
 $\text{RCH}_2\text{COOAg} \rightarrow \text{RCH}_3 + \text{CO}_2 + \text{AgBr}$
51. The boiling points of ethyl acetate and CH_3OH , respectively, are 77°C and 65°C . Which of the following reactions can be shifted to the right by the distillation of the reaction mixture at about 66°C
I. $\text{MeCOOEt} + \text{MeOH} \rightarrow$
II. $\text{MeCOOMe} + \text{EtOH} \rightarrow$
III. $\text{MeCOOMe} + \text{PhOH} \rightarrow$
IV. $\text{MeCOOPh} + \text{MeOH} \rightarrow$
a) (I), (II) b) (II), (III) c) (I), (III) d) (II), (IV)
52. If 1 gm of propionic anhydride is introduced quantitatively into water, calculate the volume of 0.5 N alkali required for neutralisation of the solution?
a) 30.8 ml b) 44.4 ml c) 61.6 ml d) 50 ml
53.  $\xrightarrow[\text{THF}]{\text{LDA}}$ (B) $\xrightarrow{\text{EtI}}$ (C)
and find out the reagent (A) from the following:
a) $\text{BrCH} = \text{CHCH}_3$
b) $\text{CH}_2 = \text{CHCH}_2\text{Br}$
c) $\text{CH}_2 = \text{C}(\text{Br}) - \text{CH}_3$
d) All
54. Given the decreasing order of the following in the extent of hydration or towards NA (nucleophilic addition reaction)
I.  II. 
III.  IV. 
a) (IV) > (III) > (II) > (I) b) (I) > (II) > (III) > (IV) c) (IV) > (II) > (III) > (I) d) (I) > (III) > (II) > (IV)
55. Which of the following order is incorrect w.r.t the property indicated?
a) Formic acid > Acetic acid > Propionic acid
(ACID STRENGTH)
b) Cyclohexanol < Phenol > Benzoic acid
(ACID STRENGTH)

c) Benzamide < Cyclohexylamine < Aniline
(BASIC STRENGTH)

$\text{FCH}_2\text{COOH} > \text{ClCH}_2\text{COOH} > \text{BrCH}_2\text{COOH}$
d) (ACID STRENGTH)



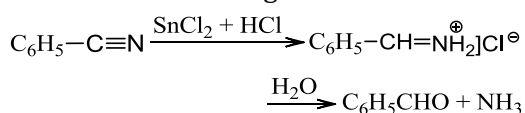
Product (C) is:



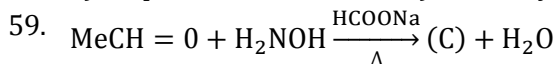
57. *m*-Chlorobenzaldehyde on reaction with conc. KOH at room temperature gives:

- a) Potassium *m*-chlorobenzoate and *m*-chlorobenzyl alcohol
b) *m*-Hydroxy benzaldehyde and *m*-chlorobenzyl alcohol
c) *m*-Chlorobenzyl alcohol and *m*-hydroxy benzyl alcohol
d) Potassium *m*-chlorobenzoate and *m*-hydroxy benzaldehyde

58. Name of the following reaction

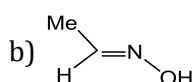
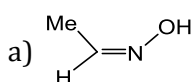


- a) Stephen reduction b) Sandmeyer reaction c) Mendius reduction d) None of these

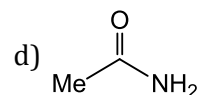


(A) (B)

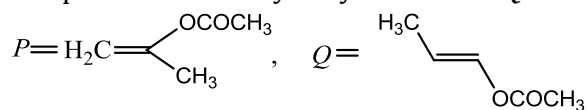
Product (C) is



c) $\text{Me}-\text{C}\equiv\text{N}$



60. The product of acid hydrolysis of *P* and *Q* can be distinguished by



- a) Lucas reagent b) 2, 4-DNP c) Fehling's solution d) NaHSO_3

61. Which of the following will not reduce Fehling's solution?

- a) Formic acid b) Ethanal c) 2-Methyl propanal d) All will reduce

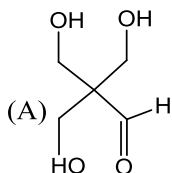
62. Aldehydes with α -H atom do not undergo disproportionation reaction because:

- a) Bond energy of (C-H) bond is increased due to (-CHO) group
b) Aldehyde is enolised in basic condition
c) Both
d) None

63. Which of the following is the strongest acid?

- a) Benzoic acid b) 4-Nitrobenzoic acid
c) 4-Methoxy benzoic acid d) 4-Methyl benzoic acid

64. Compound (A) given below can undergo Cannizzaro reaction itself and crossed Cannizzaro reaction with HCHO. It is because of:



- a) It has three ($-\text{CH}_2\text{OH}$) groups
b) It has an aldehyde group
c) It has non-enolisable α -C
d) It has a keto group

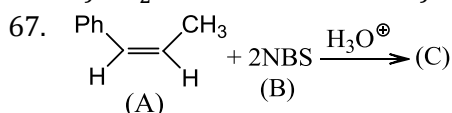
65. Which of the following is not the mechanism of Cannizzaro reaction?



- a) The attack of OH^- at the ($\text{C}=\text{O}$) group
b) The transfer of H^- ion to the ($\text{C}=\text{O}$) group
c) The abstraction of H^+ ion from carboxylic acid
d) The deprotonation of PhCH_2OH

66. The reaction of HCOOH with conc. H_2SO_4 gives:

- a) CO_2
b) CO
c) Oxalic acid
d) Acetic acid



Product (C) is:

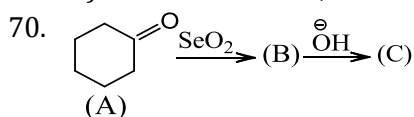
- a)
b)
c)
d)

68. Which of the following is expected to be most highly ionised in water?

- a) $\text{CH}_2\text{ClCH}_2\text{CH}_2\text{COOH}$
b) $\text{CH}_3\text{CHClCH}_2\text{COOH}$
c) $\text{CH}_3\text{CH}_2\text{CCl}_2\text{COOH}$
d) $\text{CH}_3\text{CH}_2\text{CHClCOOH}$

69. One mole of HCHO and 2 mol of PhCHO react with conc. NaOH . What are the products quantitatively?

- a) 1 mol of HCOONa , 1 mol of PhCH_2OH , and 1 mol of PhCOONa
b) 1 mol of HCOONa , 1 mol of PhCH_2OH , and 0.5 mol of PhCOONa
c) 1 mol of HCOONa , 1.5 mol of PhCH_2OH , and 0.5 mol of PhCOONa
d) 1 mol of HCOONa , 2 mol of PhCH_2OH , and 2 mol of PhCOONa

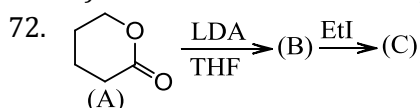


Compounds (B) and (C), respectively, are:

- a)
b)
c)
d)

71. Ethylidene chloride is hydrolysed with aqueous NaOH . The product formed is:

- a) Ethanol
b) Ethanal
c) Ethanone
d) Ethane



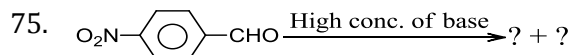
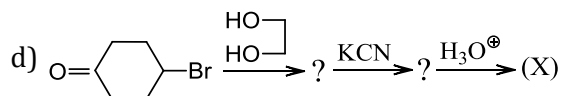
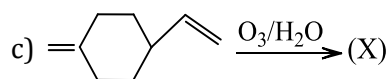
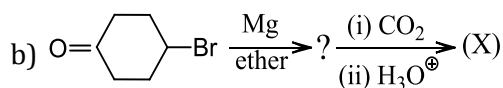
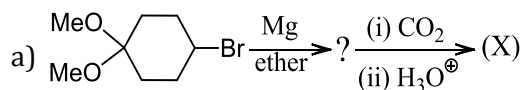
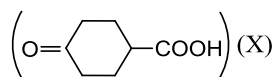
Product (C) is:

- a)
b)
c)
d)

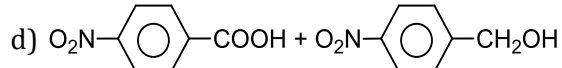
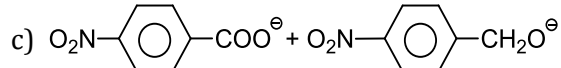
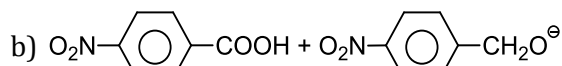
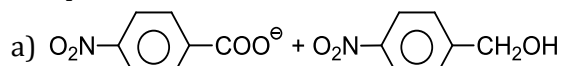
73. Which reagent can distinguish between pentanoic acid and pentanamide?

- a) Cold dil. NaOH
b) Cold dil. NaHCO_3
c) Cold conc. H_2SO_4
d) All

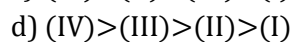
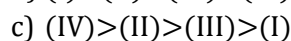
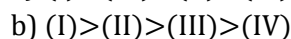
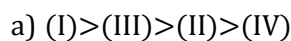
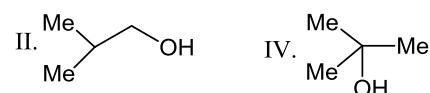
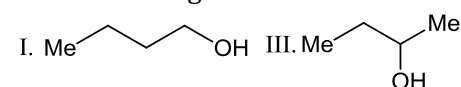
74. Which method is feasible for the preparation of compound (X) only?



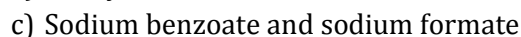
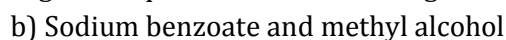
The products are:



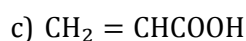
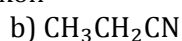
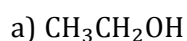
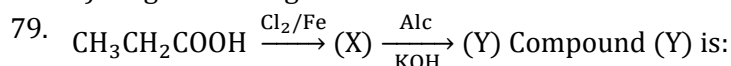
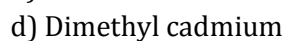
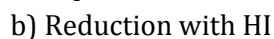
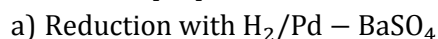
76. The decreasing order of ester formation with acetic acid in the presence of H^+ is:



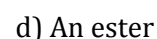
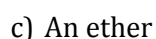
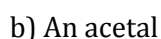
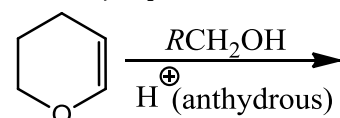
77. A mixture of benzaldehyde and formaldehyde on heating with aqueous NaOH solution gives:



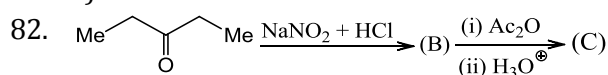
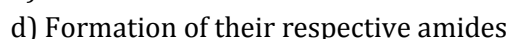
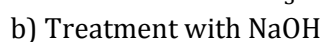
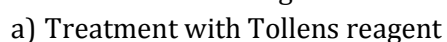
78. In order to prepare acetone from acetyl chloride in one step, which of the following reagents will be best?



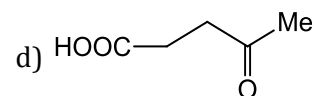
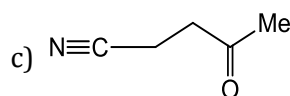
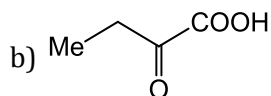
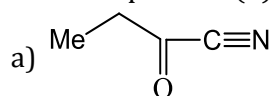
80. The major product of the following reaction is



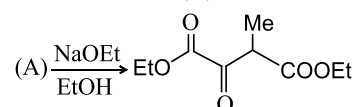
81. Which of the following tests would help in the distinction of HCOOH and CH_3COOH ?

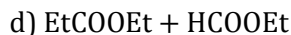
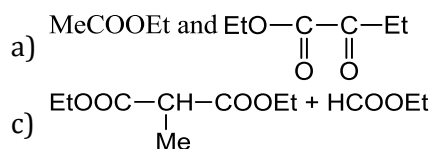


The final product (C) is:



83. The reactant (A) in the reaction is:





84. The molecular weight of benzoic acid in benzene as determined by depression in freezing point method correspond to:

a) Ionisation of benzoic acid

b) Dimerisation of benzoic acid

c) Trimerisation of benzoic acid

d) Solution of benzoic acid

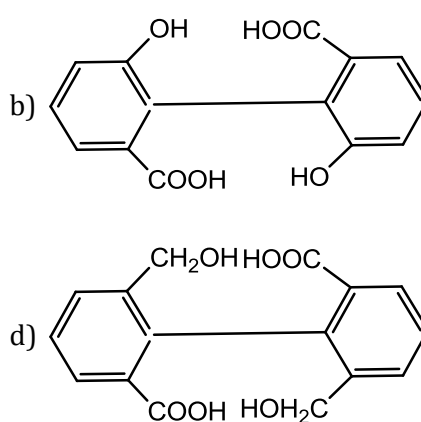
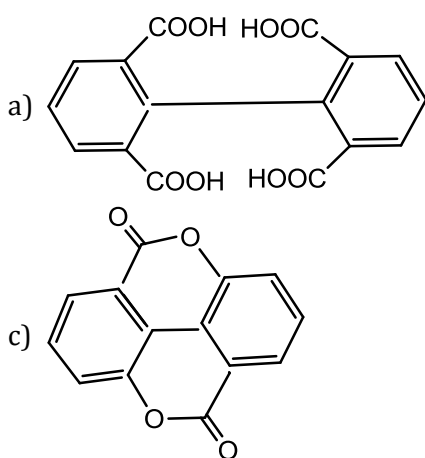
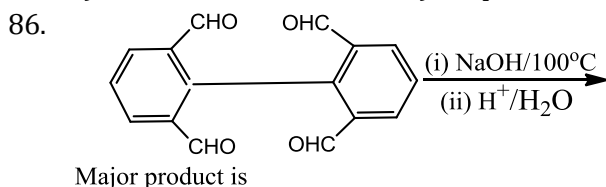
85. Which of the following will not be formed when calcium formate is distilled with calcium acetate?

a) Acetone

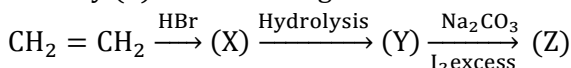
b) Propanal

c) Ethanal

d) Methanal



87. Identify (Z) in the series give below



a) $\text{C}_2\text{H}_5\text{I}$

b) $\text{C}_2\text{H}_5\text{OH}$

c) CHI_3

d) CH_3CHO

88. How will you convert butan-2-one to propanoic acid?

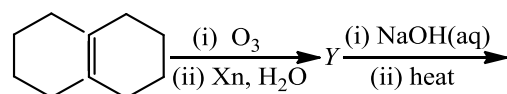
a) Tollen's reagent

b) Fehling's solution

c) $\text{NaOH} / \text{I}_2 / \text{H}^+$

d) $\text{NaOH} / \text{NaI} / \text{H}^+$

89. In the scheme given below, the total number of intramolecular aldol condensation products formed from "Y" is



a) 1

b) 2

c) 3

d) 4

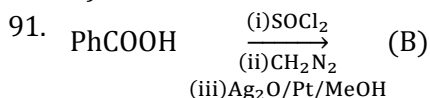
90. Benedict's solution and Fehling's solution are similar in all of the following except:

a) Both consist of a solution of CuSO_4

b) Both contain NaOH and complexing reagent

c) Both contain Cu^{2+} ion as the oxidising agent

d) Sodium citrate is used in Benedict's solution and Rochelle salt in Fehling's solution



(A)

Product (B) is:

a) PhCONH_2

b) PhCH_2COOH

c) $\text{PhCH}_2\text{COOMe}$

d) PhCONHMe

92. 2-propanone (acetone) can be obtained by Wacker's process starting with:

a) Propyne

b) Propane-2-ol

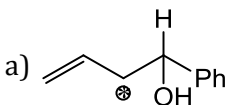
c) Propene

d) Propanol-1-ol

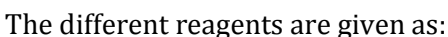
97. For the Cannizzaro reaction in



99. Vinegar contains:



- 104.


$$(X) = \begin{array}{c} \text{HO} \\ | \\ \text{CH}_2 \\ | \\ \text{CH}_2 \\ | \\ \text{OH} \end{array}$$

Select the correct order in sequence in order to get the final product (E)

I II III IV V

c) (X) (Z) (W) (U/X), (Y) (V)

d) (X) (Z) (W) (U) (V)

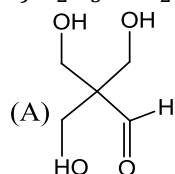
105. The product formed by the reaction of acetaldehyde with excess of ethanol in the presence of sulphuric acid is:

a) $\text{C}_2\text{H}_5\text{OCH}_2\text{CH}_2\text{OC}_2\text{H}_5$ b) Ketal

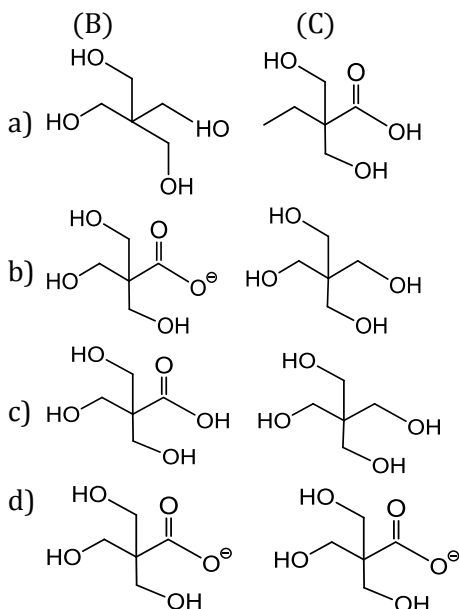
c) $\text{CH}_3\text{CH}(\text{OC}_2\text{H}_5)_2$

d) $\text{CH}_3\text{CH}(\text{OH})_2$

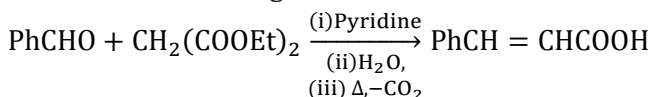
106.



undergoes Cannizzaro reaction. The products are:



107. Name of the following reaction



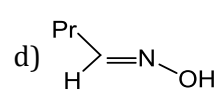
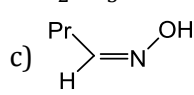
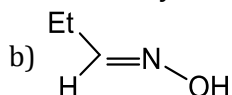
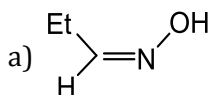
a) Perkin reaction

b) Aldol condensation

c) Claisen reaction

d) Knoevenagel

108. Which oxime on acetylation followed by reaction with Na_2CO_3 would give propane nitrile?



109. Give the decreasing order of hydrate formation of the following

I. HCHO II. PhCHO

III. Chloral IV. Acetone

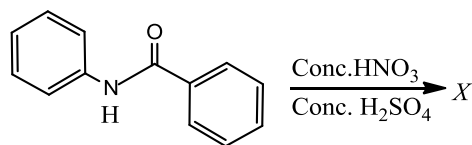
a) (III) > (I) > (II) > (IV)

b) (IV) > (II) > (I) > (III)

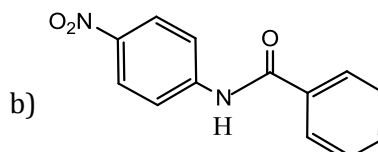
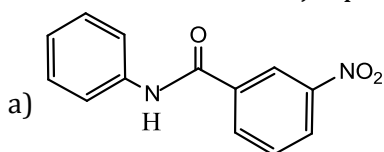
c) (I) > (III) > (II) > (IV)

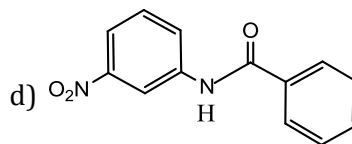
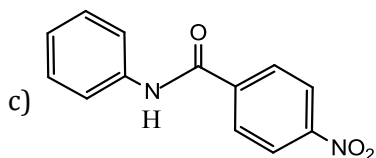
d) (IV) > (II) > (III) > (I)

110. In the following reaction,



The structure of the major product X is

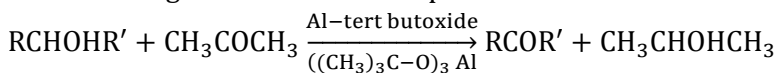




111. Electrolytic reduction of oxalic acid produces:

- a) Succinic acid b) Glycolic acid c) Glycol d) Glutaric acid

112. The following reaction is an example of:



- a) Oppenauer oxidation b) Etard oxidation c) Pinacol reduction d) Beta oxidation

113. When diethyl cadmium $[(\text{C}_2\text{H}_5)_2\text{Cd}]$ is treated with acetyl chloride $[\text{CH}_3\text{COCl}]$, the main product is likely to be:

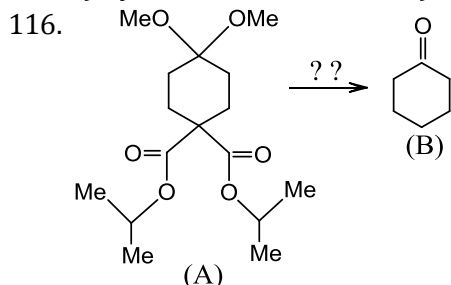
- a) Acetone b) Methyl ethyl ketone c) Diethyl ketone d) Acetaldehyde

114. Benzoyl chloride is prepared from benzoic acid by:

- a) $\text{Cl}_2, h\nu$ b) SO_2Cl_2 c) SOCl_2 d) $\text{Cl}_2, \text{H}_2\text{O}$

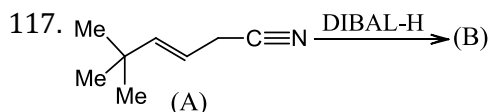
115. Cyclohexanone is subjected to reduction by NaBH_4 . The product formed is:

- a) Cyclohexane b) Cyclohexanal c) Cyclohexadiene d) Cyclohexanol



When (A) is refluxed in aq. HCl, the product (C) is:

- a)
- b)
- c)
- d)



Product (B) is:

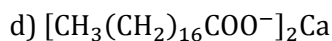
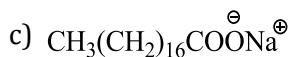
- a)
- b)
- c)
- d)

118. A compound has molecular formula $\text{C}_6\text{H}_{12}\text{O}$. It does not reduce Tollens or Fehling's reagent, but gives a crystalline derivative with 2, 4-dinitro-phenyl hydrazine. With alkali and I_2 , it gives yellow solid with a medicinal odour. Clemmensen reduction converts it to 2-methylpentane. The structural formula of the compound is most likely to be:

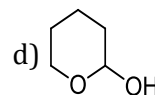
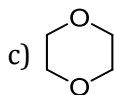
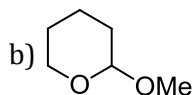
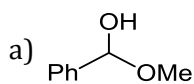
- a) $\text{CH}_3 - \text{COCH}_2 - \text{CH} - (\text{CH}_3)_2$ b) $\text{CH}_3 - \text{CH}_2 - \text{CO} - \text{CH}(\text{CH}_3)_2$
- c) $\text{CH}_3\text{CH}_2\text{CH}_2 - \text{CO} - \text{CH}_2\text{CH}_3$ d) $(\text{CH}_3)_2 - \text{CH} - \text{CO} - \text{CH} - (\text{CH}_3)_2$

119. Which of the following substances is likely to be effective as detergents in water?

- a) $\text{CH}_3(\text{CH}_2)_{15}\text{CH}_2\text{OSO}_3^- \text{Na}^+$ b) $\text{CH}_3(\text{CH}_2)_{16}\text{COOH}$



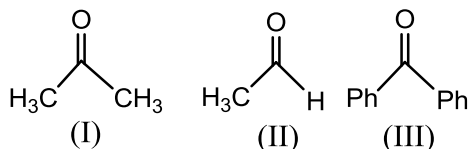
120. Of the following, which compound is an acetal?



121. Formic acid is obtained when:

- Calcium acetate is heated with conc. H_2SO_4
- Calcium formate is heated with calcium acetate
- Glycerol is heated with oxalic acid
- Acetaldehyde is oxidised with $\text{K}_2\text{Cr}_2\text{O}_7$ and H_2SO_4

122. The order of reactivity of phenyl magnesium bromide with the following compound is

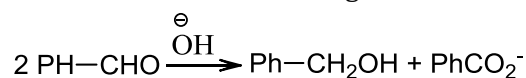


- (II) > (III) > (I)
- (I) > (III) > (II)
- (II) > (I) > (III)
- All react with the same rate

123. Which of the following reagents can help in separating a mixture of acetone and CCl_4 ?

- NaOH
- NaCl
- NaHSO_3
- None of the above

124. In the Cannizzaro reaction given below:



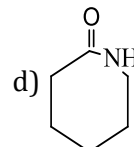
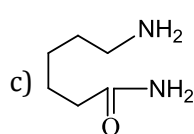
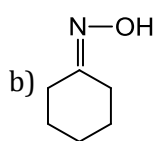
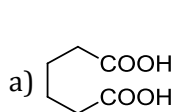
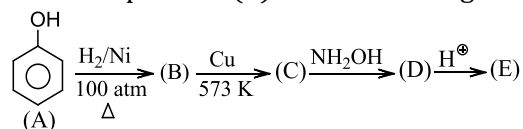
The slowest step is:

- The attack of OH^- at the carbonyl group
- The transfer of hydride to the carbonyl group
- The abstraction of proton from the carboxylic acid
- The deprotonation of $\text{Ph-CH}_2\text{OH}$

125. When lactic acid is subjected to oxidation with Fenton's reagent, the main product formed is:

- Acetic acid
- Oxalic acid
- Pyruvic acid
- Citric acid

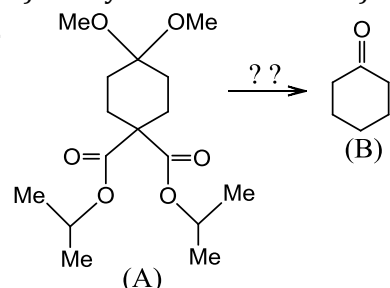
126. The final product (E) in the following reaction is:



127. Hydrogenation of benzoyl chloride in the presence of Pd/BaSO_4 gives:

- Benzyl alcohol
- Benzaldehyde
- Benzoic acid
- Phenol

128.



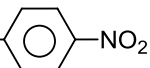
Which of the following sequence of reagents is correct in the conversion of (A) to (B)?

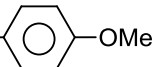
- i. NaOH , reflux; ii. Soda line, Δ
- i. Aq. HCl , reflux; ii. Soda line, Δ
- i. PCl_5 ii. H_3O^+
- Both (a) and (b)

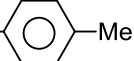
129. The decreasing order of ease of hydrolysis of the following esters is:

I. MeCOOPh

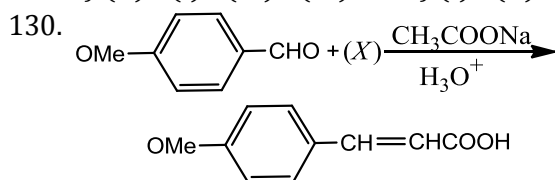
II. MeCOOPh

III. MeCOO--NO₂

IV. MeCOO--OMe

IV. MeCOO--Me

- a) (II) > (I) > (IV) > (III) b) (I) > (II) > (III) > (IV) c) (III) > (IV) > (I) > (II) d) (IV) > (III) > (II) > (I)



The compound (X) is

- a) CH₃ - COOH b) BrCH₂ - COOH c) (CH₃CO)₂O d) CHO - COOH

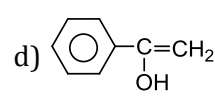
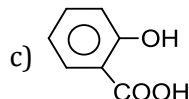
131. Which of the following does not contain (-COOH) group?

- a) Aspirin b) Benzoic acid
c) Picric acid d) All have (-COOH) group

132. Which of the following cannot be acetylated with CH₃COCl/Py?

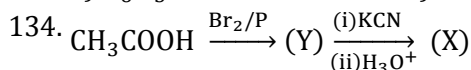
a) MeCOOH

b) CH₃NH₂



133. The compound which reacts with Fehling's solution is:

- a) C₆H₅COOH b) HCOOH c) C₆H₅CHO d) CH₂ClCH₃



Here, (X) is:

- a) Glycolic acid b) α-Hydroxypropionic acid
c) Succinic acid d) Malonic acid

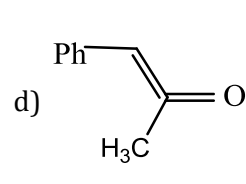
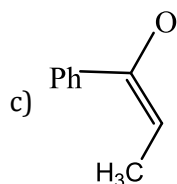
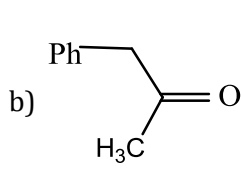
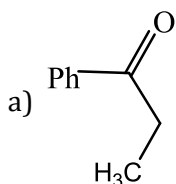
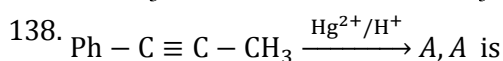
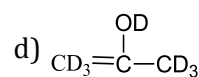
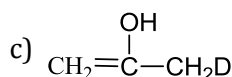
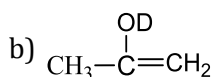
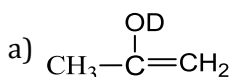
135. Which of the following reagents is used for the preparation of citric acid using Reformatsky reaction?

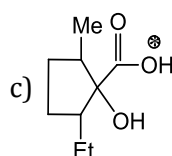
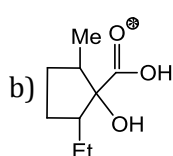
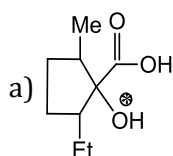
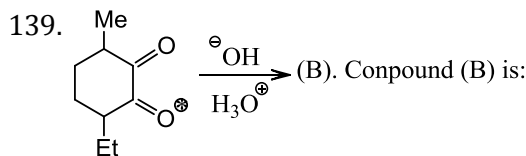
- a) Propene and Cl₂ b) Ethyl acetate glycerol
c) Ethyl bromoacetate and ethyl oxaloacetate d) Ethyl bromoacetate and ethyl acetoacetate

136. Formalin is:

- a) Liquid formaldehyde
b) 40% solution of formaldehyde in water
c) 40% solution of formaldehyde in acetone
d) 40% solution of formaldehyde in acetaldehyde

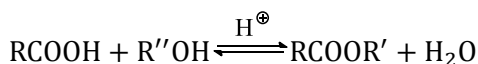
137. The enol form of acetone after treatment with D₂O gives:





d) All

140. Carboxylic acid, although uncreative to alcohols, reacts in the presence of small amount of conc. H_2SO_4 or with 2 – 3% of HCl



Which of the following statements is/are correct about the above reaction?

I. This reaction is called Fischer esterification reaction

II. The equilibrium is shifted to R. H. S. if H_2O is removed by azeotropic distillation with benzene

III. The reaction of RCOCl and $\text{R}'\text{OH}$ to give ester (RCOOR') is irreversible and more feasible than esterification of RCOOH

IV. If the above esterification of RCOOH is carried out in excess of $\text{R}'\text{OH}$, the equilibrium is shifted to R. H. S.

a) (I), (II)

b) (I), (II), (III)

c) (I), (II), (IV)

d) All

141. A hydrocarbon C_6H_{12} decolourises bromine solution and yields *n*-hexane on hydrogenation. On oxidation with KMnO_4 it affords two different monobasic acids of the type $\text{R} - \text{COOH}$. The compound is:

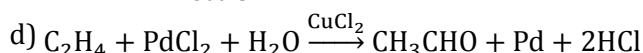
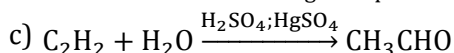
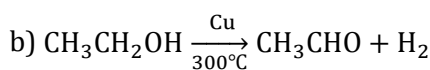
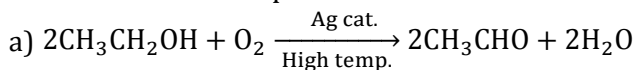
a) Cyclohexene

b) 2-Hexene

c) 1-Hexene

d) 3-Hexene

142. Which is the Wacker process?



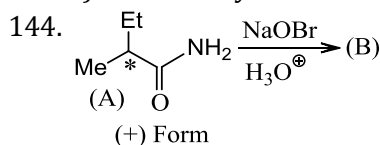
143. The Cannizzaro's reaction is not given by:

a) Trimethyl acetaldehyde

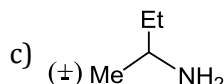
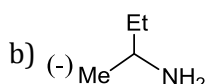
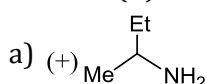
b) Acetaldehyde

c) Benzaldehyde

d) Formaldehyde

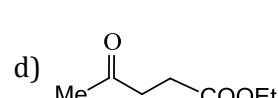
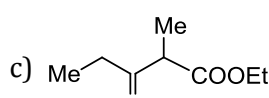
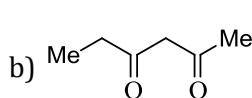
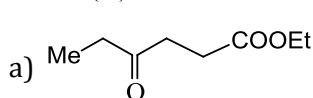
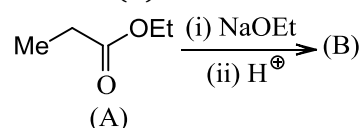


Product (B) is:

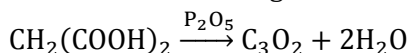


d) None

145. Product (B) in the reaction is:



146. Name of the following reaction

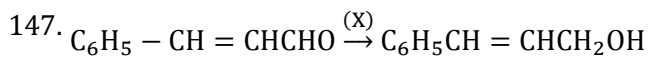


a) Diels-Alder reaction

b) Wolff-Kishner reaction

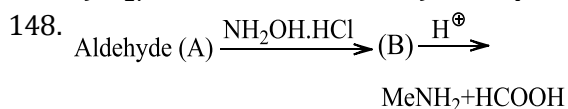
c) Diels-Wolff reaction

d) None of these



In the above sequence (X) can be:

- a) H_2/Ni b) $NaBH_4$ c) $K_2Cr_2O_7/H^+$ d) Both (a) and (b)

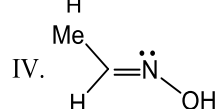
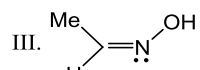


Aldehyde (A) and compound (B), respectively, are:

Aldehyde (A) Compound (B)

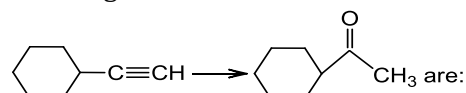
I. $MeCHO$

II. $HCHO$



- a) (I), (IV) b) (I), (III) c) (II), (III) d) (II), (IV)

149. The reagents used to convert

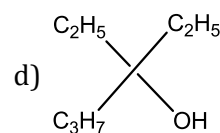
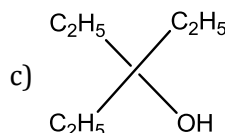
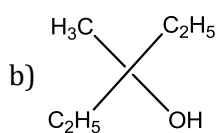
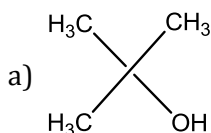


- a) i. $O_3/Red.$ ii. $AlCl_3$ iii. $MeCOOH$ b) i. $H_2SO_4 + HgSO_4$ ii. H_2O , heat
c) i. $O_3/Zn - AcOH$ ii. $H_2SO_4 + H_2SO_4$ iii. H_2O , heat d) i. CH_3COOH ii. $H_2O_2 + \overset{+}{O}H/H_2O$

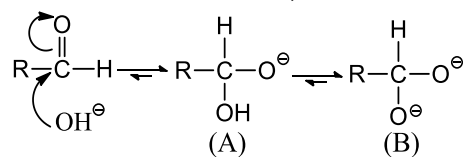
150. Which of the following ketone will not give yellow precipitate with $NaOH/I_2$?

- a) 2-Pentanone b) Benzophenone c) Acetone d) 2-Hexanone

151. Ethyl ester $\xrightarrow[\text{(excess)}]{CH_3MgBr}$ P, the product 'P' will be

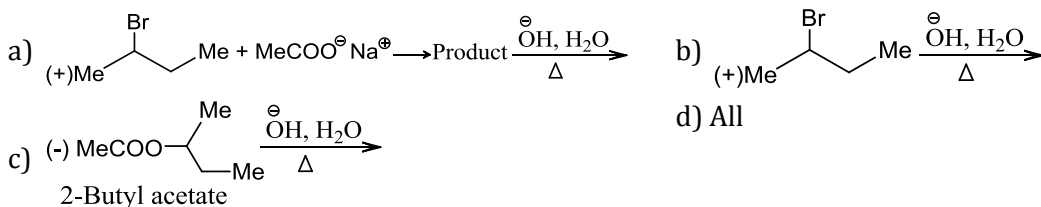


152. In Cannizzaro reaction, which of the following is a better hydride donor?



- a) (a) b) (b) c) Both d) None

153. Which of the following would give (–) – 2-butanol?



154. When CH_3CHO is reached in the presence of a base with excess of $HCHO$, which statement is true?

- a) Only aldol-type (Claisen-Schmidt) reaction takes place
b) Only Cannizzaro-type (crossed Cannizzaro) takes place
c) First aldol-type and then Cannizzaro-type reaction takes place
d) First Cannizzaro-type and then aldol-type reaction takes place

155. How will you distinguish the products obtained by acidic hydrolysis of

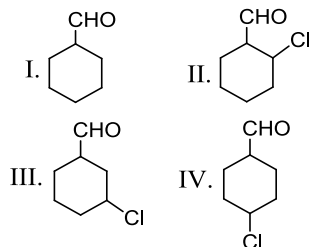


- a) Fehling solution b) NaHSO_3 c) Brady's reagent d) Lucas test

156. $\text{CH}_3\text{CH}=\text{CHCHO}$ is oxidised to $\text{CH}_3\text{CH}=\text{CHCOOH}$ using:

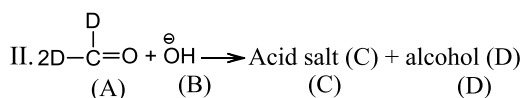
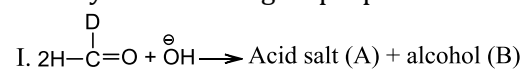
- a) Alkaline KMnO_4 b) Selenium dioxide c) Ammoniacal AgNO_3 d) All

157. Given decreasing order of the following towards NA reaction



- a) (I) > (II) > (III) > (IV) b) (IV) > (III) > (II) > (I) c) (II) > (III) > (IV) > (I) d) (I) > (IV) > (III) > (II)

158. Identify the following disproportionation reaction.

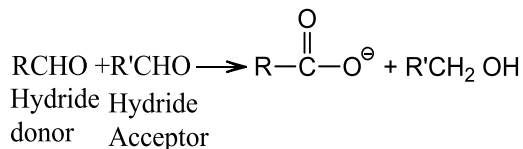


- a) $\text{D}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^\ominus \text{CH}_2\text{DOH}$ $\text{D}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^\ominus \text{CH}_2\text{DOH}$ b) $\text{H}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^\ominus \text{CH}_3\text{OH}$ $\text{H}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^\ominus \text{CH}_2\text{DOH}$
 c) $\text{H}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^\ominus \text{CH}_2\text{DOH}$ $\text{D}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^\ominus \text{CH}_2\text{DOH}$ d) $\text{D}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^\ominus \text{CH}_2\text{DOH}$ $\text{D}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^\ominus \text{CD}_3\text{OH}$

159. A substance $\text{C}_5\text{H}_{10}\text{O}$ does not reduce Fehling's solution, forms a phenylhydrazone, shows the haloform reaction, and can be converted into *n*-pentane by strong reduction. The structural formula of the original substance is:

- a) $\text{CH}_3\text{COC}_3\text{H}_7$ b) $\text{C}_2\text{H}_5\text{COC}_2\text{H}_5$ c) $\text{CH}_3\text{COCH}(\text{CH}_3)_2$ d) $\text{C}_4\text{H}_9\text{CHO}$

160.



Select the correct statement

- a) Oxidation number of C in RCHO increases and that of $\text{R}'\text{CHO}$ decreases
 b) Oxidation number of C in RCHO decreases and that of $\text{R}'\text{CHO}$ increases
 c) Oxidation number of C remains unchanged in both but that of oxygen is affected
 d) In CH_3CHO and $\text{C}_6\text{H}_5\text{CHO}$, the former can act as RCHO (hydride donor)

161. What is formed when oxalic acid is dehydrated by conc. H_2SO_4 ?

- a) C + CO_2 b) CO c) CO_2 d) CO + CO_2

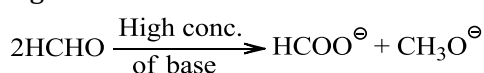
162. One mole of an organic compound is found to require only 0.5 mol of oxygen to produce an acid. Which class of compounds does the starting material belong to?

- a) Alcohol b) Aldehyde c) Ether d) Ketone

163. Which of the following reagents can give Urotropine, which is used as an antiseptic for urinary track infection?

- a) Ethanal and ethylamine b) Methanal and H_2SO_4
 c) Methanal and ammonia d) Methanal and 50% NaOH

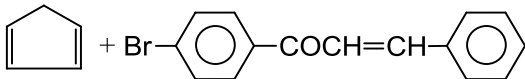
164. Which of the following is not the mechanism of Cannizzaro reaction when the concentration of base is very high?

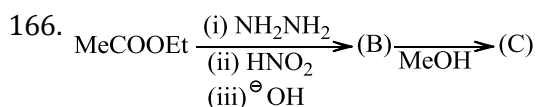


- a) The attack of OH^\ominus at the (C=O) group
- b) Removal of H^\oplus ion by the OH^\ominus ion from $\left(\begin{array}{c} \text{CH}_2-\text{O}^\ominus \\ | \\ \text{OH} \end{array} \right)$
- c) The transfer of H^\ominus ion to the (C=O) group of another HCHO
- d) The abstraction of proton from the carboxylic acid

Multiple Correct Answers Type

165. Which of the following does not undergo Michael addition?

- a) $\text{C}_6\text{H}_5\text{CH}=\text{CHCHOCH}_3 + \text{C}_6\text{H}_5\text{OCH}_3$ b) $\text{C}_6\text{H}_5\text{CH}=\text{CHCH}_2\text{COC}_6\text{H}_5 + \text{CH}_2(\text{COOC}_2\text{H}_5)_2$
- c)  d) $\text{CH}_2=\text{CHCOCH}_3 + \text{CH}_3\text{COCH}_3$

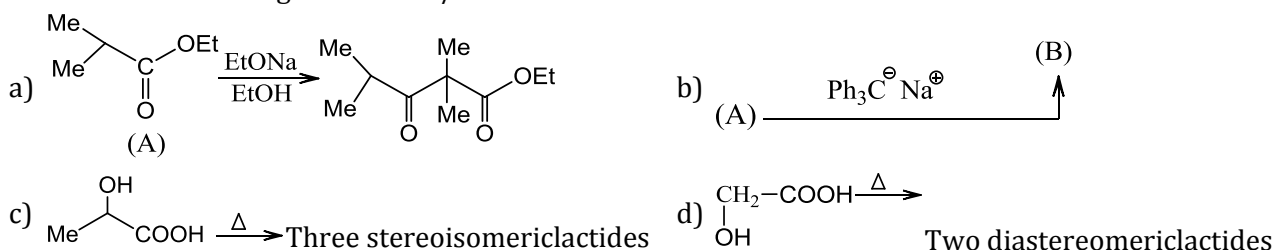


Which of the following statements are correct about the given reaction?

- a) The compounds (B) and (C), respectively, are $\text{Me}-\text{N}=\text{C}=\text{O}$ and MeNHCOOMe
- b) The compounds (B) and (C), respectively, are $\text{Et}-\text{N}=\text{C}=\text{O}$ and MeNH_2
- c) The reaction proceeds *via* the formation of acyl nitrene (MeCON^\bullet) as the intermediate species
- d) The reaction proceeds *via* the formation of acyl nitrene (EtCON^\bullet) as the intermediate species
167. Which of the following compounds on oxidation with $(\text{CH}_3\text{COO})_4\text{Pb}$ would give the product $\text{OHC}(\text{CH}_2)_4\text{CHO}$?



168. Which of the following reactions is/are correct?



169. Which of the following statement are correct?

- a) The decreasing acidic character of the following acids: *o*-Bromo->*m*-Bromo->*p*-Bromobenzoic acid
- b) *p*-Chlorobenzoic acid is a stronger acid than *p*-fluoro benzoic acid
- c) *p*-Bromobenzoic acid is a stronger acid than *p*-fluorobenzoic acid
- d) *p*-Bromobenzoic acid is stronger acid than *p*-iodo benzoic acid

170. Which of the following compounds will react with ethanolic KCN?

- a) Ethyl chloride b) Acetyl chloride c) Chlorobenzene d) Benzaldehyde

171. Silver mirror test is given by which one of the following compounds?

- a) Acetaldehyde b) Acetone c) Formaldehyde d) Benzophenone

172. Which of the following statements are correct?

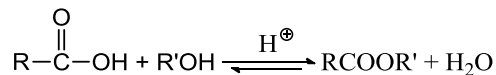
- a) Oximes are stronger acids than hydroxylamine
- b) $\text{p}K_a$ of maleic acid is less than $\text{p}K_a$ of fumaric acid
- c) $\text{Me}_3\text{SiCH}_2\text{COOH}$ is a stronger acid than $\text{Me}_3\text{C}-\text{CH}_2\text{COOH}$
- d) *o*-Nitrobenzoic acid is a weaker acid than 3,5-dinitrobenzoic acid

173. During the reaction between carbonyl compounds with ammonia derivatives, a proper pH is required.

Select the correct reasons

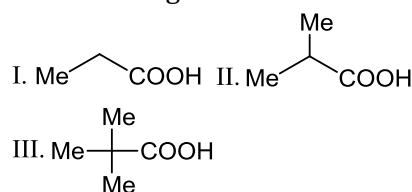
- To increase positive charge on the C atom of (C = O) group for the better attack of nucleophilic centre of ammonia derivative, a small amount of acid is needed
- a) With excess of acid, ammonia derivatives form their salts and act as strong nucleophiles
- b) With excess of acid, ammonia derivatives form their salts and cannot act as nucleophiles
- c) The proper pH required for these reactions is nearly 3.5

174. Which of the following statements are correct about the following reaction



- a) Rate = $K[\text{RCOOH}][\text{R}'\text{OH}][\text{H}^+]$. First order in acid, alcohol, and H^+ , third order overall
- b) Rate = $K[\text{RCOOH}][\text{R}'\text{OH}]$. First order in acid and alcohol; second order overall
- c) Slow and rate-determining step (R.D.S) is the addition of alcohol to the protonated acid
- d) Slow and rate-determining step (R.D.S) is the addition of acid to the protonated alcohol

175. The following acids can be differentiated by:

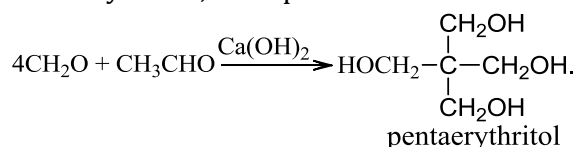


- a) NaHCO_3 b) AgNO_3 c) H.V.Z. reaction d) Hunsdiecker reaction

176. A new carbon-carbon bond formation is possible in:

- a) Cannizzaro reaction b) Friedel-Crafts reaction
- c) Clemmensen reduction d) Reimer-Tiemann reaction

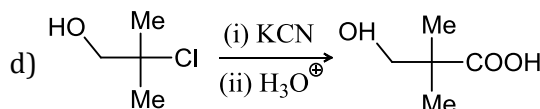
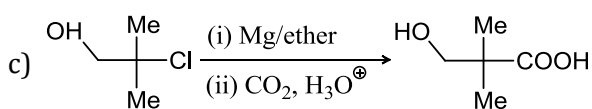
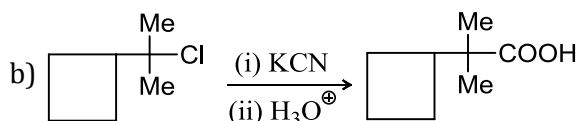
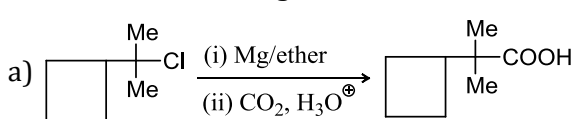
177. Pentaerythritol, an important industrial chemical, is prepared by the following reaction



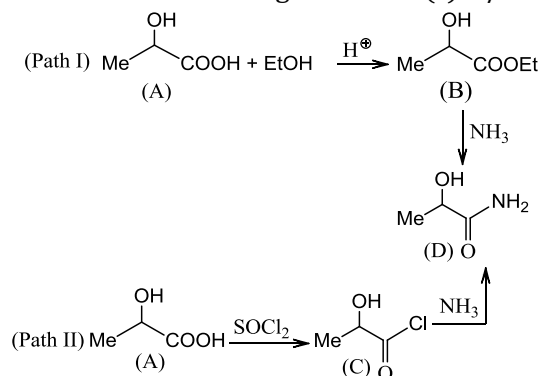
This reaction involves

- a) Cannizzaro reaction b) Aldol condensation
- c) Crossed Cannizzaro reaction d) Crossed aldol condensation

178. Which of the following reactions are correct?

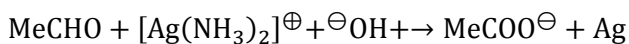


179. Which of the following statement(s) is/are correct about the preparation of an amide?



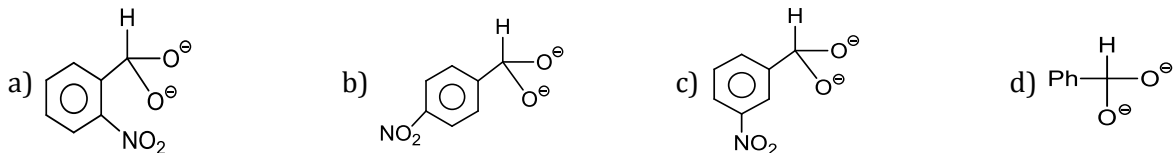
- a) Path (I) is feasible b) Path (II) is feasible
- c) Both the paths are feasible d) None is feasible

180. Which of the statements are correct about the following reactions?

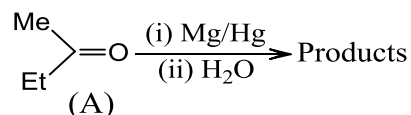


- The equivalent weight of MeCHO is 22
- Three moles of ^-OH are required in the above reaction
- MeCHO is an oxidising agent
- Reduction of $[\text{Ag}(\text{NH}_3)_2]^+$ occurs

181. Among the following, the least and the best H^\ominus ion donor respectively, are:



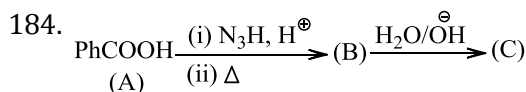
182. Which of the statements are correct about the given reaction?



- Two enantiomeric products are obtained
- Three products, racemate, and meso products are obtained
- The reaction proceeds *via* the formation of radical anion
- The reaction is called Pinacol-Pinacolone rearrangement reaction

183. Which of the following statements are correct?

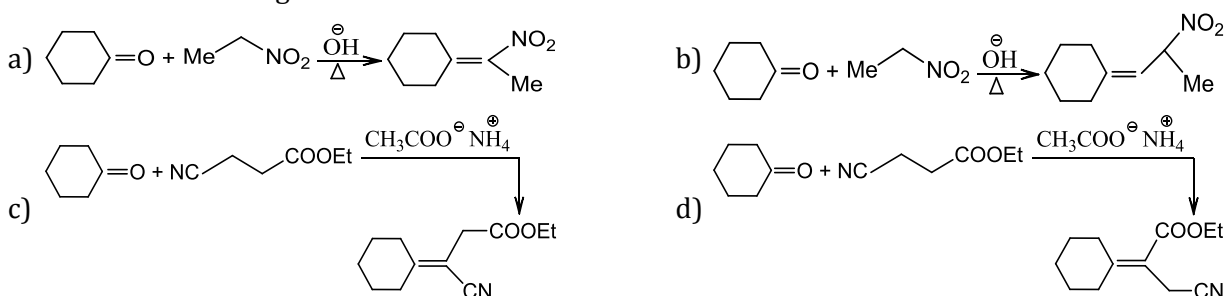
- Benzoic acid is a stronger acid than formic acid
- Benzoic acid is a stronger acid than peroxy benzoic acid
- Acetic acid is a stronger acid than *p*-nitrophenol
- α -Methyl butyric acid is a stronger acid than β -methyl butyric acid



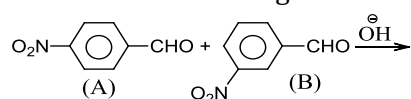
Which of the following statements is/are correct about the reaction?

- The compounds (B) and (C), respectively, are $\text{Ph}-\text{N}=\text{C}=\text{O}$ and PhNH_2
- The compounds (B) and (C), respectively, are $\text{Ph}-\text{N}^\oplus\equiv\text{C}^\ominus$ and PhNHMe .
- The reaction is known as Curtius rearrangement reaction
- The reaction is known as Schmidt rearrangement reaction

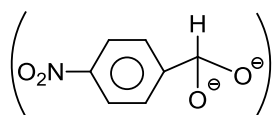
185. Which of the following are correct reactions?



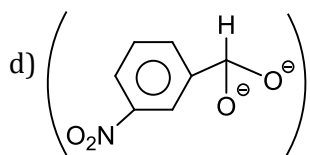
186. Which of the following statements are true about crossed Cannizzaro reaction?



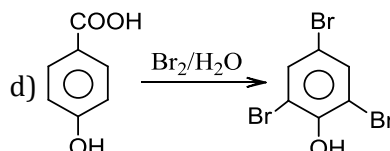
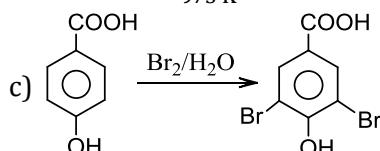
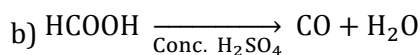
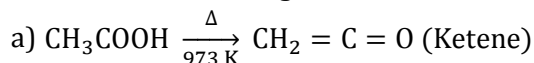
- ^-OH attacks at the (C=O) group of (A)
- ^-OH attacks at (C=O) group of (B)
- The H^\ominus ion transfer takes place from



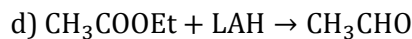
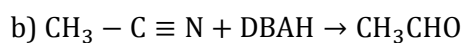
The H^\ominus ion transfer takes place from



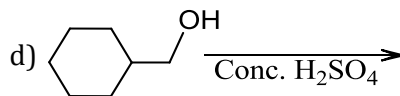
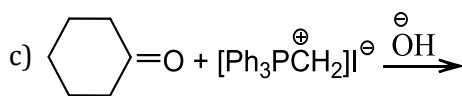
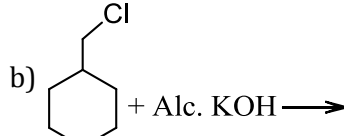
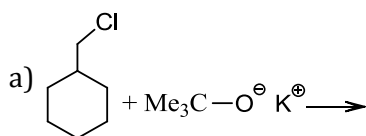
187. Which of the following reactions are correct?



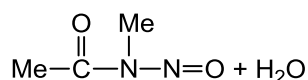
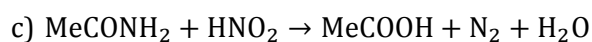
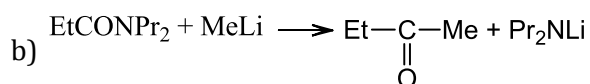
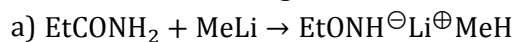
188. Which of the following are correct reaction?



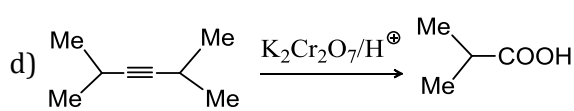
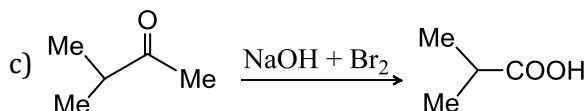
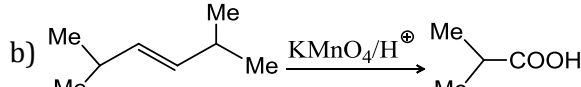
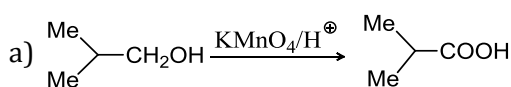
189. Which of the methods are suitable for the preparation of methylene cyclohexane?



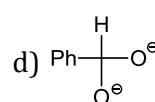
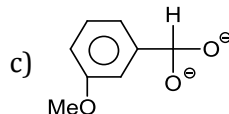
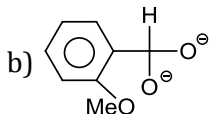
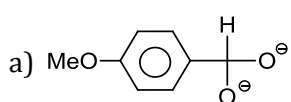
190. Which of the following reactions are correct?



191. Which of the following reactions are correct?

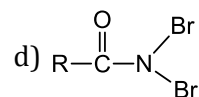
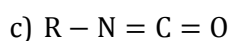
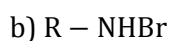
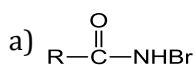


192. Among the following, the best and the least H^\ominus ion donor, respectively, are:

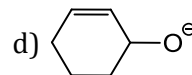
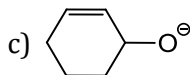
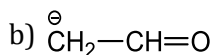
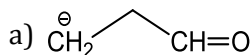


193.

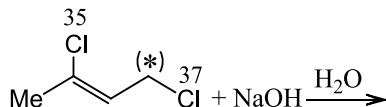
Reaction of $\text{R}-\text{C}(=\text{O})-\text{NH}_2$ with a mixture of Br_2 and KOH gives $\text{R}-\text{NH}_2$ as the main product. The intermediates involved in this reaction are: with a mixture of Br_2 and KOH gives $\text{R}-\text{NH}_2$ as the main product. The intermediates involved in this reaction are:



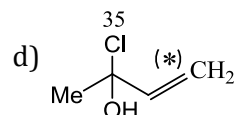
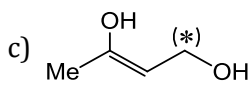
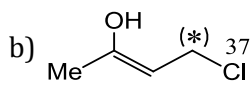
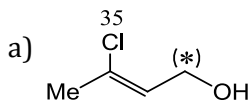
194. Which of the following are not ambident carbanions?



195. Consider the following reaction using isotopically labelled Cl^{35} , Cl^{37} , and $\text{C}^{14}(\text{C}^*)$



What are the products of this S_{N} reaction?



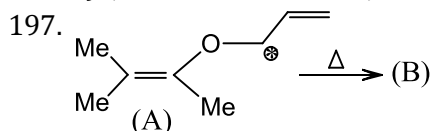
196. Which of the following statement are correct?

a) In the gaseous phase, propanoic acid is stronger acid than acetic acid

b) In the gaseous phase, *t*-butanol is stronger acid than *n*-butanol

c) Propanoic acid is stronger acid than $\text{CH}_2=\text{CHCH}_2\text{COOH}$

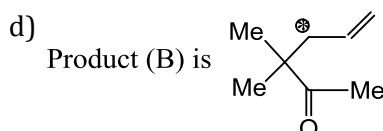
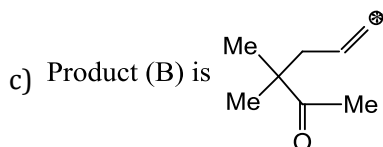
d) $(\text{HC}\equiv\text{C}-\text{CH}_2\text{COOH})$ is stronger acid than $\text{CH}_2=\text{CHCH}_2\text{COOH}$



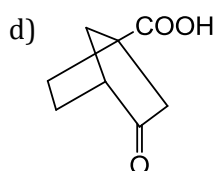
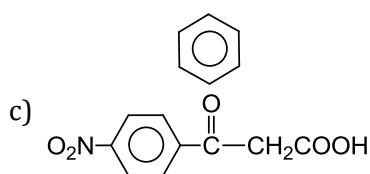
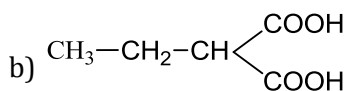
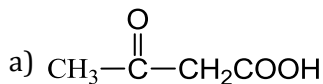
Which of the following statements are correct about the above reaction?

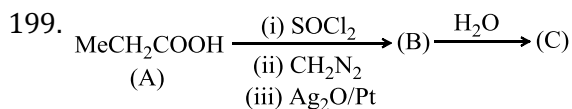
a) The reaction is called Claisen-Schmidt reaction

b) The reaction is called Claisen rearrangement reaction



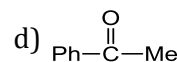
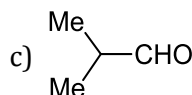
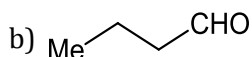
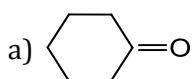
198. On gently warming, which of the following acids undergo decarboxylation?



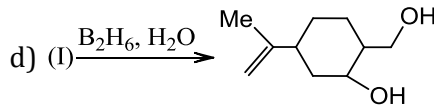
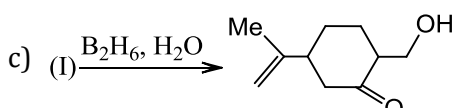
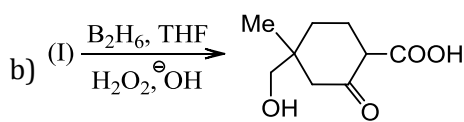
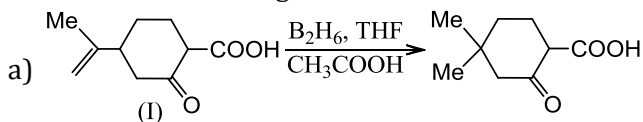


Which of the following statements are correct about the given reaction

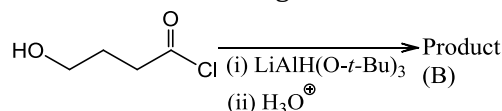
- The products (B) and (C), respectively, are $\text{MeCH}=\text{C}=\text{O}$ and $\text{MeCH}_2\text{COOMe}$
 - The products (B) and (C), respectively, are: $\text{MeCH}_2\text{CH}=\text{C}=\text{O}$ and $\text{MeCH}_2\text{CH}_2\text{COOH}$
 - The reaction is known as Wolff rearrangement reaction
 - The reaction is known as Arndt-Eistert rearrangement reaction
200. Which of the following statements is/are correct about transacylation?
- Amides can be prepared by RCOCl and anhydrides
 - Anhydrides can be prepared by esters
 - Esters can be prepared by anhydrides
 - RCOCl can be prepared by anhydrides and esters
201. Base catalysed aldol condensation occurs with:
- Propionaldehyde
 - Benzaldehyde
 - 2-Methyl propionaldehyde
 - 2,2-Dimethyl propionaldehyde
202. Which of the following statements are wrong?
- Benzoic acid is a stronger acid than *o*-toluic acid
 - m*-Toluic acid is a stronger acid than *p*-toluic acid
 - Salicylic acid is a stronger acid than benzoic acid
 - p*-Hydroxy benzoic acid is a stronger acid than *m*-hydroxy benzoic acid
203. Which of the following would undergo Aldol condensation?



204. Which of the following reactions are correct?



205. Which of the following statements are correct about the given reaction?

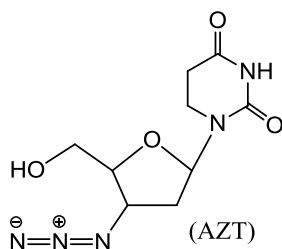


- The product (B) can also be obtained by the reaction of (A) with DIBAL-H
- The product (B) can also be obtained by the reaction of (A) with poisoned Pd
- The product (B) is a racemate of two enantiomeric forms and the product is (cyclic hemiacetal)
- Product (B) is

206. Which of the following statements are correct?

- Ethyl isobutyrate does not undergo Claisen ester condensation in the presence of NaOEt/EtOH
- Ethyl isobutyrate undergoes Claisen ester condensation in the presence of $\text{Ph}_3\text{C}^-\text{Na}^+$
- Acetyl chloride is hydrolysed rapidly by water, whereas benzoyl chloride is not
- β -Keto esters are stronger acids than alcohol and esters

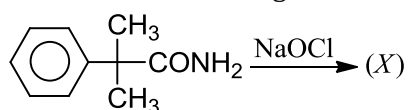
207. The structure of AZT (azidothymine) is given below. It is used to treat AIDS patients. It fights an AIDS infection but does not cure it



Which of the following statements are correct about AZT?

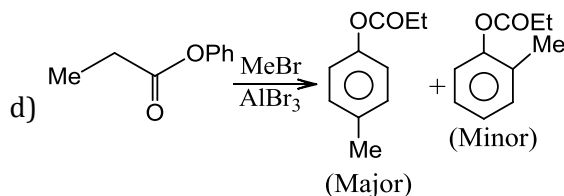
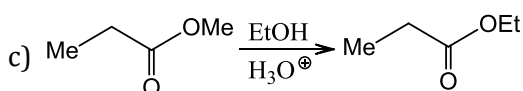
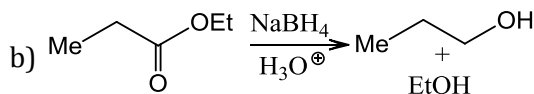
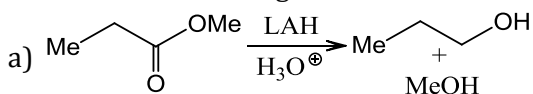
- a) It shows acidic property
- b) It undergoes tautomerisation
- c) It gives white precipitate with $(\text{ZnCl}_2 + \text{HCl})$ (Lucas reagent)
- d) Azide ion (N_3^-) cannot replace Br^- by S_N^2 reaction

208. Which of the following statements are true about the major product (X) in this reaction?



- a) (X) is a cyclic amide
- b) (X) has an asymmetric centre
(X) can also be obtained by treatment of NH_3 with $\text{C}_6\text{H}_5 - \text{CH} - \text{Br}$
|
 CH_3
- c) (X) is a primary amine
- d) $\text{C}_6\text{H}_5 - \text{CH} - \text{Br}$
|
 CH_3

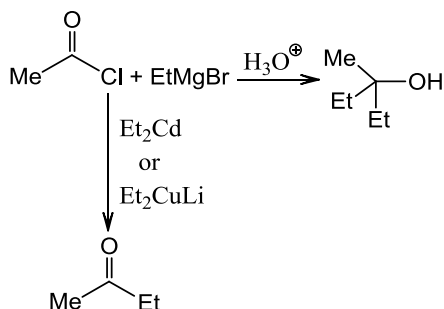
209. Which of the following reactions are correct?



210. Among the following compounds, which will react with acetone to give a product containing $>\text{C}=\text{N}-$?

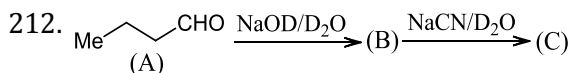
- a) $\text{C}_6\text{H}_5\text{NH}_2$
- b) $(\text{CH}_3)_3\text{N}$
- c) $\text{C}_6\text{H}_5\text{NHC}_6\text{H}_5$
- d) $\text{C}_6\text{H}_5\text{NHNH}_2$

211. Which of the statements are correct about the following reaction?

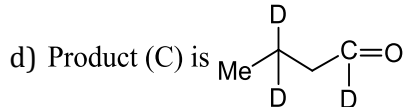
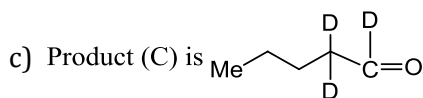
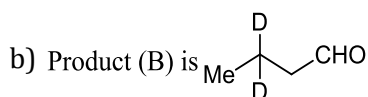
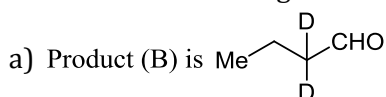


- a) Ketones are more reactive than RCOCl , therefore ketones further react with RMgX to give 3° alcohols
- b) $(\text{C}-\text{Mg})$ bond is more ionic than $(\text{C}-\text{Cu})$ or $(\text{C}-\text{Cd})$ bond
- c) Nucleophile R^- from Grignard reagent is more reactive and the reaction of RMgX with RCOCl is a nucleophilic addition reaction

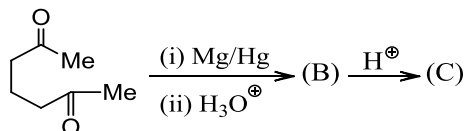
- d) Cu or Cd forms complex with Cl of RCOCl , $\left[\text{R}-\overset{\delta+}{\underset{\text{O}}{\parallel}}\text{C}-\text{Cl}-\overset{\delta-}{\text{Cd}} \text{R}_2 \right]$, similar to acylium-like ion with greater $(\delta+)$ charge on C , which bonds even with the weakly nucleophilic R of R_2Cd or R_2CuLi



Which of the following statements are correct about the above reaction?



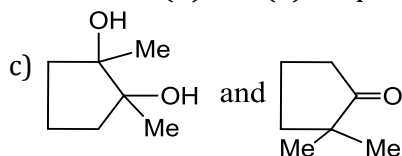
213. Which of the following statements are wrong about the given reaction?



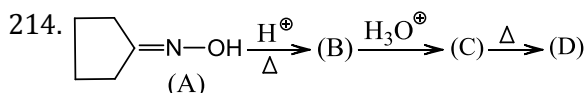
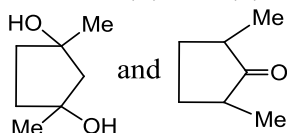
a) Formation of (B) from (A) is called bimolecular reduction and takes place by radical anion mechanism

b) Formation of (B) from (A) takes place by free radical mechanism

Products (B) and (C), respectively, are:



d) Products (B) and (C), respectively, are



find which of the following statements are correct

a) Product (D) is a polyamide called Nylon-5

b) Product (D) is a polyamide called Nylon-6

c) Common name of (C) is δ -amino valeric acid

d) IUPAC name of (C) is 5-amino pentanoic acid

215. Which of the following pair (s) represents an example of diastereoisomers?

a) (+) Tartaric acid and *meso*-tartaric acid

b) Maleic acid and fumaric acid

c) D (+) galactose and D (+) mannose

d) (+) Lactic acid and (-) lactic acid

216. Silver mirror test is given by which one of the following compounds?

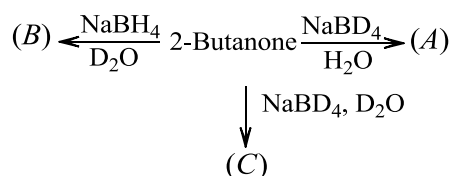
a) Acetaldehyde

b) Acetone

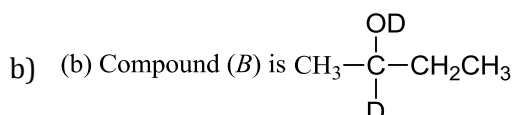
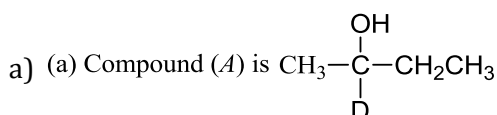
c) Formaldehyde

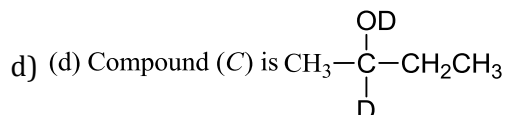
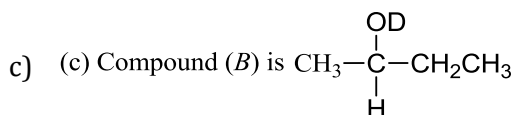
d) Benzophenone

217. Consider the reduction of 2-butanone

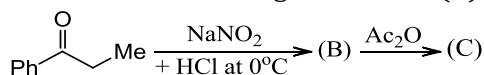


Which of the following statements are true about the product

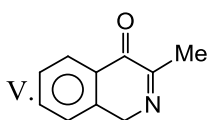
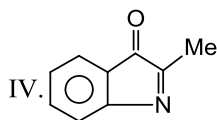
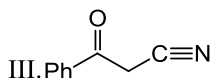
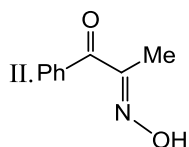
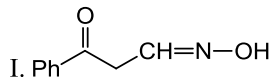




218. Which of the following are correct (B) and (C) products, respectively?



The products given are:



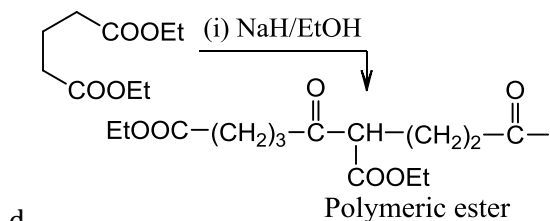
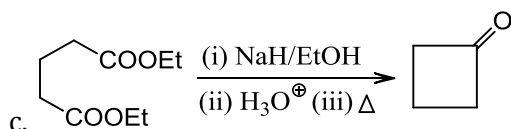
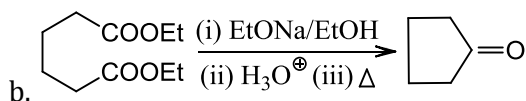
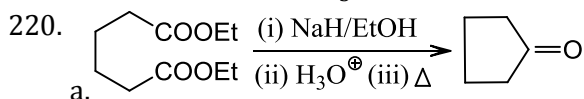
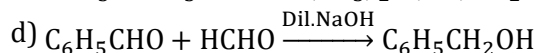
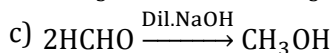
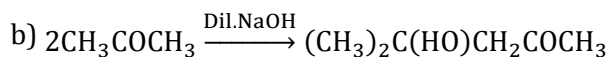
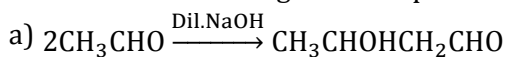
a) (I), (V)

b) (I), (III)

c) (II), (V)

d) (II), (IV)

219. Which of the following are examples of aldol condensation?



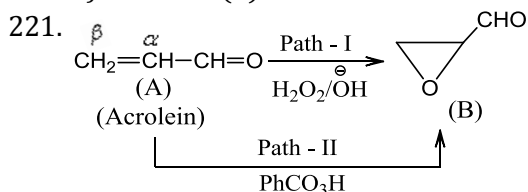
which of the following statements are correct?

a) All the reactions are intramolecular condensation reaction

b) All the reactions are intermolecular condensation reaction

c) Reaction (a) is intramolecular condensation reaction

d) Reaction (d) is intermolecular condensation reaction

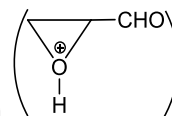
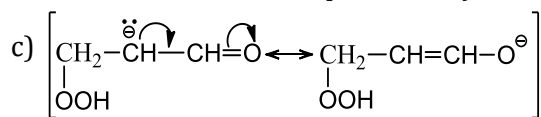


and find out which statement is correct

a) Path I proceeds by nucleophilic addition (HOO^\ominus) on the ($\text{C}=\text{C}$) bond followed by Michael addition with (A) to give α -carbanion which displaces OH^\ominus from (HOO) group to give epoxide (B)

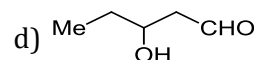
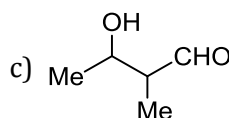
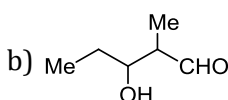
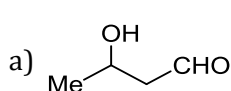
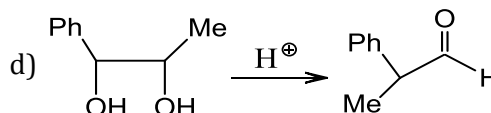
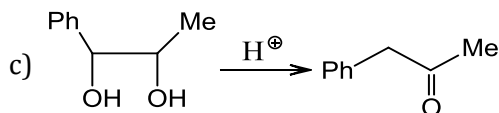
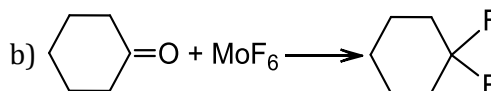
b) Path II proceeds by electrophilic addition (OH^\ominus) on the ($\text{C}=\text{C}$) bond followed by the removal of H from

Path I is faster since it proceeds by the formation of resonance-stabilised α -carbanion as shown

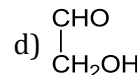
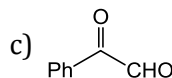
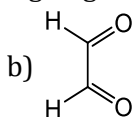



222. Which of the following will undergo aldol condensation?

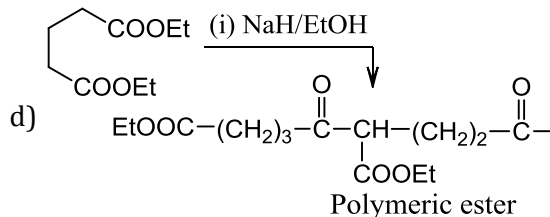
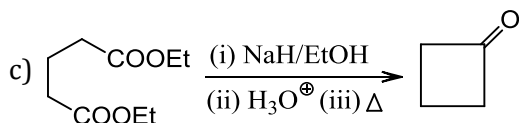
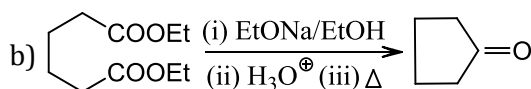
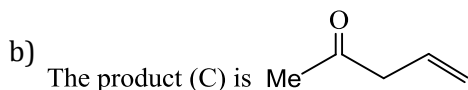
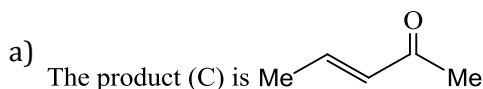
- a) Acetaldehyde b) Propanaldehyde
c) Benzaldehyde d) Trideutereo acetaldehyde

$$\text{MeCHO} + \text{MeCH}_2\text{CHO} \xrightarrow[25^\circ\text{C}]{\text{OH}^\ominus}$$

$$\text{a) PhCH=O} + \text{SF}_4 \xrightarrow{\Delta} \text{PhCHF}_2$$


a) ClC(Cl)C(=O)c1ccccc1



a) 


$$\text{Me}-\overset{\text{O}}{\parallel}-\text{Cl} + \text{Me}-\text{CH}=\text{CH}_2 \xrightarrow{\text{BF}_3} (\text{C})$$


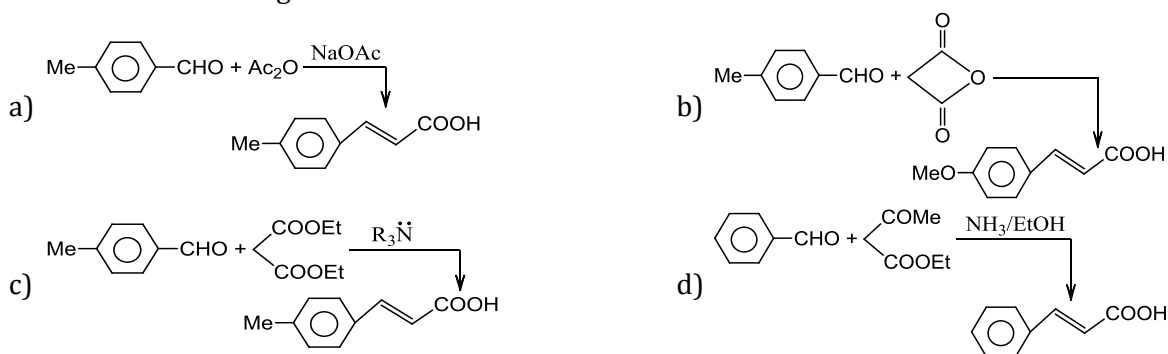
- c) The formation of (C) proceeds *via* the formation of acylium ion
d) The formation of (C) proceeds *via* the formation of carbocation

Page | 29

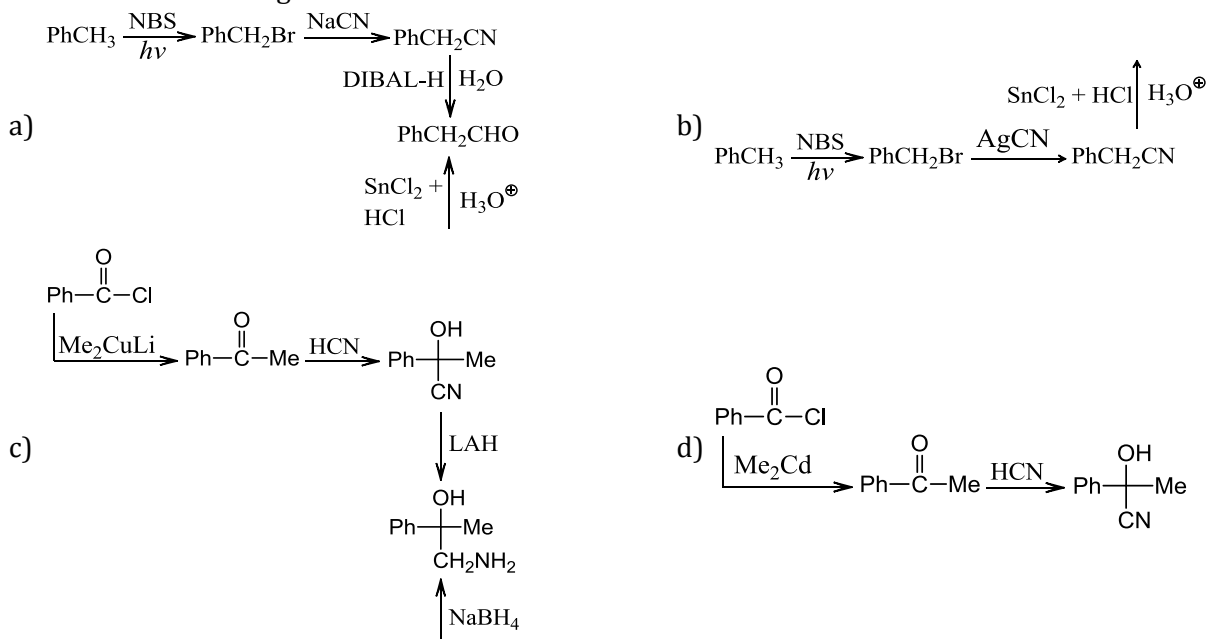
I. $\text{Cl}_3\text{C} - \text{COOH}$ II. $\text{Br}_3\text{C} - \text{COOH}$ III. CH_3COOH IV. PhCOOH

a) (I)>(II)>(III)>(IV) b) (I)>(II)>(IV)>(III) c) (IV)>(III)>(II)>(I) d) (III)>(IV)>(II)>(I)

229. Which of the following are Perkin reactions?



230. Which of the following are correct reactions?



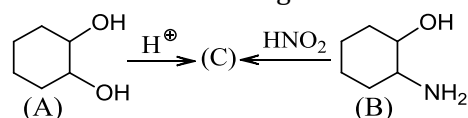
231. Which of the following undergo easy decarboxylation?

a) $\text{MeCOCH}_2\text{COOH}$ b) $\text{O}_2\text{N} - \text{CH}_2\text{COOH}$ c) $\text{Cl}_3\text{C} - \text{COOH}$ d) $\text{F}_3\text{C} - \text{COCH}_2\text{COOH}$

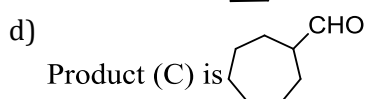
232. Among the following, the best and the least H^\ominus ion donor, respectively, are:



233. Which of the following statements are correct about the following reaction?



- a) In the formation of (C) from (A) or (B), expansion of ring takes place
 b) In the formation of (C) from (A) or (B), contraction of ring takes place
 c) Product (C) is

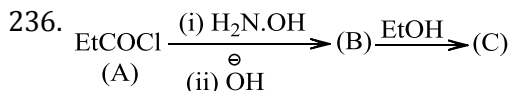
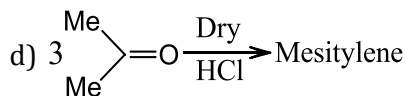
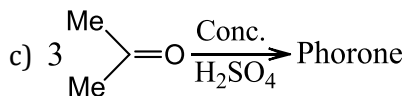
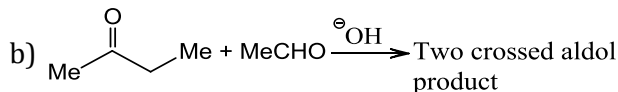
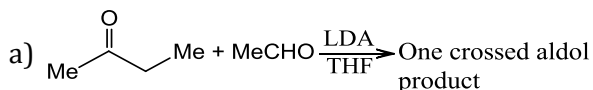


234. Which of the following statements are correct about the bisulphite addition product of a carbonyl compound?

- a) The nucleophile is HSO_3^\ominus
 b) The nucleophile is SO_3^{2-}
 c) The (C - S) bond is formed rather than (C - O) bond because O is more nucleophilic than S

d) The bisulphite adduct can be regenerated to carbonyl compound by both acid or base

235. Which of the following reactions are correct?



Which of the following statements are correct about the given reaction?

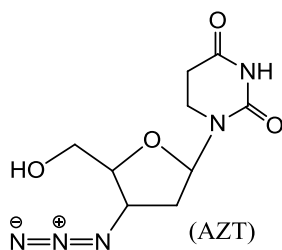
a) The compounds (B) and (C), respectively, are $\text{Et}-\text{C}\equiv\text{N}$ and EtNH_2

b) The compounds (B) and (C), respectively, are $\text{EtN}=\text{C}=\text{O}$ and EtNHC(=O)OEt

c) The reaction is known as Lossen rearrangement reaction

d) The reaction proceeds *via* the formation of acyl carbene ($\text{EtCO}\dot{\text{C}}\text{H}$) as the intermediate species

237. The structure of AZT (azidothymine) is given below. It is used to treat AIDS patients. It fights an AIDS infection but does not cure it



and find which of the following functional groups are present in AZT?

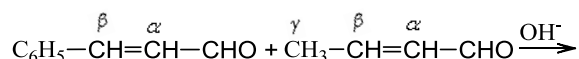
a) Oxolane

b) Keto group

c) Lactam

d) Alcoholic group

238. A mixture of cinnamaldehyde and crotonaldehyde is treated with concentrated alkali,



Which statement is incorrect about the above reaction?

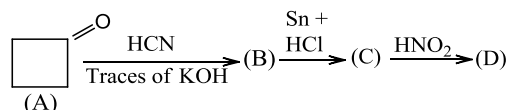
a) Aldol condensation takes place and α -carbon atom of crotonaldehyde provides the carbanion

b) Aldol condensation takes place and α -carbon atom of cinnamaldehyde provides the carbanion

c) Aldol condensation takes place and γ -carbon atom of crotonaldehyde provides the carbanion

d) Cannizzaro reaction takes place of crotonaldehyde is reduced whereas cinnamaldehyde is oxidised

239. Which of the following statements are correct about the reaction given below?



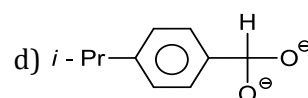
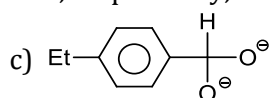
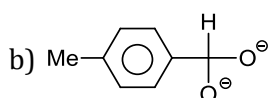
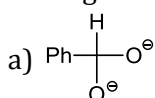
a) In the formation of (D) from (C), ring expansion takes place

b) The product (D) is cyclopentanone

c) The product (D) is α, β -unsaturated cyclopentanone

d) Conversion of (B) to (C) can also be carried out with LAH

240. Among the following, the least and the best H^\ominus ion donor, respectively, are:



241. Which of the following statements are correct?

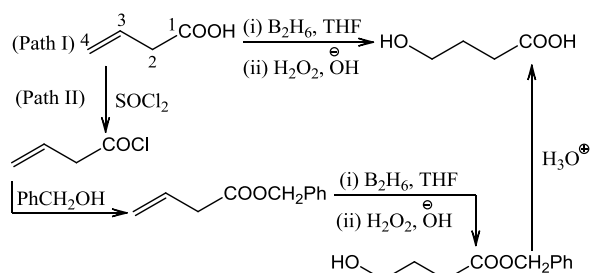
a) The (C – O) bond length is shorter in ester than in anhydride

b) Esters have higher boiling points than ketones of comparable molecular masses

c) The boiling points of 1° amides are higher than those of 2° amides

d) *N*-Methyl acetamide exists in two eclipsed conformation structures, *E* and *Z* forms

242. Which of the following statements are correct about the following reactions



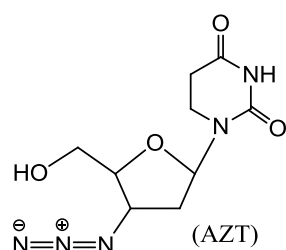
a) Path (I) is feasible but path (II) is not

b) Path (II) is feasible but path (I) is not

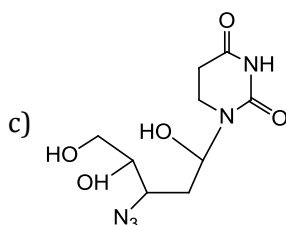
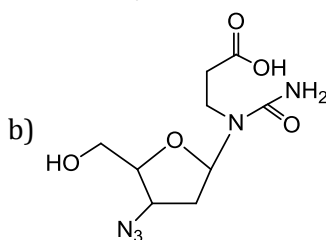
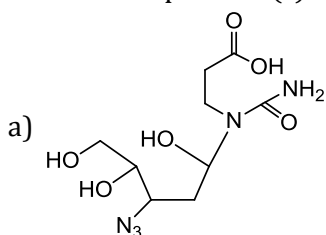
c) $\text{B}_2\text{H}_6/\text{H}_2\text{O}_2, \text{OH}^-$ adds to ($\text{C}=\text{C}$) bond to give alcohol by anti-Markovnikov addition

d) $\text{B}_2\text{H}_6/\text{THF}$ does not react with (COOH) group

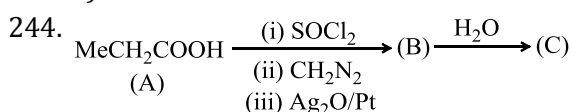
243. The structure of AZT (azidothymine) is given below. It is used to treat AIDS patients. It fights an AIDS infection but does not cure it



and find the product (s) of the controlled hydrolysis of AZT



d) All



and find which of the following statements are correct

a) The reaction proceeds *via* the formation of acyl carbene ($\text{MeCH}_2\text{CO}\dot{\text{C}}\text{H}$) as the intermediate species

b) The reaction proceeds *via* the formation of acyl carbene ($\text{MeCO}\dot{\text{C}}\text{H}$) as the intermediate species

c) The compound (B) on reaction with MeNH_2 forms the product ($\text{MeCH}_2\text{CH}_2\text{CONHMe}$)

d) The compound (B) on reaction with MeOH forms the product ($\text{MeCH}_2\text{CH}_2\text{COOOMe}$)

245. Which statement is true about acetoacetic ester?

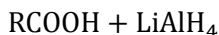
a) Its ketos form boils at a higher temperature than the enolic form

b) Its enolic form boils at a higher temperature than the keto-form

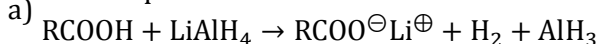
c) Both boils at same temperature

d) It discharges the colour of bromine dissolved in CCl_4

246. Which of the following statements are correct about the following reaction:



a) First step in the above reaction is:

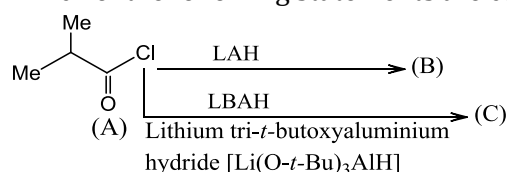


b) Second step is the transfer of H^\ominus ion from AlH_3 to $(\text{C}=\text{O})$ of RCOO^\ominus

c) The intermediate product ($\text{RCH}=\text{O}$) is formed

d) ($\text{RCH}=\text{O}$) is further reduced to $\text{RCH}_2\text{O}^\ominus$ which on acidification gives RCH_2OH

247. Which of the following statements are correct about the following reaction?



a) The products (B) and (C), respectively, are: $\text{Me}_2\text{CHCH}_2\text{OH}$ and Me_2CHCHO

b) The products (B) and (C), respectively, are: $\text{Me}_2\text{CHCH}_2\text{OH}$ and Me_2CHCHO

c) LBAH is more reactive reducing agent than LAH

d) LBAH is less reactive reducing agent than LAH

248. Which of the following statements regarding semicarbazone formation from cyclohexanone and benzaldehyde are incorrect?

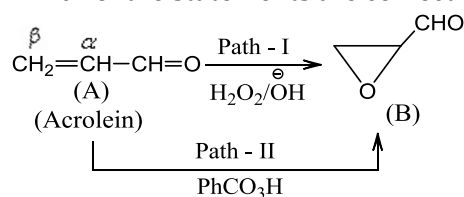
a) Both form nearly the same amount of semicarbazone

b) Semicarbazone of benzaldehyde is more stable

c) Semicarbazone of cyclohexanone is more stable

d) Semicarbazone formation from cyclohexanone is more faster

249. Which of the statements are correct about the reaction given below?



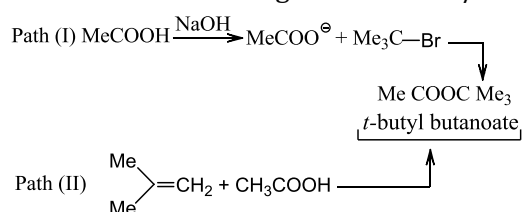
a) Formation of (B) by Path I is much more faster than by Path II

b) Formation of (B) by Path II is much more faster than by Path I

c) Formation of (B) by both paths is equal

d) (B) is formed by Path II only

250. Which of the following statements is/are correct about the preparation of *t*-butyl ethanoate



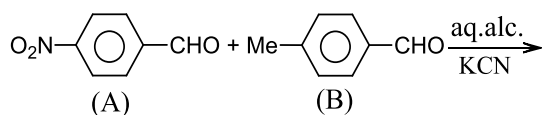
a) Path (I) is feasible

b) Path (II) is feasible

c) Both paths are feasible

d) None is feasible

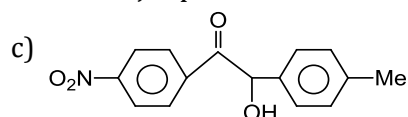
251. Which of the following statements are true about the benzoin reaction?



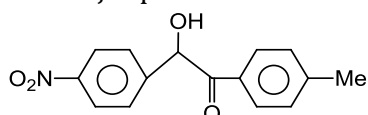
a) CN^- attacks at the (C=O) group of (A)

b) CN^- attacks at (C=O) group of (B)

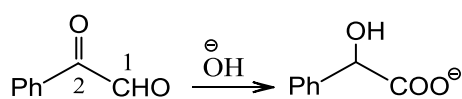
The major product formed is:



d) The major product formed is:



252. Which of the statements are correct about the internal or intramolecular Cannizzaro reaction given below?



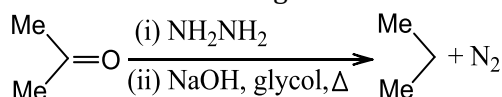
a) OH^- attacks at C-1 of (CHO) group

b) OH^- attacks at C-2 of (C = O) group

c) H^- transfer takes place from C-1 to C-2

d) H^+ exchange from acid to alcohol ion

253. Which of the following statements are correct about Wolff-Kishner reduction?



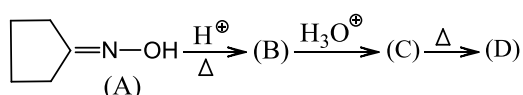
a) Hydrazone intermediate compound is formed

b) In basic conditions, migration of double bond occurs with the loss of N_2

c) Reaction is thermodynamically favoured due to the loss of N_2

d) Reaction is thermodynamically not favoured due to the migration of double bond

254. Which of the statements are correct about the reaction?



a) (B) is a six-membered cyclic lactam

b) (B) is a five-membered cyclic lactam

c) Formation of (B) from (A) is Beckmann reaction

d) Formation of (B) from (A) is Beckmann rearrangement reaction

255. Which of the following reactions would give propanal?

a) Ethyl propanoate + DBAH (diisobutyl aluminum hydride). $[(i-\text{C}_4\text{H}_9)_2\text{AlH}]$ at -70°C , followed by hydrolysis

b) Propyl propanoate + DIBAL-H/ H_2O

c) Ethyl cyanide + DBAH

d) Propanoyl chloride + LBAH

256. Which of the following statements are correct about nucleophilic acyl substitution?

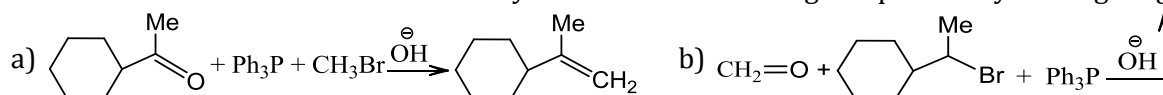
a) RCOCl is more reactive than RCON_3 (acid azide)

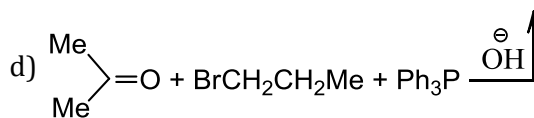
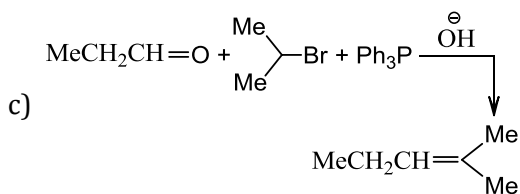
b) RCON_3 is more reactive than anhydride

c) RCON_3 is less reactive than anhydride

d) Esters are less reactive than anhydrides but more reactive than amides

257. Which of the methods are better in the synthesis of the following compounds by Wittig reagent?





258. Which of the following can exist as inner salt?

- a) *p*-aminobenzenesulphonic acid
c) Aminoacetic acid

- b) *p*-aminobenzoic acid
d) Alanine

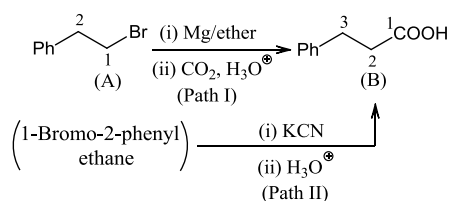
Assertion - Reasoning Type

This section contain(s) 0 questions numbered 259 to 258. Each question contains STATEMENT 1(Assertion) and STATEMENT 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

- a) Statement 1 is True, Statement 2 is True; Statement 2 **is** correct explanation for Statement 1
b) Statement 1 is True, Statement 2 is True; Statement 2 **is not** correct explanation for Statement 1
c) Statement 1 is True, Statement 2 is False
d) Statement 1 is False, Statement 2 is True

259

Statement 1: 3-Phenol propanoic acid (B) can be prepared by both nitrile and carbonation method as shown

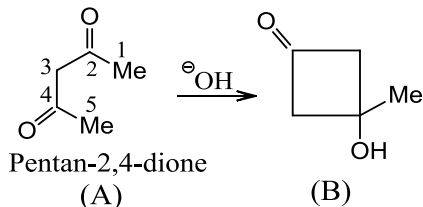


Path I gives a good yield of (B)

Statement 2: CN^{\ominus} initiates elimination reaction

260

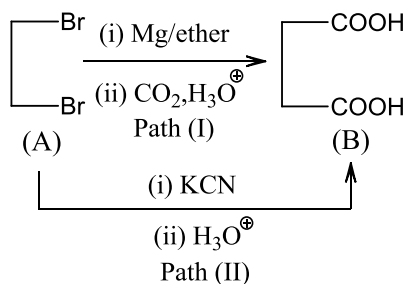
Statement 1: The following intramolecular aldol reaction occurs



Statement 2: The carbanion does not add to C-4 because a strained four-membered ring would result

261

Statement 1: Succinic acid (B) can be prepared by both nitrile and carbonation method as shown

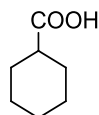


Both paths given good yield of (B)

Statement 2: (A) with Mg would lead to the loss of vicinal Br atoms to give alkene and MgBr_2

262

Statement 1:



(I) is more acidic than PhCOOH (II)

Statement 2: The negative charge of the conjugate base of (II) cannot be delocalised through the benzene ring

263

Statement 1: $(\text{KOO} - \text{CH} = \text{CH} - \text{COOK})$ undergoes Kolbe's reaction to form a product which reacts with ammoniacal AgNO_3 solution to form a precipitate

Statement 2: The product is a saturated hydrocarbon that forms salt with AgNO_3

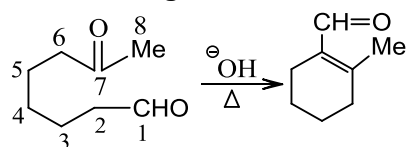
264

Statement 1: Highly branched carboxylic acids are more acidic than unbranched acids

Statement 2: Hydrogen bonding in carboxylic acids is stronger than alcohols

265

Statement 1: The following intramolecular aldol reaction occurs



Statement 2: (CHO) is a better acceptor than $(\text{C}=\text{O})$

266

Statement 1: β -Hydroxy propanoic acid on heating gives acrylic acid

Statement 2: Acrylic acid exists in two diastereomers

267

Statement 1: CH_3^- adds to $>\text{C}=\text{O}$ $\text{C}=\text{O}$ group irreversibly but CN^- ion adds reversibly

Statement 2: CH_3^- ion is much stronger nucleophile than CN^- ion

268

Statement 1: Halogen acids donot add on to carbonyl bond

Statement 2: Addition depends upon the polarization of HX and carbonyl bond

269

Statement 1: Both HCOOH (I) and CH_3COOH (II) give precipitate with aqueous AgNO_3 solution soluble in HNO_3

Statement 2: HCOOH gives positive Tollens test

270

Statement 1: The second dissociation constant of maleic acid is greater than Fumaric acid

Statement 2: Higher the dissociation constant of acid more is acidic character

271

Statement 1: The reaction of MeCOCl with Me_2CuLi or Me_2Cd gives acetone but with MeMgBr a 3° alcohol ($\text{Me}_3\text{C} - \text{OH}$) is formed

Statement 2: (C-Mg) bond is more ionic than (C-Cu) or (C-Cd) bond. Me group of MeMgBr is more nucleophilic and is much more reactive

Me_2CuLi or Me_2Cd does not react by nucleophilic addition reaction

272

Statement 1: Friedel-Craft's reaction between benzene and acetic anhydride in the presence of anhydrous AlCl_3 yields acetophenone and not polysubstituted products

Statement 2: Acetophenone formed poisons and catalyst preventing further reaction

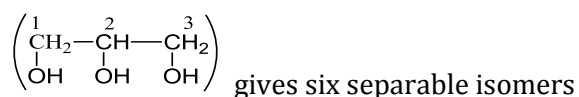
273

Statement 1: Acetic acid does not undergo haloform reaction

Statement 2: Acetic acid has no α -hydrogen

274

Statement 1: The reaction of 1 mol each of ($\text{MeCH}=\text{O}$) with glycerol



Statement 2: Acetaldehydes react with 1- and 2-OH group of glycerol to form five-membered cyclic acetal. In the ring closure, two chiral centres are formed and thus we have two pairs of enantiomers: *cis* and *trans*

When acetaldehydes react with 1-and 3-OH groups, a six-membered cyclic acetal is formed giving two diastereomeric products (*cis* and *trans*). These diastereomers are achiral

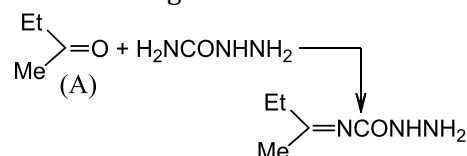
275

Statement 1: *p*-Hydroxybenzoic acid has a lower boiling point than *o*-hydroxybenzoic acid

Statement 2: *o*-Hydroxybenzoic acid has intramolecular hydrogen bonding

276

Statement 1: The following reaction occurs:



Statement 2: The semicarbazone of (A) (pentan-2-one) exists in two geometrical isomers

277

Statement 1: In sodium formate, both the C-O bonds have same value 1.27 Å

Statement 2: Same bond length is due to the phenomenon of resonance

278

Statement 1:
 $R - C \equiv O^+$ is more stable than $R - \overset{+}{C} = O$.

Statement 2: Resonance in carbonyl compound provides C^+ and O^-

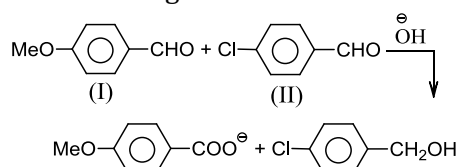
279

Statement 1: Pentan-3-one an reaction with $NaHSO_3$ gives sodium bisulphite adduct product

Statement 2: (C=O) group of pentan-3-one is sterically hindered and nucleophile SO_3^{2-} is also of large size, so nucleophilic addition reaction does not occur

280

Statement 1: The following cross Cannizzaro reaction occurs



Statement 2: Rate of reaction is:

Rate = K [Aldehyde] (I) [Aldehyde] (II) $[OH^-]$ and bimolecular

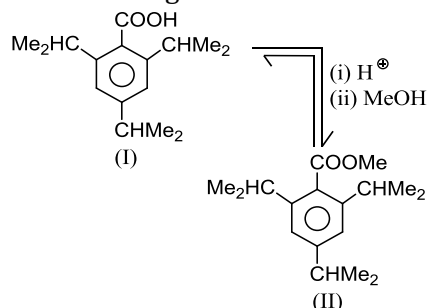
281

Statement 1: The equilibrium constant for cyanohydrin formation is $\approx 10^{13}$ times greater for cyclohexanone than for cyclopentanone

Statement 2: For a five-membered ring, reactions are more favourable when a ring C changes from sp^3 to sp^2 because eclipsing interactions are removed

282

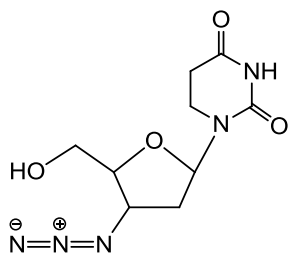
Statement 1: The following reaction occurs



Statement 2: Acylium ion is resonance stabilised

283

Statement 1: AZT (azidothymine) is used to treat AIDS patients. It fights AIDS infection but does not cure it



Statement 2: It shows acidic property

284

Statement 1: Acetic acid on reaction with hydrazoic acid (N_3H) in the presence of H_2SO_4 followed by heating and hydrolysis in basic medium gives acetamide

Statement 2: Methyl isocyanate ($\text{Me}-\text{N}=\text{C}=\text{O}$) is formed as an intermediate compound

285

Statement 1: Oximes $\left(\begin{array}{c} \text{R} \\ \diagup \\ \text{C}=\text{N}-\text{OH} \\ \diagdown \\ \text{R} \end{array} \right)$ are more acidic than hydroxylamine (NH_2OH)

Statement 2: Conjugate base of oxime is resonance stabilised

286

Statement 1: Pure acetic acid is converted into ice like solid called glacial acetic acid

Statement 2: Acetic acid is stronger than HCOOH

287

Statement 1: α -hydrogen atoms in aldehydes and ketones are acidic

Statement 2: The anion left after the removal of α -hydrogen is stabilised by inductive effect

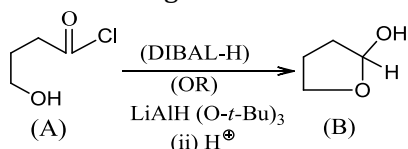
288

Statement 1: Benzoic acid does not give Friedel-Craft's reaction

Statement 2: Benzoic acid is obtained by catalytic oxidation of toluene with air in presence of Co-Mn catalyst

289

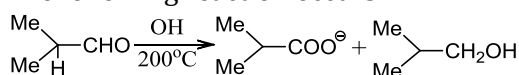
Statement 1: The following reaction occurs



Statement 2: The product is a stable cyclic hemiacetal formed by the anion of (A) product of the reduction. In the ring closure, a chiral centre is formed. thus (B) is a racemate

290

Statement 1: The following reaction occurs

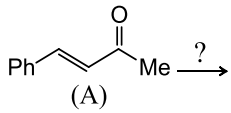
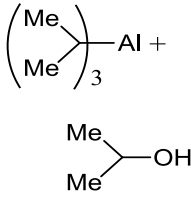
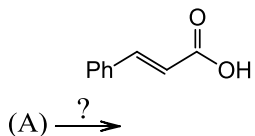
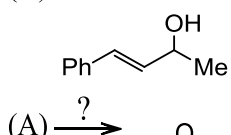
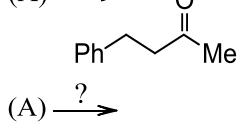
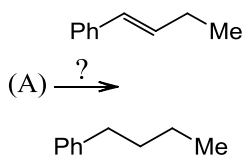


Statement 2: Undergoes disproportionation reaction since the mobility of α -H atom is arrested by the steric effect of the two bulky methyl groups

Matrix-Match Type

This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**.

291.

Column-I	Column- II
(A) 	(p) 
(B) 	(q) $\text{NH}_2\text{NH}_2 + \text{OH}^\ominus$
(C) 	(r) $\text{ClO}^\ominus + \text{H}_3\text{O}^\oplus$
(D) 	(s) (i) Zn-Hg/HCl , (ii) $\text{H}_2 + \text{Pt}$
(E) 	(t) $\text{K} + \text{Liq. NH}_3, \text{EtOH}$

CODES :

	A	B	C	D	E
a)	S	q	p	r	t
b)	r	p	t	q	t
c)	p	q	r	s	t
d)	s	t	q	v	t
e)	q	p	r	s	t

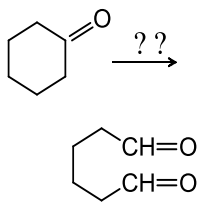
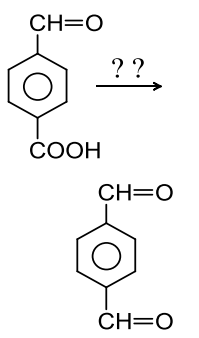
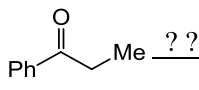
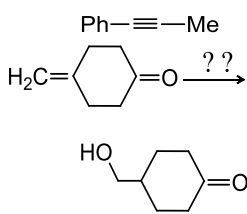
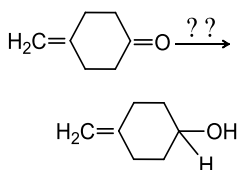
292. Match the name of the following reactions

Column-I	Column- II
(A) (I)	(p) Lossen
(B) (II)	(q) Hofmann bromamide
(C) (III)	(r) Claisen-Schmidt rearrangement
(D) (IV)	(s) Curtius

CODES :

	A	B	C	D
a)	p	s	r	q
b)	q	p	s	r
c)	s	r	q	p
d)	r	q	r	s

293.

Column-I	Column- II
(A) 	(p) i. Glycol+HCl; ii. SOCl ₂ iii. DIBAL-H; iv. H ₃ O ⁺
(B) 	(q) i. NaBH ₄ /EtOH
(C) 	(r) i. LAH; ii. Conc. H ₂ SO ₄ /Δ iii. O ₃ /Zn – AcOH
(D) 	(s) i. PCl ₅ ; ii. 2NaNH ₂
(E) 	(t) i. BH ₃ /THF, ii. H ₂ O ₂ /OH ⁻

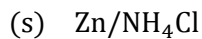
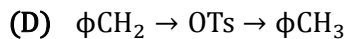
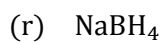
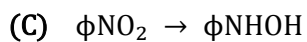
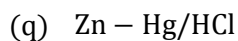
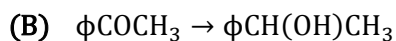
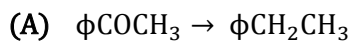
CODES :

	A	B	C	D	E
a)	P	q	r	s	t
b)	t	r	s	p	t
c)	r	p	s	t	t
d)	p	q	r	s	t
e)	t	s	r	p	t

294. Match the following

Column-I

Column- II



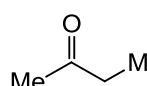
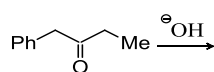
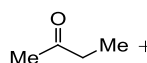
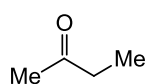
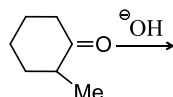
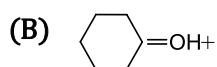
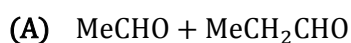
CODES :

	A	B	C	D
a)	b	c	d	a
b)	b	a	d	c
c)	b	a	c	d
d)	a	b	d	c

295.

Column-I

Column- II

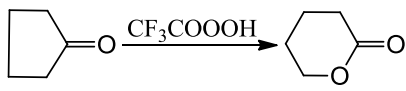


CODES :

	A	B	C	D	E
a)	P	q	r	s	t
b)	t	s	r	p	t
c)	s	t	q	p	t
d)	q	q	p	r	t

e) t r s p t

296.

Column-I	Column- II
(A) 	(p) Schmidt
(B) $RCOOH \rightarrow RCH_2COOH$	(q) Baeyer Villiger
(C) $RCOOH \xrightarrow[H_2O]{N_3H} RNH_2$	(r) Arndt Eistert

CODES :

	A	B	C	D
a)	a	b	c	
b)	c	b	a	
c)	b	c	a	
d)	none			

297.

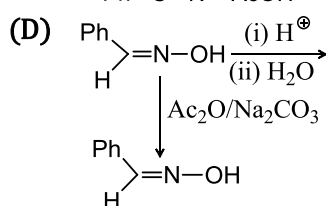
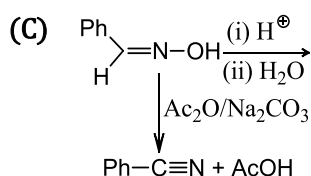
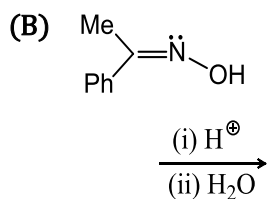
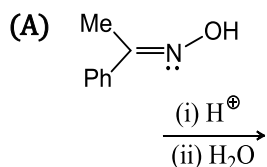
Column-I	Column- II
(A) $CH_3COOH + C_2H_5OH \xrightleftharpoons{H^+}$	(p) Transacylation
(B) $MeCOOC_2H_5 + n - C_5H_{11}OH \xrightleftharpoons{H^+}$	(q) Esterification
(C) $RCOOR' + NH_3 \rightarrow$	(r) Transesterification
(D) $RCOCl + 2Me_2NH \rightarrow$	(s) Nucleophilic acyl substitution
(E) $RCONHOH \xrightarrow{OH^-} ? \xrightarrow{H_3O^+}$	(t) Rearrangement

CODES :

	A	B	C	D
a)	Q,s	r,s	p,s	p,s
b)	r, s	p,s	q,s	q,r
c)	p,s	q,s	q,r	t
d)	q,r	u	q,s	r,s

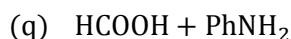
298.

Column-I	Column- II
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CODES :

	A	B	C	D
a)	R	p	s	q
b)	s	t	p	q
c)	p	q	r	s
d)	p	r	s	t



299. Match the following List I and List II.

Column-I

- (A) Grignard reagent
 (B) Clemmensen reduction
 (C) Rosenmund reduction
 (D) Wolff-Kishner reduction

Column- II

- (1) $\text{H}_2/\text{Pd} - \text{BaSO}_4$
 (2) $\text{N}_2\text{H}_4|\text{KOH}|\text{CH}_2 - \text{OH}$
 $\quad \quad \quad |$
 $\quad \quad \quad \text{CH}_2 - \text{OH}$
 (3) CH_3MgX
 (4) $\text{Zn-Hg}|\text{conc. HCl}$
 (5) $\text{H}_2|\text{Ni}$

CODES :

	A	B	C	D
a)	3	4	2	1
b)	3	4	1	2
c)	2	1	4	5

d) 5 3 2 1

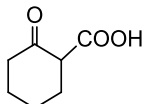
300. Match the list

Column-I	Column- II
(A) $\phi - \overset{\text{O}}{\underset{\text{O}}{\parallel}}\text{C} - \overset{\text{O}}{\underset{\text{O}}{\parallel}}\text{C} - \phi \xrightarrow{\text{OH}^-}$	(p) Aldol
(B) $R\text{CHO} + R\text{CHO} \xrightarrow{\text{OH}^-}$	(q) Cannizaro
(C) $2 \text{ (furan-2-yl)CHO} \xrightarrow{\text{OH}^-}$	(r) Tischenko
(D) $2R\text{CHO} \xrightarrow{(\text{C}_2\text{H}_5\text{O})_3\text{Al}}$	(s) Benzilic acid rearrangement

CODES :

	A	B	C	D
a)	b	a	c	d
b)	d	a	b	c
c)	c	a	b	d
d)	b	a	d	c

301.

Column-I	Column- II
(A) $\text{Br}_3\text{C} - \text{COOH} \xrightarrow[\Delta]{\text{Dil. NaOH}}$	(p) $\text{CHBr}_3 + \text{CO}_2$
(B) $\text{Br}_3\text{C} - \text{COOH} \xrightarrow[\Delta]{\text{Conc. NaOH,}}$	(q) $\text{HCOONa} + \text{CO} + 2\text{Br}^\ominus$
(C) $\text{F}_3\text{C} - \overset{\text{O}}{\parallel}\text{C} - \text{CH}_2 - \text{COOH} \xrightarrow{\Delta}$	(r) $:\text{CBr}_2$
(D) $\text{O}_2\text{N} - \text{CH}_2 - \text{COOH} \xrightarrow{\Delta}$	(s) CO_2
(E) 	(t) No reaction

CODES :

	A	B	C	D	E
a)	Q,r	t	s	p	t
b)	p	q,r	t	s	t
c)	t	p	q	r	t
d)	p,s	q	r	t	t

302. Match the following

Column-I	Column- II
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- (A) Claisen condensation
 (B) Allylic bromination
 (C) Fries rearrangement
 (D) Wolff rearrangement

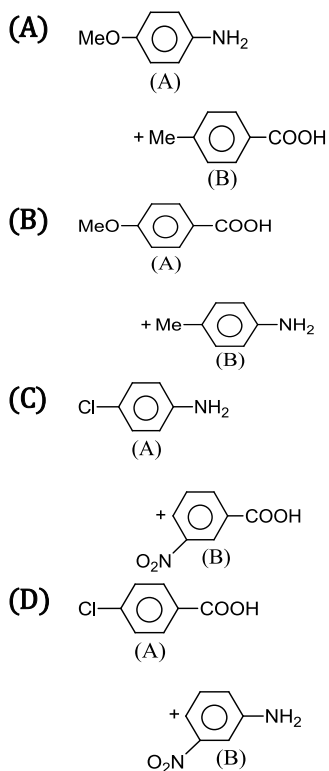
CODES :

	A	B	C	D
a)	b	a	c	d
b)	b	a	d	c
c)	a	b	c	d
d)	a	b	d	c

- (p) Free radical
 (q) Carbon anion
 (r) Alkyl migration
 (s) Acyl migration

303.

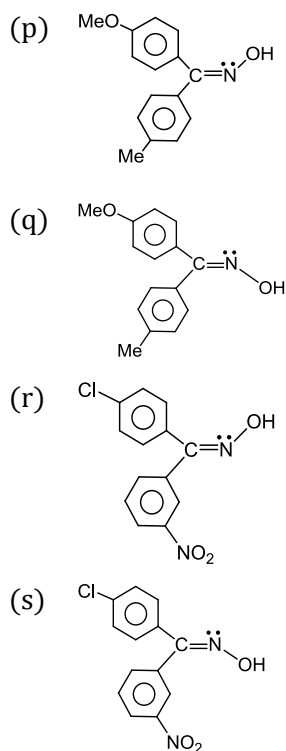
Column-I



CODES :

	A	B	C	D
a)	Q	p	s	r
b)	p	q	r	s
c)	s	r	p	q
d)	t	s	r	p

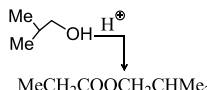
Column- II



304.

Column-I

Column- II

- (A) Salicylic + $\text{CH}_3\text{OH} \xrightarrow{\text{H}^\oplus}$ Methyl salicylate (p) Rum flavour
- (B) $\text{MeCOOH} + \text{PhCH}_2\text{OH} \xrightarrow{\text{H}^\oplus} \text{MeCOOCH}_2\text{Ph}$ (q) Oil of wintergreen (Flavouring agents)
- (C) $\text{MeCH}_2\text{COOH} + n - \text{C}_5\text{H}_{11}\text{OH} \xrightarrow{\text{H}^\oplus} \text{MeCOOC}_5\text{H}_{11}$ (r) Jasmine odour
- (D) $\text{MeCH}_2\text{COOH} +$

 $\text{MeCH}_2\text{COOCH}_2\text{CHMe}_2$ (s) Banana oil flavour

CODES :

	A	B	C	D
a)	q	r	s	p
b)	r	s	p	q
c)	s	q	p	r
d)	p	s	q	r

305. Match list-I with list-II and choose the correct answer from the codes

Column-I

Column- II

- (A) CH_3CONH_2 and PCl_5 (1) Acid strengthening
- (B) $-\text{NO}_2$ group (2) Optically active
- (C) Lactic acid (3) Hydrogen is liberated
- (D) CH_3COOH and Na (4) Acetonitrile

CODES :

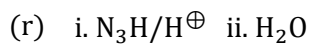
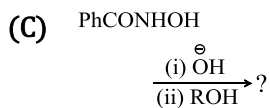
	A	B	C	D
a)	1	2	3	4
b)	4	1	2	3
c)	4	1	3	2
d)	3	1	2	4

306.

Column-I

Column- II

- (A)  (p) i. PCl_5 or ArSO_3H ii. H_2O
- (B)  (q) Isocyanate



(s) Carbamate ester

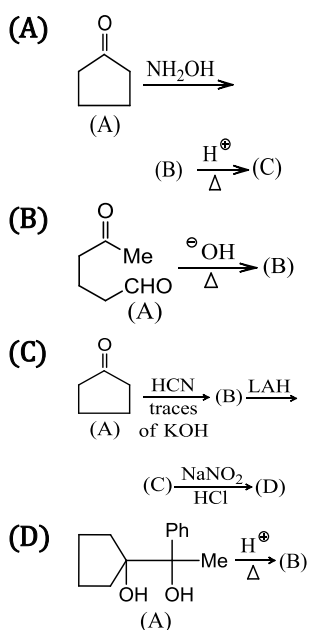
(t) Acyl nitrene

CODES :

	A	B	C	D	E
a)	Q,r	t	s	p	t
b)	p	q,r	t	s	t
c)	t	p	q	r	t
d)	p,s	q	r	t	t

307.

Column-I



Column- II

(p) Final product is α, β -unsaturated ketone or ketone

(q) Formation of six-membered ring takes place

(r) Final product will give positive Tollens test

(s) Ring expansion takes place

(t) Final product gives positive test with Brady's reagent

CODES :

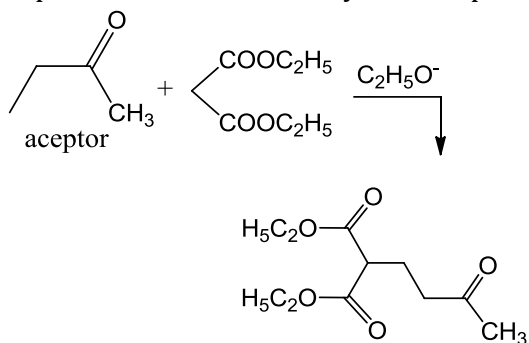
	A	B	C	D
a)	P,q	s,t,r	q,p,r,s	q,r
b)	q,s	p,q,t	p,q,s,t	p,q,s,t
c)	p,q,r,s	t,s,p	p,q	s,t,r
d)	q,r,s	p,t	q,s	p,q,s

Linked Comprehension Type

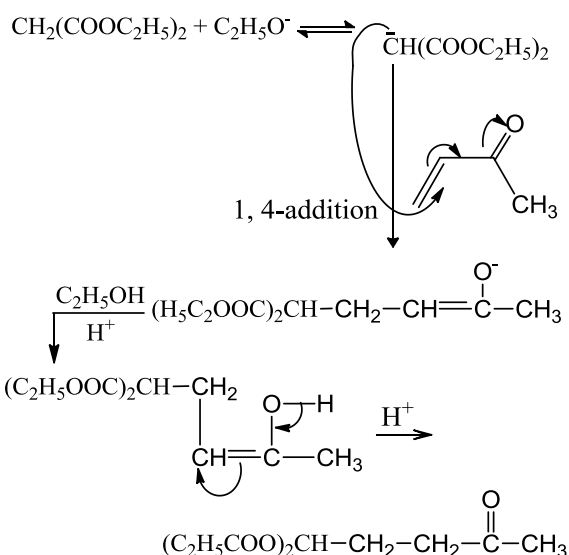
This section contain(s) 44 paragraph(s) and based upon each paragraph, multiple choice questions have to be answered. Each question has atleast 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

Paragraph for Question Nos. 308 to -308

The 1, 4-addition of active methylene compounds to α, β -unsaturated compounds in the presence of base (sodium ethoxide or piperidine) is referred as 'Michael addition'. The α, β -unsaturated compound is regarded as acceptor while reactive methylene compound as donor



The mechanism of the reaction is given as,



308. Which of the following statements is correct?

- The protic solvent with alkoxide bases are used in the above reaction
- Side reactions include Knoevenagel and aldol condensation
- Enolate ion is formed during the reaction
- All of the above are correct

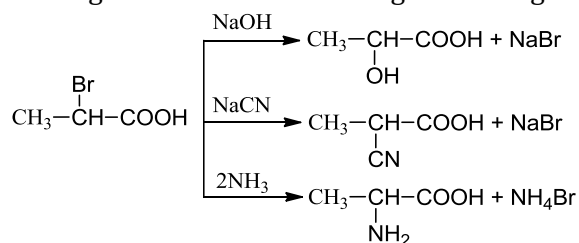
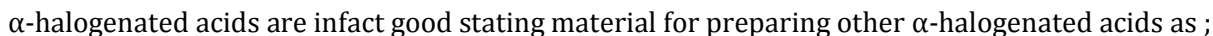
Paragraph for Question Nos. 309 to -309

Ethanal is heated with a base in two separate test tubes. In one test tube nothing except the two mentioned reactants were present. In second test tube, malonic acid, $\text{CH}_2(\text{COOH})_2$ was also added. The final products of both test tubes easily add 1, 3-butadiene molecule. The product obtained in the first test tube can be converted into product, identical in all respect, with that obtained in the second test tube

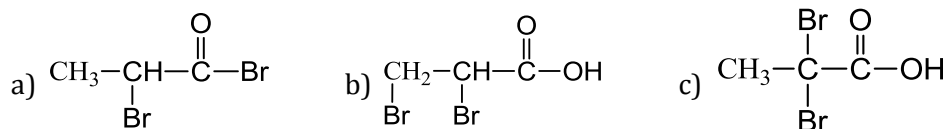
309. The respective reaction involved in the two test tubes are

- Aldol condensation and Cannizzaro reaction
- Aldol condensation and Perkin reaction
- Aldol condensation and Knoevenagel reaction
- Aldol condensation and Claisen condensation

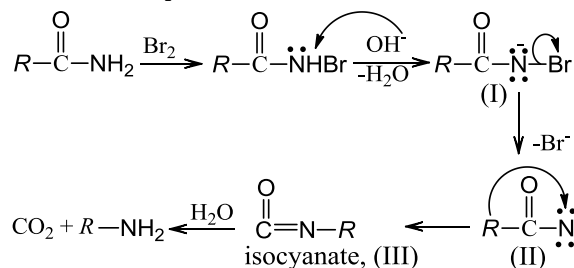
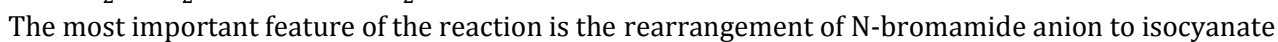
Hell-Volhard-Zelinsky (HVZ) reaction involves the reaction of aliphatic carboxylic acid with bromine in the presence of a trace of PBr_3 to form α -bromocarboxylic acid



d) Both (b) and (c)



The conversion of an amide to an amine with one carbon atom less by the action of alkaline hydrohalite is known as Hofmann degradation



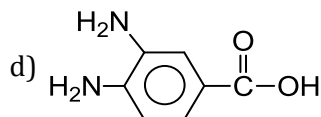
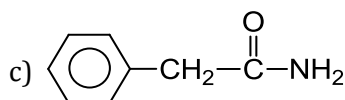
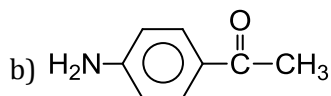
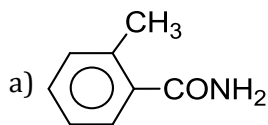
311. Which step is the driving force in the above reaction to produced in right direction?

- a) Conversion of (I) to (II) b) Conversion of (II) to (III)
c) Conversion of (III) to RNH_2 d) All of the above

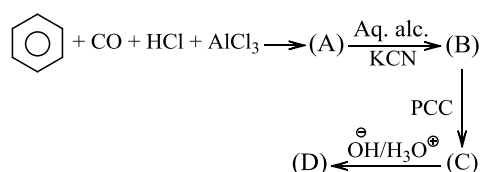
An organic compound (*A*) of molecular weight 135 on boiling with NaOH evolves a gas which gives white dense fumes on bringing a rod dipped in HCl near it. The alkaline solution thus, obtained on acidification gives the precipitate of a compound (*B*) having molecular weight 136. Treatment of (*A*) with HNO_2 also yields(*B*), whereas its treatment with Br_2/KOH gives(*C*). Compound (*C*) reacts with cold HNO_2 to give(*D*), which gives red colour with ceric ammonium nitrate. On the other hand, (*E*), an isomer of (*A*) on boiling with dilute HCl gives an acid (*F*) having molecular weight 136. On oxidation, followed by heating, (*F*) gives an anhydride (*G*)

which condenses with benzene in presence of AlCl_3 to give anthraquinone

312. Structural formula of compound (A) is



Paragraph for Question Nos. 313 to - 313



313. Compound (A) is:

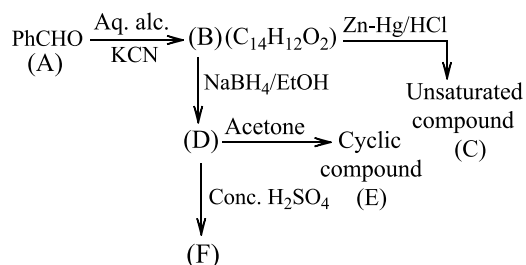
a) PhCHO

b) PhCOOH

c) PhCOMe

d) PhCOCl

Paragraph for Question Nos. 314 to - 314



314. The conversion of (A) to (B) is called:

a) Pinacol-Pinacolone rearrangement reaction:

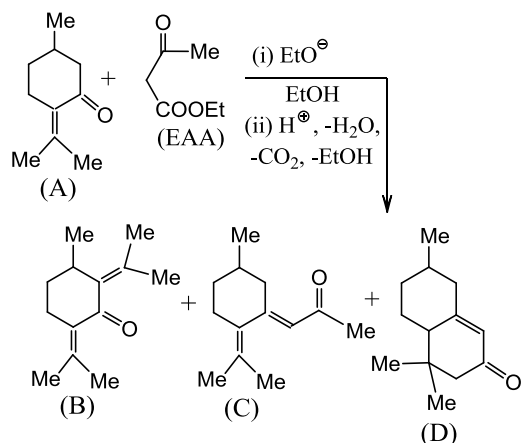
b) Benzoin condensation

c) Claisen-Schmidt reaction

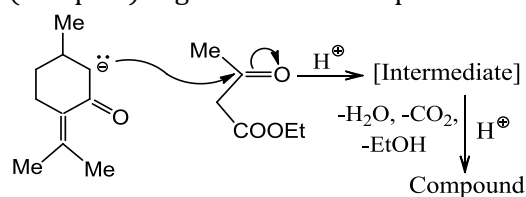
d) Cannizzaro reaction

Paragraph for Question Nos. 315 to - 315

Consider the following reaction in which compound (A) on reaction with EAA ($\text{MeCOCH}_2\text{COOEt}$) in the presence of NaOEt/EtOH gives a product which on hydrolysis and decarboxylation can give three compounds by different mechanisms:

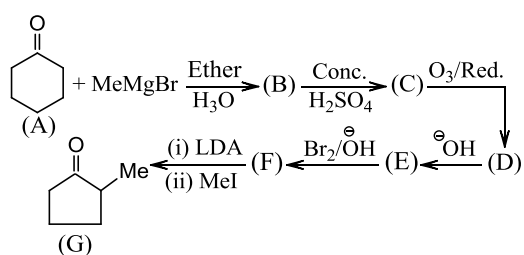


315. One of the mechanisms in which an aldol addition by the carbanion of (A) takes place on the ($\text{C}=\text{O}$) of EAA (acceptor) is given below. Compound formed by this mechanism is :



- a) Compound (B) b) Compound (C) c) Compound (D) d) Compound (A)

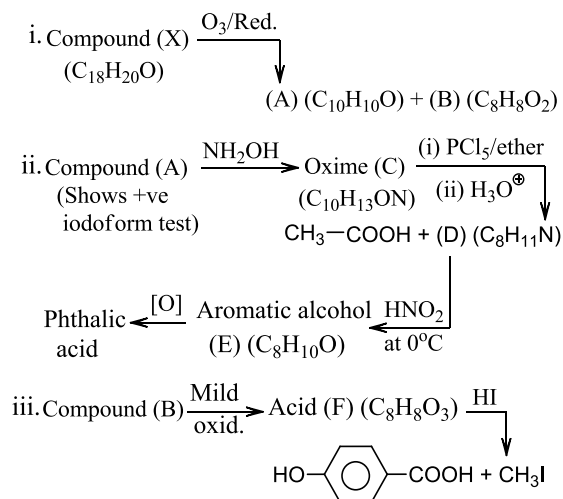
Paragraph for Question Nos. 316 to - 316



316. Compound (C) is:

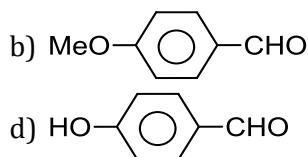
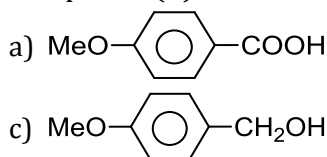
- a) b) c) d)

Paragraph for Question Nos. 317 to - 317



iv. Compound (X) has the highest melting point among its isomers.

317. Compound (B) is:

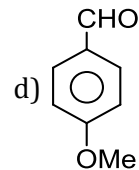
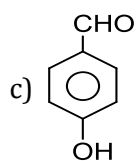
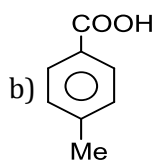
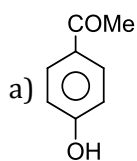


Paragraph for Question Nos. 318 to - 318

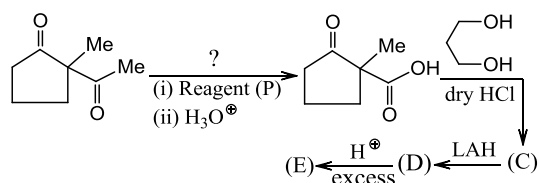
Five isomeric *p*-substituted aromatic compounds (A) to (E) with molecular formula $\text{C}_8\text{H}_8\text{O}_2$ are given for identification. Based on the following observation, give the structures of the compounds.

- Both (A) and (B) form a silver mirror with Tollens reagent, (B) also gives a positive test with neutral FeCl_3 solution
- (C) gives positive iodoform test
- (D) is readily extracted in aqueous NaHCO_3 solution
- (E) on acid hydrolysis gives 1,4-dihydroxy benzene

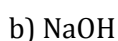
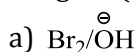
318. Compound (A) is:



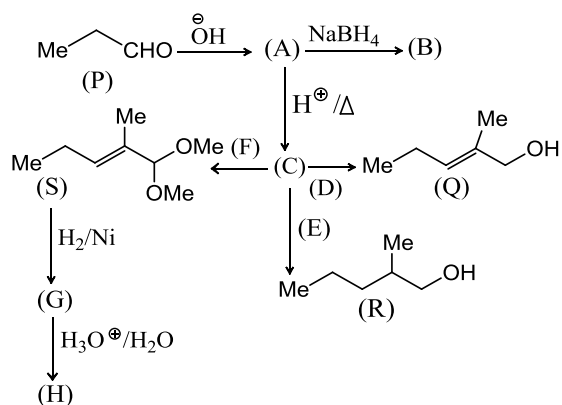
Paragraph for Question Nos. 319 to - 319



319. Reagent (P) is:



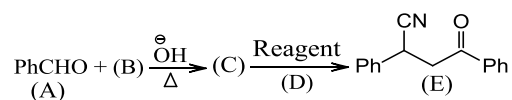
Paragraph for Question Nos. 320 to - 320



320. Compound (A) is:

- a) MeCH2CH(OH)CH2CH2CHO b) MeCH2C(=O)CH2CH2Me c) MeCH2CH(OH)CH(Me)CHO d) MeCH2C(=O)CH2CH2CHO

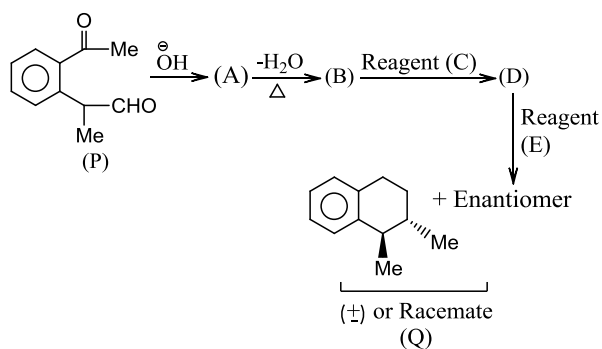
Paragraph for Question Nos. 321 to - 321



321. Compound (B) is:

- a) PhCH2CHO b) PhCOCH3 c) PhCOCH2CH3 d) None

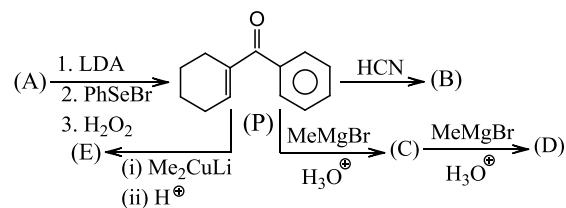
Paragraph for Question Nos. 322 to - 322



322. Compound (A) is:

- a) MeC(=O)C1=CC=CC=C1C(=O)C1=CC=CC=C1 b) MeC(=O)C1=CC=CC=C1C(=O)C1=CC=CC=C1 c) MeC(=O)C1=CC=CC=C1C(=O)C1=CC=CC=C1 d) MeC(=O)C1=CC=CC=C1C(=O)C1=CC=CC=C1

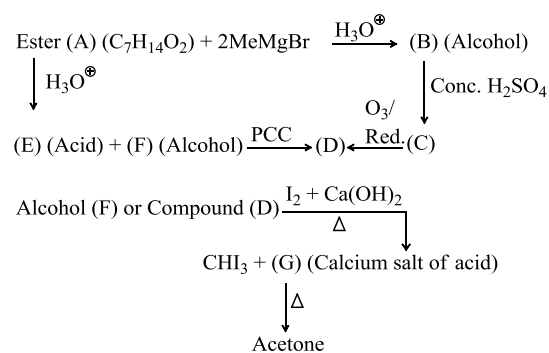
Paragraph for Question Nos. 323 to - 323



323. Compound (A) is:



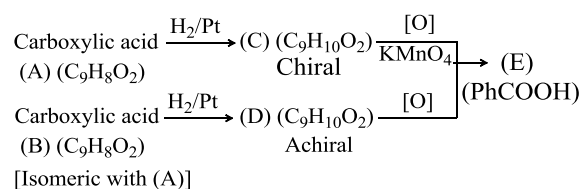
Paragraph for Question Nos. 324 to - 324



324. Ester (A) is:



Paragraph for Question Nos. 325 to - 325



325. Carboxylic acid (A) is:



Paragraph for Question Nos. 326 to - 326

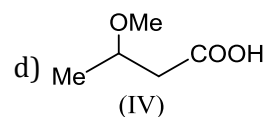
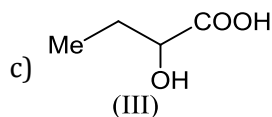
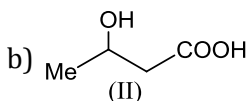
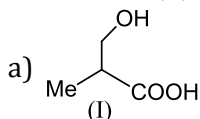
Four isomeric optically active compounds $\xrightarrow{\text{NaHCO}_3}$ CO_2 (g) (A, B, C, D) ($\text{C}_4\text{H}_8\text{O}_3$)

Compound (A) $\xrightarrow{\text{LAH}}$ (E) (Achiral compound)

Compound (B) $\xrightarrow[\text{or CrO}_3]{\text{KMnO}_4}$ Inert to oxidation

Compound (C) $\xrightarrow{\text{NaOI/H}_3\text{O}^+}$ CHI_3 (Yellow ppt) + Compound (F)

326. Compound (A) is:



Paragraph for Question Nos. 327 to - 327

i. Carboxylic acid (A) ($\text{C}_9\text{H}_{10}\text{O}_3$) $\xrightarrow[\text{KMnO}_4]{[\text{O}]}$ PhCOOH

$\downarrow \text{HBr}$

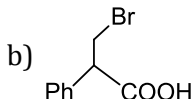
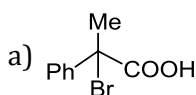
(B) $\text{C}_9\text{H}_9\text{O}_2\text{Br} \xrightarrow{\text{alc.KOH}}$ (C) $\xrightarrow{\text{H}_2/\text{Pd}}$ (D)

ii. Compound (D) is prepared by carbonation

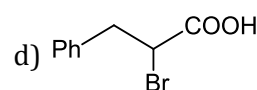
(Mg/ether, $\text{CO}_2/\text{H}_3\text{O}^+$) of compound

iii. Compounds (A) and (D) give positive test with CrO_3 in acid

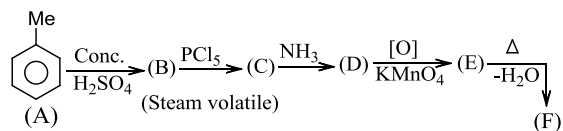
327. Compound (A) is:



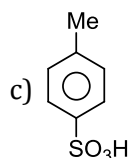
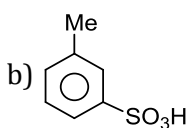
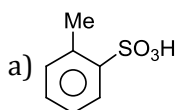
c) Both (a) and (b)



Paragraph for Question Nos. 328 to - 328

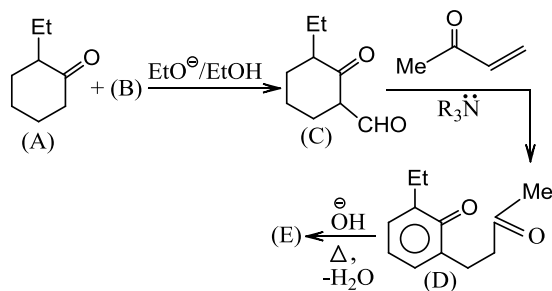


328. Compound (B) is:



d) Both (a) and (c)

Paragraph for Question Nos. 329 to - 329

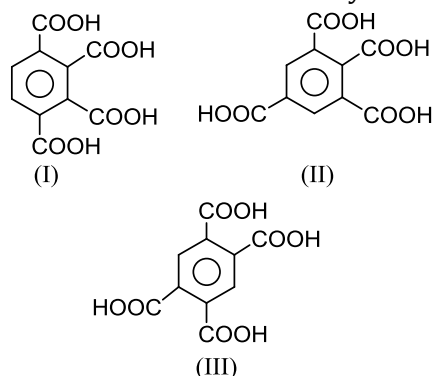


329. Compound (B) is:

- a) $\text{CH}_2 = \text{O}$ b) HCOOMe c) HCOOEt d) Both (b) and (c)

Paragraph for Question Nos. 330 to - 330

Three isomeric tetracarboxylic acids (I), (II), and (III) are given



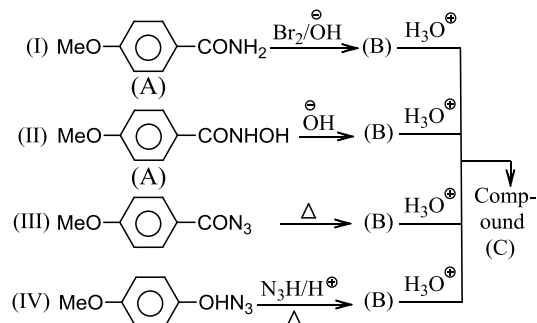
They can be distinguished by anhydride formation by treating with one equivalent and two equivalents of SOCl_2

330. Which tetracarboxylic acid on reaction with one equivalent of SOCl_2 gives two isomeric monoanhydrides?

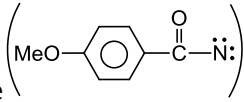
- a) (I) b) (II) c) (III) d) All

Paragraph for Question Nos. 331 to - 331

For rearrangement reactions are given:



331. Which statement(s) is/are wrong about the reaction?

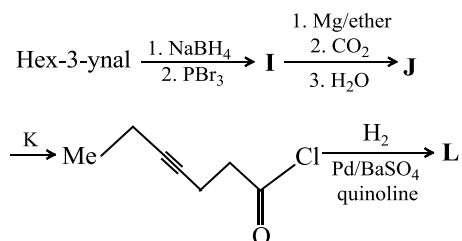
- a) All the reaction proceed *via* the formation of acyl nitrene  as intermediate
b) All the reactions proceed *via* the formation of alkyl isocyanate as the intermediate compound

c) In all the reaction, the product (C) is *p*-methoxy aniline

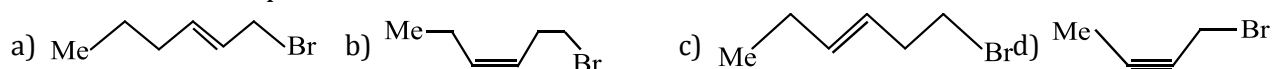
d) In all the reaction, the product (C) is aniline

Paragraph for Question Nos. 332 to - 332

In the following sequence products I, J and L are formed K represents a reagent.

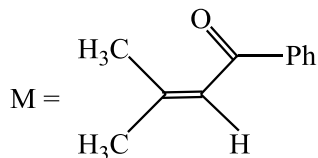


332. The structure of the product I is:

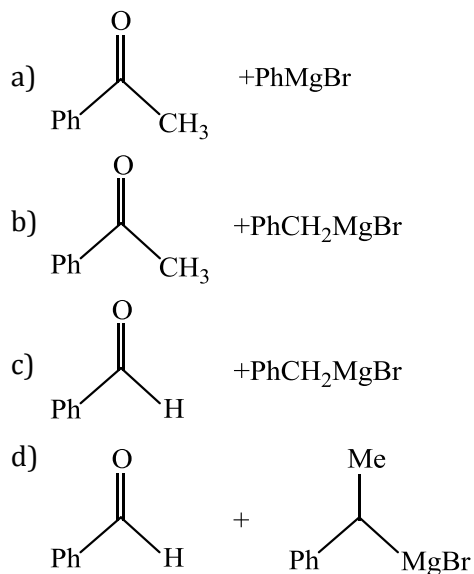


Paragraph for Question Nos. 333 to - 333

A tertiary alcohol H upon acid catalyzed dehydration gives a product I. Ozonolysis of I leads to compounds J and K. Compound J upon reaction with KOH gives benzyl alcohol and a compound L, whereas K on reaction with KOH gives only M.



333. Compound H is formed by the reaction of:



: ANSWER KEY :

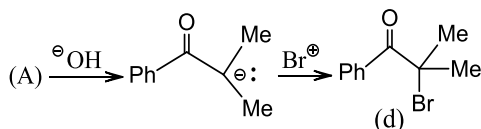
1)	b	2)	d	3)	b	4)	a	13)	c,d	14)	a	15)	a	16)	
5)	a	6)	c	7)	a	8)	a		a,b,d						
9)	b	10)	a	11)	b	12)	b	17)	a,d	18)	b,c	19)	b,c	20)	
13)	d	14)	c	15)	a	16)	b		a,d						
17)	b	18)	c	19)	b	20)	a	21)	a,c	22)	a,c	23)	a,b,d	24)	
21)	c	22)	d	23)	c	24)	b		a,b,c						
25)	b	26)	d	27)	b	28)	c	25)	a,b,c	26)	a,b,c,d	27)	a,b,c,d	28)	
29)	d	30)	d	31)	a	32)	b		a,c						
33)	b	34)	c	35)	b	36)	b	29)	a,c	30)	a,c	31)	a,d	32)	
37)	b	38)	c	39)	c	40)	c		a,b,d						
41)	a	42)	a	43)	d	44)	b	33)	b,c	34)	a,b,c	35)	b,d	36)	
45)	a	46)	c	47)	d	48)	b		a,c						
49)	b	50)	d	51)	d	52)	b	37)	a	38)	a,d	39)	a,b,d	40)	
53)	b	54)	a	55)	c	56)	a		a,b,c						
57)	a	58)	a	59)	c	60)	c	41)	a,b,c	42)	b,c,d	43)	a,b,d	44)	
61)	d	62)	b	63)	b	64)	c		b,c,d						
65)	d	66)	b	67)	c	68)	c	45)	a,c,d	46)	a,d	47)	a,b,c,d	48)	
69)	c	70)	c	71)	b	72)	b		a,c						
73)	d	74)	a	75)	c	76)	a	49)	b,d	50)	a,c,d	51)	a,b,c	52)	
77)	a	78)	d	79)	c	80)	b		a,c						
81)	a	82)	b	83)	b	84)	b	53)	a,c,d	54)	d	55)	a,b	56)	
85)	b	86)	d	87)	c	88)	c		c,d						
89)	a	90)	d	91)	c	92)	c	57)	a,b,c	58)	a,b,d	59)	c,d	60)	
93)	d	94)	b	95)	d	96)	d		a,b,c						
97)	a	98)	a	99)	c	100)	c	61)	a,b,c	62)	b,c	63)	a,c	64)	b
101)	b	102)	b	103)	c	104)	c	65)	a,b	66)	a,c	67)	a,b,c	68)	
105)	c	106)	b	107)	d	108)	a		a,d						
109)	a	110)	b	111)	b	112)	a	69)	b,c	70)	b,d	71)	a,b	72)	
113)	b	114)	c	115)	d	116)	b		b,c						
117)	b	118)	a	119)	a	120)	b	73)	a,c,d	74)	a,b,d	75)	a,b,d	76)	
121)	c	122)	c	123)	c	124)	b		a,b						
125)	c	126)	d	127)	b	128)	b	77)	a,c,d	78)	b,c	79)	b	80)	
129)	a	130)	c	131)	c	132)	a		a,c,d						
133)	b	134)	d	135)	c	136)	b	81)	a,d	82)	a,b,c,d	83)	b,d	84)	
137)	a	138)	a	139)	a	140)	d		c,d						
141)	b	142)	d	143)	b	144)	a	85)	a	86)	b	87)	a,c	88)	
145)	c	146)	d	147)	b	148)	a		a,c,d						
149)	b	150)	b	151)	a	152)	b	89)	a,b,c	90)	a,d	91)	a,b,c,d	92)	
153)	d	154)	c	155)	a	156)	c		a,b,d						
157)	c	158)	d	159)	a	160)	a	93)	a,d	94)	a,c,d	1)	a	2)	d
161)	d	162)	b	163)	c	164)	d		3)	d	4)	d			
1)	b,d	2)	a,c	3)	a	4)		5)	c	6)	d	7)	d	8)	c
	b,c							9)	a	10)	b	11)	b	12)	d
5)	a,b,d	6)	a,d	7)	a,c	8)		13)	a	14)	c	15)	c	16)	a
	a,b							17)	d	18)	d	19)	a	20)	b
9)	a,c,d	10)	a,c	11)	c	12)		21)	d	22)	d	23)	a	24)	a
	b,d							25)	a	26)	d	27)	a	28)	c

29)	c	30)	b	31)	a	32)	a	5)	c	6)	a	7)	b	8)	a
1)	b	2)	b	3)	c	4)	a	9)	c	10)	b	11)	d	12)	d
5)	d	6)	c	7)	a	8)	a	13)	c	14)	b	15)	b	16)	a
9)	b	10)	b	11)	b	12)	b	17)	a	18)	b	19)	a	20)	b
13)	a	14)	a	15)	b	16)	b	21)	a	22)	d	23)	a	24)	d
17)	b	1)	d	2)	c	3)	c	25)	d	26)	b				
	4)	b													

: HINTS AND SOLUTIONS :

2 (d)

OH^- abstracts the α -H atom followed by electrophile (Br^+) addition



4 (a)

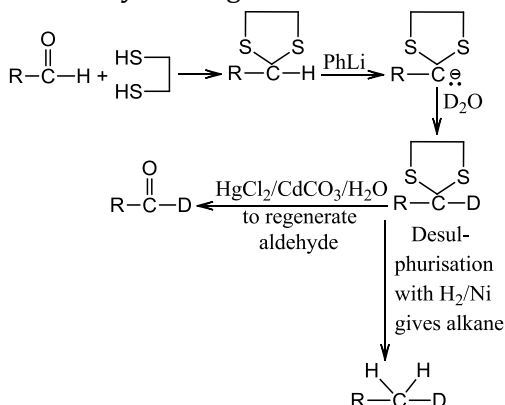
Acyl nucleophilic substitution order is $\text{RCOCl} > \text{ester} > \text{amide}$

5 (a)

Here, 2° ($-\text{OH}$) group would be sterically more hindered when ester with bulky (PhCO) group is formed. Hence, 1° ($-\text{OH}$) group reacts

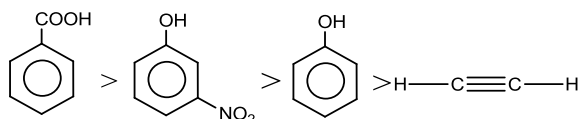
6 (c)

The ($\text{C}=\text{O}$) group is protected by converting into cyclic thioacetal and then an organometallic base like PhLi is used to generate carbanion followed by treatment with D_2O to incorporate D. Finally, the aldehyde is regenerated



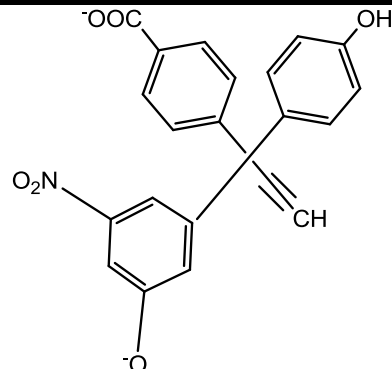
7 (a)

The acidic strength of the attached group is in the following order :



Note Due to attachment of electron attractive group acidic strength increases and carboxylic acids are more acidic than phenols.

The two moles of NH_2^- ions will abstract two moles of a most acidic hydrogen out of the four moles of hydrogen present per mole of the given acidic compounds. Hence, after abstraction of two moles of hydrogen and obtained product will be as shown

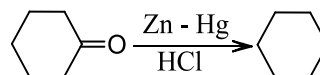


8 (a)

Arndt-Eistert reaction

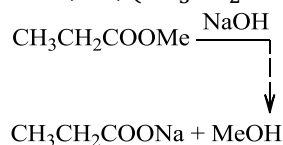
9 (b)

Clemmensen's reduction converts ($\text{C}=\text{O}$) to (CH_2)



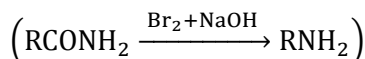
10 (a)

1 D.U. with 2 O atoms, and on hydrolysis gives salt of an acid and CH_3OH . So, compound is methyl ester, i.e., ($\text{CH}_3\text{CH}_2\text{COOMe}$)



11 (b)

Hofmann bromamide rearrangement reaction



12 (b)

1. (I) is more acidic than (II), so reaction occurs

2. (II) is more acidic than (I), so on reaction

3. (I) is more acidic than (II), so reaction occurs

4. (I) is more acidic than (II), so reaction occurs

13 (d)

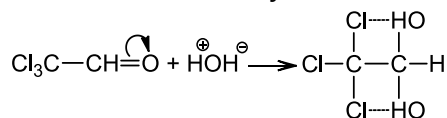
Aldol condensation

14 (c)

The esterification of an alcohol with RCOCl or with RCOOH is affected by steric hindrance. Bulky group on either alcohol or acid derivatives slow down the reaction. So, the esterification with diazomethane (CH_2N_2) is the best method

19 (b)

Chloral ($\text{Cl}_3\text{C}-\text{CHO}$) reacts with water to give stable chloral monohydrate.



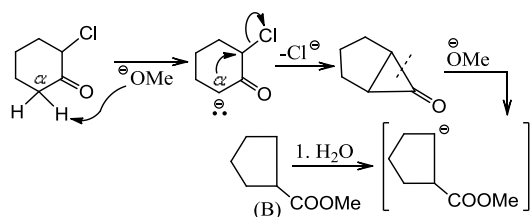
20 (a)

Acidic strength: d (acid) > c (diol) > b [H_2O_2 , (-I effect of O)] > a (1°ROH)

Basic strength is reverse, so (a) is basic

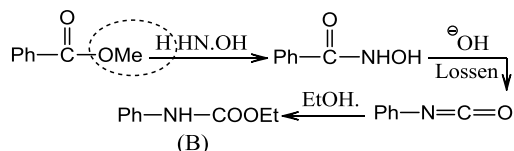
22 (d)

Favonskii reaction



23 (c)

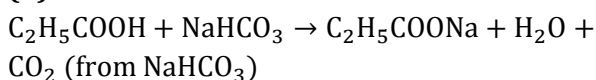
Lossen reaction



24 (b)

Lesser the steric hindrance, more easily the ester formed

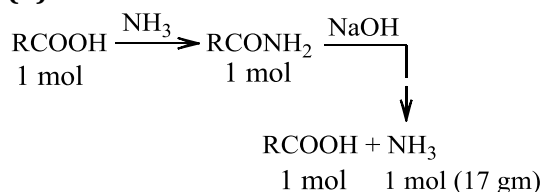
30 (d)



31 (a)

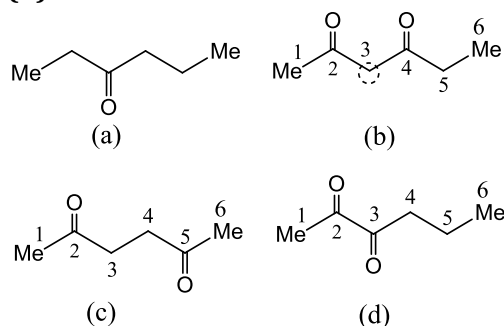
4-methyl benzene sulphonic acid is stronger than acetic acid thus, it will release acetic acid from sodium acetate.

32 (b)



$\text{RCONH}_2 = (\text{R} + \text{CONH}_2) = \text{R} + 44 = 59$, $\text{R} = 15$, $\text{R} = \text{CH}_3$. The acid is CH_3COOH

33 (b)



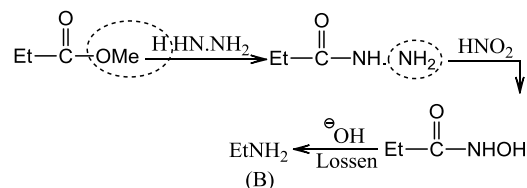
Here, (b) is most acidic because H atoms at C-3

are acidic due to two EWG ($\text{C}=\text{O}$) groups attached to C-3

Acidic order is: (b) > (c) > (d) > (a)

36 (b)

Lossen reaction



38 (c)

Statement is self-explanatory

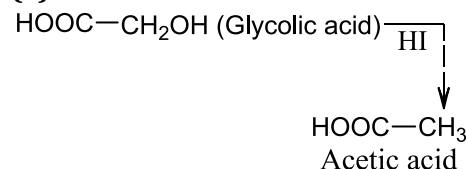
39 (c)

$^3(\text{CH}_2)$ is most acidic due to two electron-withdrawing ($\text{C}=\text{O}$) groups

41 (a)

1. Kolbe's electrolytic reaction gives ($\text{R}-\text{R}$)
2. Birnbaum-Simonini reaction gives ($\text{RCOOR} + \text{CO}_2 + 2\text{AgI}$)
3. Free radical halogenations gives $\text{CH}_3\text{CH}_2\text{Cl}$
4. No reaction

42 (a)



(HI reduces CH_2OH to CH_3 , but $\text{HI} + \text{P}$ reduces both COOH and CH_2OH to CH_3)

43 (d)

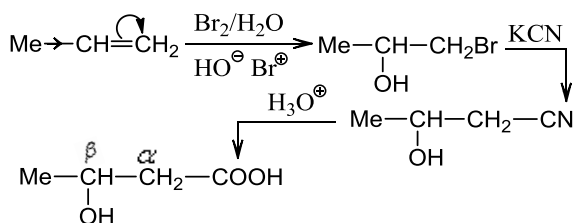
RCONH_2 (B), $\text{R}-\text{C}\equiv\text{N}$ (C), RCHO (D)

44 (b)

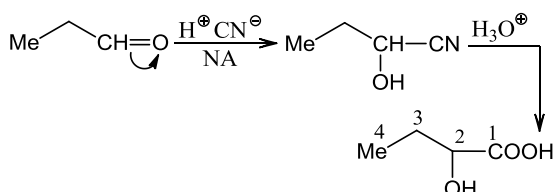
Hofmann bromamide reactions. The product ($\text{Ph}-\text{N}=\text{C}=\text{O}$) reacts with MeOH to give urethane ($\text{Ph}-\text{NH}-\text{COOMe}$)

46 (c)

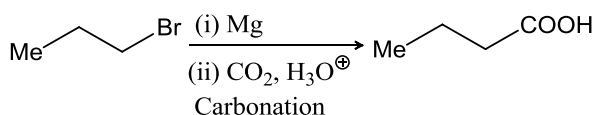
1. is 2° halide, so with CH^- elimination can also occur
2. would give β -hydroxy butyric acid



Only (c) would give the required product:



d. It would give butyric acid (step up by one C atom)

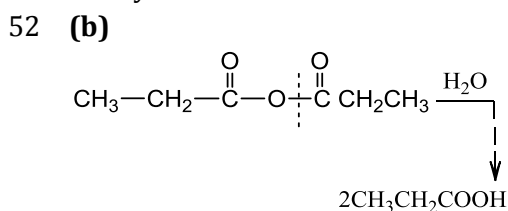


- 47 (d)
PhCOOH (B), PhCOCl (C), (PhCO)₂O (D)

- 48 (b)
Arndt-Eistert reaction occurs with the retention of the configuration (with the increase of one C atom)

- 51 (d)
In (II), the products are ethyl acetate (boiling point 77°C) and MeOH (boiling point 65°C). Thus at 66°C, MeOH is removed due to distillation and equilibrium is shifted to R.H.S.

In (IV), phenyl acetate is more reactive than methyl acetate



1 mol (130 gm) = 2 mol

1 gm = $\frac{2}{130}$ mol or eq.

Number of equivalent of acid = Number of equivalent of base

$$\frac{2}{130} \times 1000 \text{ mEq} = 0.5 \times V$$

$$\therefore V = 44.4 \text{ ml}$$

- 53 (b)
Allyl bromide is more reactive

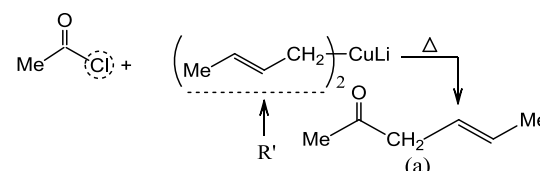
- 54 (a)
More the \bar{e} -withdrawing group, more NA reaction

is favoured. Aldehydes are more reactive than ketones

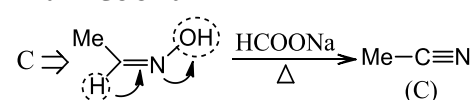
(IV) > (III) > (II) > (I)

- 55 (c)
Basic strength is: Benzamide < Aniline < Cyclohexylamine

- 56 (a)
R'₂CuLi and R'₂Cd react with (RCOCl) to give RCOR'



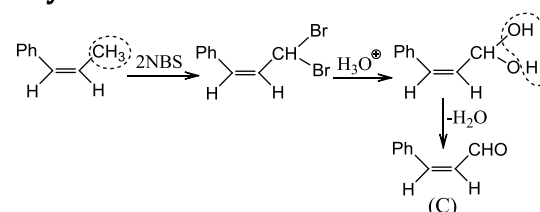
- 59 (c)
Anti-elimination of H and OH from oxime occurs with HCOONa



- 63 (b)
Due to electron-withdrawing ($-\text{NO}_2$) group

- 64 (c)
(A) Does not have α -H atom (non-enolisable)

- 67 (c)
Allylic substitution:



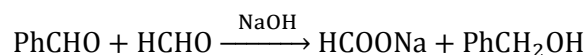
- 68 (c)
The most acidic compound is more ionised in H₂O
Also, (c) is the most acidic compound due to ($-\text{I}$) effect of 2 Cl on α -C

- 72 (b)
LDA abstract α -H atom to form a carbanion which reacts with EtI to give product (b)

- 73 (d)
a. Amides are hydrolysed by dilute NaOH to give NH₃
b. NaHCO₃ reacts with acids to give CO₂ (g)
c. Amides are also hydrolysed in acidic conditions

- 76 (a)
Lesser the steric hindrance, more easily the ester formed

- 77 (a)
Crossed Cannizzaro reaction



- 79 (c)

(X) = $\text{CH}_3\text{CH}(\text{Cl})\text{COOH}$ (H. V. Z reaction)

(Y) = $\text{CH}_2 = \text{CH} - \text{COOH}$

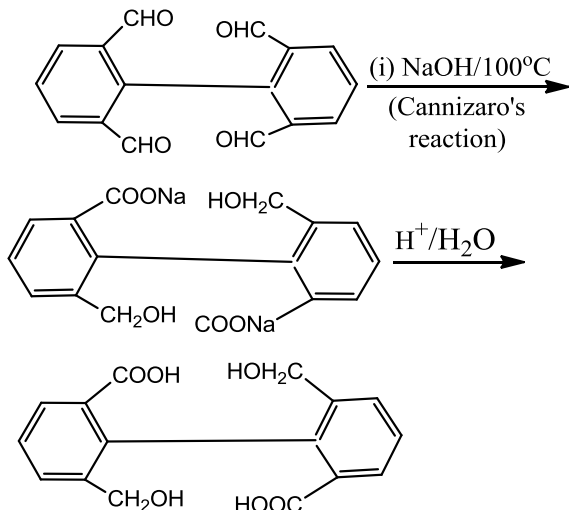
81 (a)

HCOOH gives positive Tollens test

83 (b)

Proceed reverse as explained in Section 14.25

86 (d)



Note Cannizaro reaction is due to the absence of α -hydrogen atom.

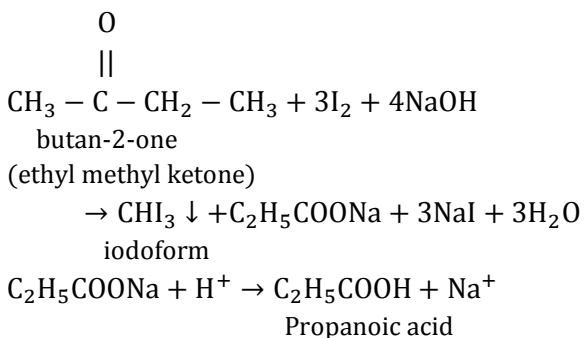
87 (c)

(X) = $\text{CH}_3\text{CH}_2\text{Br}$

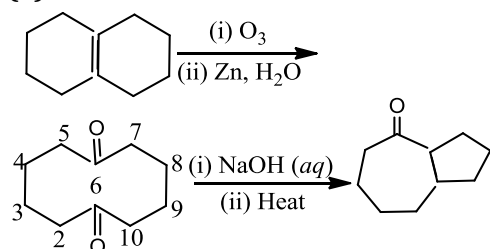
(Y) = $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{Iodoform}} \text{CHI}_3 + \text{HCOO}^-$

88 (c)

Tollen's reagent, Fehling solution and $\text{NaOH}/\text{NaI}/\text{H}^+$ are not able to change butan-2-one (ketone) into propanoic acid because these are mild oxidising agents, so NaOH/I_2 firstly from iodoform along with $\text{C}_2\text{H}_5\text{COONa}$ with butan-2-one (ethyl methyl ketone). In these $\text{C}_2\text{H}_5\text{COONa}$ reacts with acid (H^+) to give $\text{C}_2\text{H}_5\text{COOH}$ (propanoic acid).



89 (a)



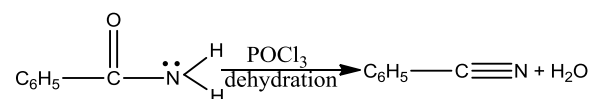
For aldol condensation C-5 and C-7 can attack to C-1 similarly C-2 and C-10 can attack to C-6 but all give same product.

91 (c)

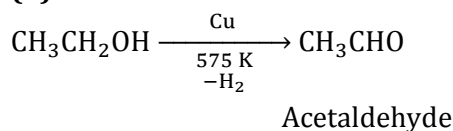
Arndt-Eistert reaction. The product $\text{PhCH} = \text{C} = \text{O}$ (ketene) reacts with MeOH to give ester ($\text{PhCH}_2\text{COOMe}$) (step up by one C atom)

94 (b)

Benzamide on treatment with POCl_3 gives benzonitrile (phenyl cyanide) because in this reaction POCl_3 acts as dehydrating agent and on dehydration of benzamide, benzonitrile is obtained.



95 (d)



98 (a)

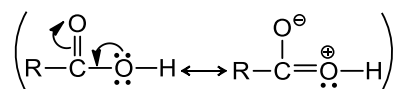
Carboxylic acids are stronger acids than phenolic compounds

99 (c)

The statement is self-explanatory

102 (b)

Acids are resonance stabilised



103 (c)

Statement is self-explanatory

106 (b)

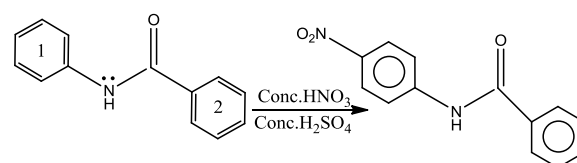
Convert (CHO) to COO^- in one molecule of (A) and to (CH_2OH) in another molecule of (A)

109 (a)

More the \bar{e} -withdrawing group, more is the NA reactivity

$\text{Cl}_3\text{C} - \text{CHO} > \text{HCHO} > \text{PhCHO} > \text{MeCOMe}$
Chloral

110 (b)



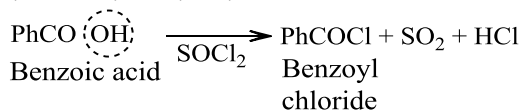
Ring 1 is more active, electrophilic substitution takes place over ring.1.

$-\text{NH} - \text{C} - \text{Ph}$ is *ortho para* directing. *Para* product is predominating.



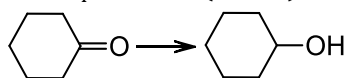
114 (c)

Here, SOCl_2 readily replaces $(-\text{OH})$ group of $(-\text{COOH})$ by $(-\text{Cl})$ forming acid chloride



115 (d)

NaBH_4 reduces $(\text{C}=\text{O})$ to CH_2OH

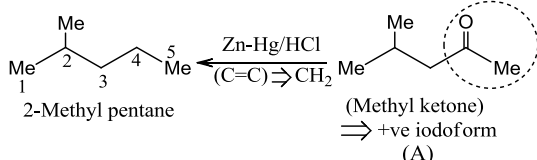


117 (b)

DIBAL-H reduces $(\text{C}\equiv\text{N})$ and (CHO) groups only. But $(\text{C}=\text{C})$ and $(\text{C}\equiv\text{C})$ bonds are not affected

118 (a)

Proceed reverse from the Clemmensen reduction



119 (a)

Sodium salts of sulphonated long-chain alcohols or hydrocarbons are used as anionic detergents

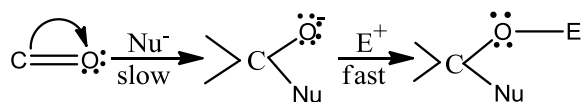
120 (b)

Statement is self-explanatory

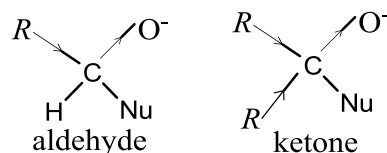
122 (c)

In phenyl magnesium bromide $\left(\overset{\delta-}{\text{Ph}} \overset{\delta+}{\text{Mg}} \overset{\delta-}{\text{Br}} \right)$ Ph is attached with that C-atom of carbonyl group which have low electron density (higher electropositive charge)

In carbonyl compounds, aldehydes are more reactive

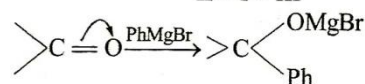


towards nucleophile in nucleophilic addition reaction because in ketones alkyl groups (due to +I effect) decrease the electropositive charge of carbon of carbonyl group. Hence attraction of nucleophile decreases. Moreover in the tetrahedral intermediate aldehyde have less steric repulsion than ketones and also the aldehyde increases the negative charge on oxygen less in comparison of ketones.



Thus, on the basis of above reason the order of reactivity of acetone(I), acetaldehyde (II) and benzaldehyde (III) with PhMgBr is

II > I > III

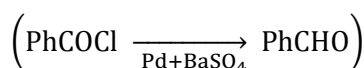


123 (c)

NaHSO_3 reacts with acetone to form sodium bisulphite adduct product and precipitates, but CCl_4 remains in the solution. The acetone can be regenerated from sodium bisulphite adduct by treating it with an acid or base

127 (b)

Rosenmund reduction



129 (a)

More EWG favours acyl substitution or hydrolysis of acid derivative

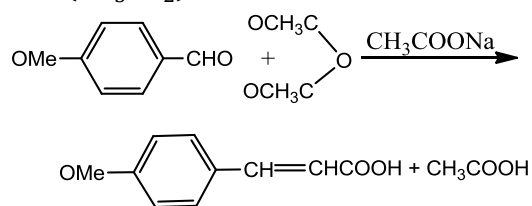
II $[(-\text{NO}_2), (-\text{I}) \text{ and } (-\text{R})]$, > (I) $[(\text{Ph}), (-\text{I}), \text{ and } (+\text{R}), (\text{Standard})]$ > (IV) $[\text{Me}, (+\text{I}) \text{ and } \text{H.C.}]$ > (III) $[\text{OMe}, (-\text{I}) \text{ and } (+\text{R}), \text{ net more EDG than (IV)}]$

130 (c)

This reaction is an example of Perkin's reaction because in it α, β -unsaturated acid is obtained with aromatic aldehydes.

Therefore, (X) is acetic anhydride

i.e., $(\text{CH}_3\text{CO}_2)_2\text{O}$.



131 (c)

Picric acid is 2, 4, 6-trinitrophenol. It does not contain (COOH) group

132 (a)

Acetylation of (OH) and (NH_2) groups occurs

133 (b)

HCOOH gives positive Tollens test

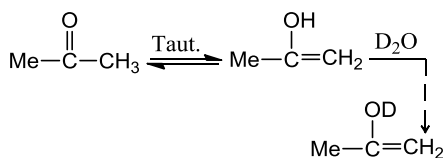
135 (c)

Reformatsky reaction

136 (b)

Statement is self-explanatory

137 (a)



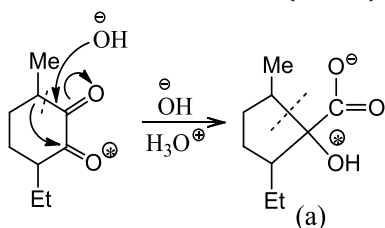
D₂O exchanges acidic H of (OH) group with D

139 (a)

This is an example of Benzil-Benzilic acid rearrangement reaction

OH^- attacks at the more reactive ($\text{C}=\text{O}$) group, (containing more KWG or less EDG). Et is more EDG than Me (due to +I effect; here no H.C.).

Therefore, OH^- attacks ($\text{C}=\text{O}$) with (Me) group

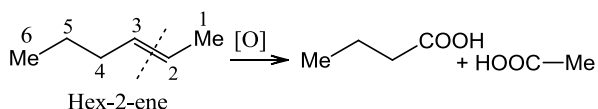


140 (d)

All the statements are self-explanatory

141 (b)

1 D.U. suggests alkene (decolourises Br_2 solution), gives *n*-hexane on hydrogenation. Two different acids on oxidation suggest that ($\text{C}=\text{C}$) bond is not symmetrical. So, the compound (A) is:



143 (b)

Aldehydes lacking α -H atom gives Cannizzaro reaction. The acetaldehyde (CH_3CHO) has α -H atom, so does not give C.R.

144 (a)

Hofmann bromamide reaction occurs with the retention of the configuration

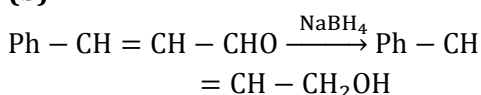
145 (c)

Claisen ester condensation

146 (d)

The statement is self-explanatory

147 (b)

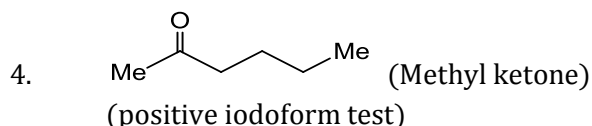
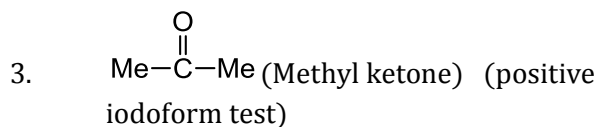
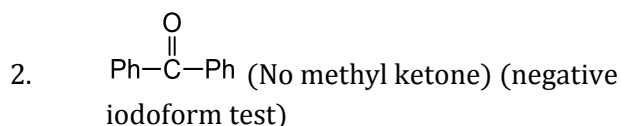
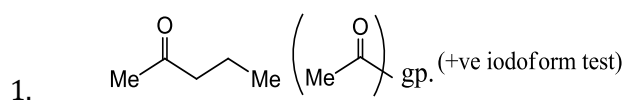


NaBH_4 does not reduce ($\text{C}=\text{C}$) and ($\text{C}\equiv\text{C}$) bonds

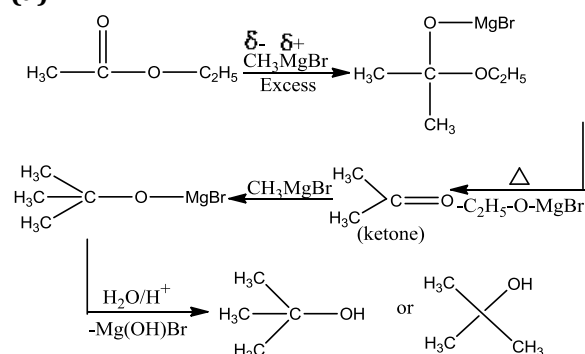
149 (b)

$\text{R}-\text{C}\equiv\text{CH}$ is converted to ketone by catalytic hydration with reagent (b)

150 (b)



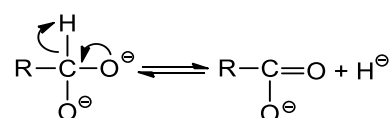
151 (a)



This ketone is further reacted with excess CH_3MgBr (Grignard reagent) and to give *t*-alcohol as the final product. Hence, it is a tertiary butyl alcohol.

152 (b)

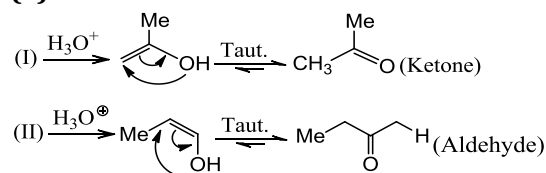
Due to \bar{e} migration of two O atoms, H^+ is lost easily



153 (d)

Inversion occurs in (a) and (b), since chiral ($\text{C}-\text{Br}$) bond is broken. In (c), hydrolysis of ester takes place without breaking the chiral C atom

155 (a)



Aldehydes and ketones can be distinguished by Fehling's solution

156 (c)

Tollens reagent oxidises CHO to COOH without affecting the ($\text{C}=\text{C}$) bond

157 (c)

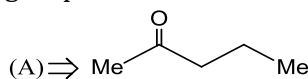
All are aldehydes, -I effect of Cl at C-2 > at C-3 > at

C-4

More the -I effect, more reactive is the aldehyde towards NA reaction [(II)>(III)>(IV)>(I)]

159 (a)

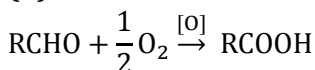
(A) is a keto compound and contains (MeCO-) group and converts into pentane



160 (a)

RCHO (\ominus_{H} donor) is converted to RCOO^\ominus and $\text{R}'\text{CHO}$ (\ominus_{H} acceptor) is converted to $\text{R}'\text{CH}_2\text{OH}$. Therefore, RCHO is oxidized and $\text{R}'\text{CHO}$ is reduced. In oxidation, the oxidation number increases and in reduction it decreases

162 (b)



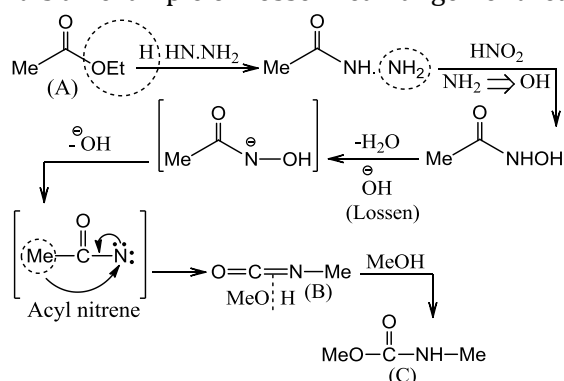
165 (b,d)

(b) - $\text{C}_6\text{H}_5-\text{CH}=\text{CH}-\text{C}(=\text{O})-\text{C}_6\text{H}_5$ does not have α, β -unsaturated carbonyl group,

while (d) $-\text{CH}=\text{CH}-\text{C}(=\text{O})-\text{CH}_3$ cannot form stable carbanion (from acetone) Remember that cyclopentadiene is quite acidic in nature, because its carbanion is stable due to presence of conjugated system; hence, it functions as the nucleophile required in Michael addition

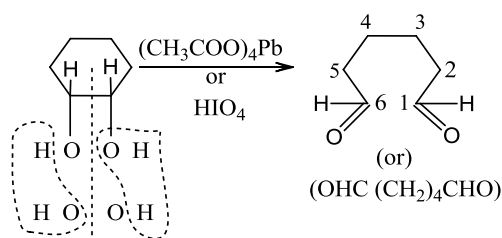
166 (a,c)

It is an example of Lossen rearrangement reaction



167 (a)

Oxidation with $(\text{CH}_3\text{COO})_4\text{Pb}$ and HIO_4 is similar. The necessary cyclic transition state forms easily from *cis*-glycol but not from *trans*-glycol



168 (b,c)

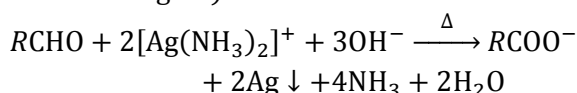
Reactant in (d) gives only one compound

170 (a,d)

RX aldehydes and ketones react with alc. KCN. (C) is aryl halide; it does not undergo ArSN reaction unless strong EWG (e.g., $-\text{NO}_2$) group) is present at *o*- and *p*-positions

171 (a,c)

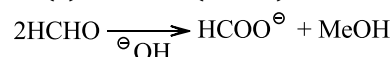
All aldehydes including reducing sugar (as glucose, fructose) give **Silver-mirror test** (with Tollen's reagent)



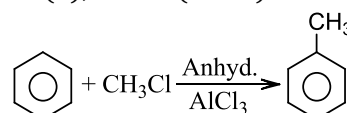
silver mirror

176 (b,d)

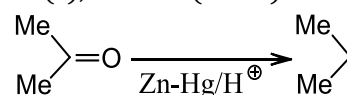
In (a), no new (C - C) bond is formed



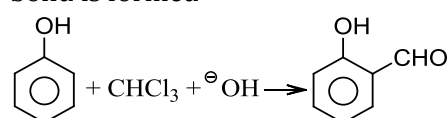
In (b), a new (C - C) bond is formed



In (c), no new (C - C) bond is formed

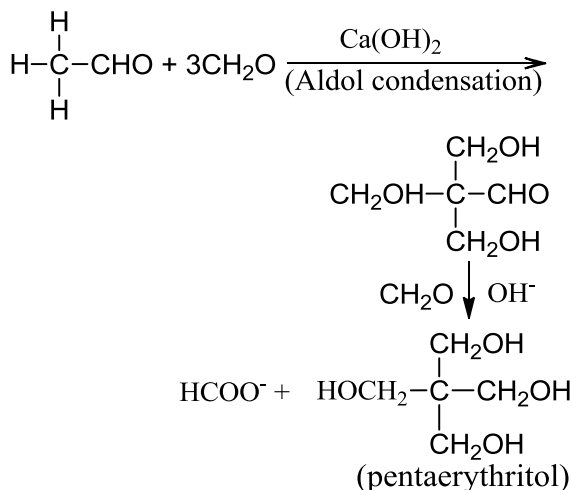


In (d), a new (C - C) bond is formed



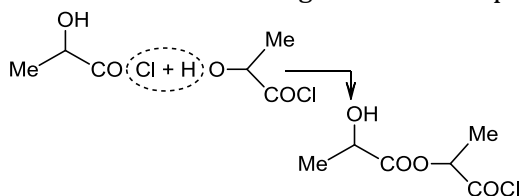
177 (c,d)

Acetaldehyde having three α -hydrogen atoms undergo aldol condensation with three molecules of CH_2O . The product formed now undergoes intermolecular Cannizzaro reaction with the fourth molecule of CH_2O to form pentaerythritol

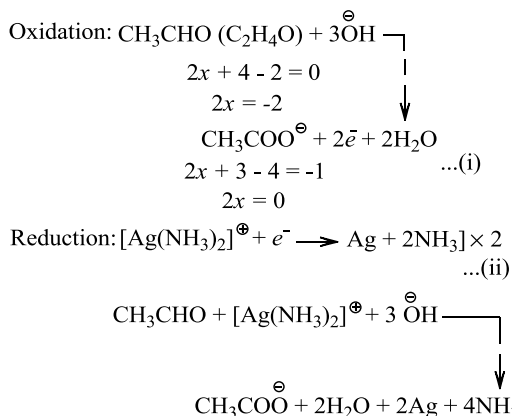


179 (a)

Reaction of the acid (A) with SOCl_2 is not feasible because it would also react with (OH) group of (A). In path II, (C) would react with the (OH) of the second molecule to give a different product



180 (a,b,d)



Molecular mass (Mw) of $\text{CH}_3\text{CHO} = 44$

Equivalent weight (Ew) = $\frac{\text{Mw}}{n \text{ factor}} = \frac{44}{2} = 22$

181 (a,d)

$(-\text{NO}_2)$ has \bar{e} -withdrawing effect at o -, m - and p -positions

Less \bar{e} -withdrawing will be better \ominus_{H} donor

EW order of NO_2 :

$m - \text{NO}_2 < p - \text{NO}_2 < o - \text{NO}_2$
1. (II) (III)

(Only -I at m)

$\rightarrow \left(\begin{array}{l} -\text{R and } -\text{I, but} \\ \text{at } p - \end{array} \right) \left(\begin{array}{l} -\text{I at } o - > -\text{I at } p - \\ \text{so net more EW} \\ \text{than (I) and (II)} \end{array} \right)$

Decreasing order of \ominus_{H} donor:

(d) (standard) > (c) > (b) > (a)

(Best)

(Least)

184 (a,d)

It is an example of Claisen-Schmidt rearrangement reaction

186 (a,c)

More EDG means more negative charge density on the C of (C - H) group and consequently more easily the H^+ ion is lost

Me (three H.C. structures) > Et (Two H.C. structures) > *i*-Pr (one H.C. structure) > Ph (standard)

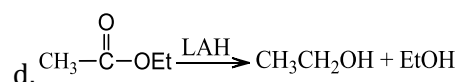
Decreasing order of \ominus_{H} donor:

(b) > (c) > (d) > (a)

(Best) (Least)

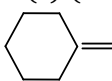
188 (a,b,c)

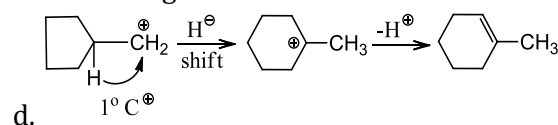
Reaction (d) is wrong. LAH reduces esters to alcohol



189 (a,b,c)

In (a), (b), and (c) (Witting reaction), the

products are  but in (d) the product is different as given below

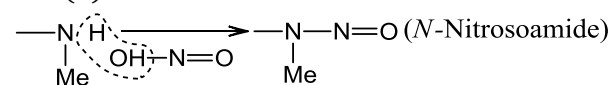


190 (a,b,c,d)

For (a and b): In 1° and 2° amide, N has an H atom, so with RLi , an acid-base reaction occurs, producing metal salts which are precipitates and no further reaction occurs. But in N, N -disubstituted amide, N does not have H atom and its reaction with RLi gives ketone

For (c): $-\text{NH}_2 \xrightarrow{\text{HNO}_2} -\text{OH}$

For (d):



192 (a,c)

The \bar{e} -donating order of (OMe) group:

$p - \text{OMe} > o - \text{OMe} > m - \text{OMe}$
1. (II) (III)

$\left(\begin{array}{l} +R \text{ and } -I; \\ \text{net more ED} \end{array} \right) \left[\begin{array}{l} +R \text{ and } -I, \text{ but } -I \\ \text{at } o \rightarrow -I \text{ at } p, \\ \text{so net less ED than (I)} \end{array} \right] \left(\begin{array}{l} \text{Only } -I \\ \text{at meta} \\ \text{net EW} \end{array} \right)$

Decreasing order of \ominus donor:
H

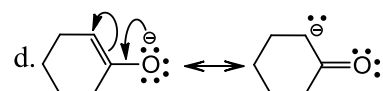
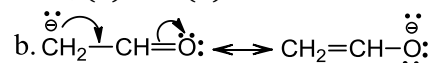
(a) > (b) > (d) (standard) > (c)

(Best)

(Least)

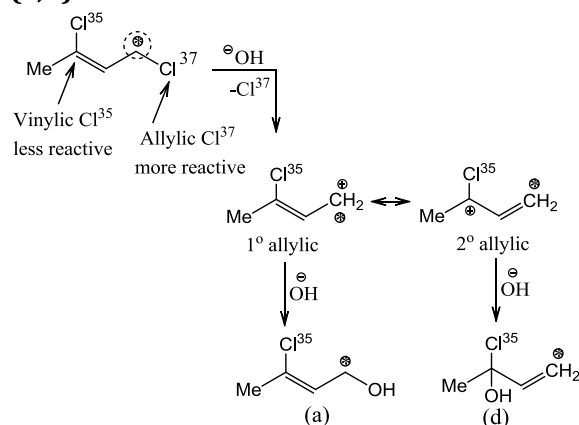
194 (a,c)

Here, (b) and (d) are ambident carbanions



In (a) and (c), resonance does not occur

195 (a,d)

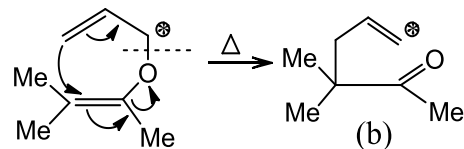


Cl^{35} cannot be replaced by \ominus because of vinylic

Cl, but Cl^{37} can be replaced by \ominus because of allylic Cl

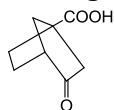
197 (b,c)

It is an example of Claisen rearrangement reaction



198 (a,b,c)

Upon gently heating β -keto acids, gem-



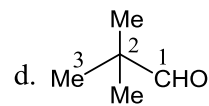
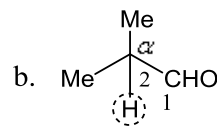
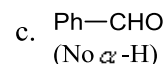
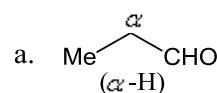
dicarboxylic acids lose CO_2 . through is a β -keto acid, does not lose CO_2 since $-\text{COOH}$ group is present at bridge and produces unstable transition state or intermediate (carbanion) after losing CO_2

199 (b,d)

Arndt-Eistert reaction

201 (a)

Compounds containing α -H atom undergo Aldol condensation



(Although α -H atom, does not undergo aldol)

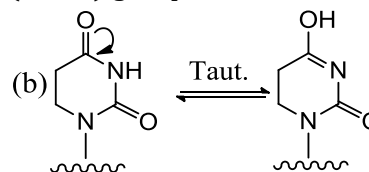
(No α -H)

203 (a,b,d)

Compounds containing α -H atom undergo aldol condensation but compound (C) containing α -H atom does not undergo aldol condensation. It undergoes Cannizzaro reaction, because the mobility of α -H atom is arrested by two sterically hindered methyl groups

207 (a,b,d)

For (a), H atom attached to N is acidic due to the presence of the two electron-withdrawing ($\text{C}=\text{O}$) groups. Its ion is resonance stabilised



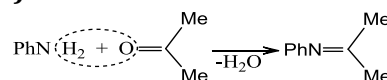
(c) 1° ROH does not give Lucas test at room temperature

(d) Strong ($\text{C}-\text{N}$) bond is not broken by Br^\ominus

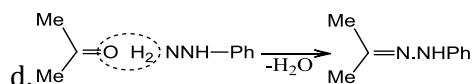
209 (a,c,d)

NaBH_4 does not react with ester

210 (a,d)

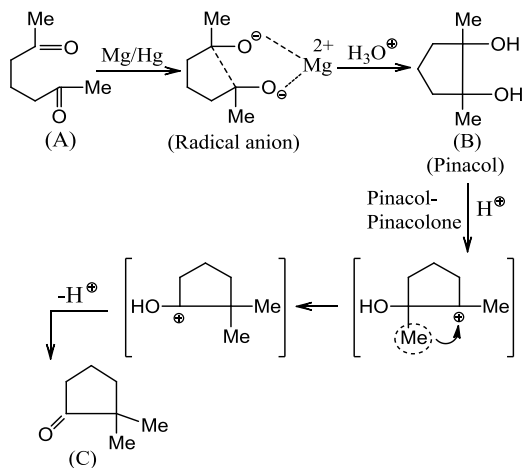


And c. there is no reaction



213 (b,d)

The correct answers are (a, c)



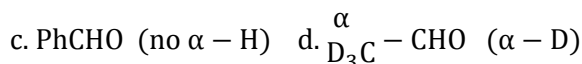
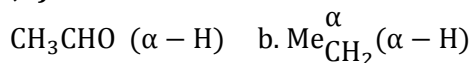
215 (a,b,c)

Stereoisomers, which are not enantiomers are called diastereomers

219 (a,b)

(a) and (b) have α -H atoms, so they undergo aldol condensation; (c) is Cannizzaro reaction; (d) is Claisen-Schmidt reaction

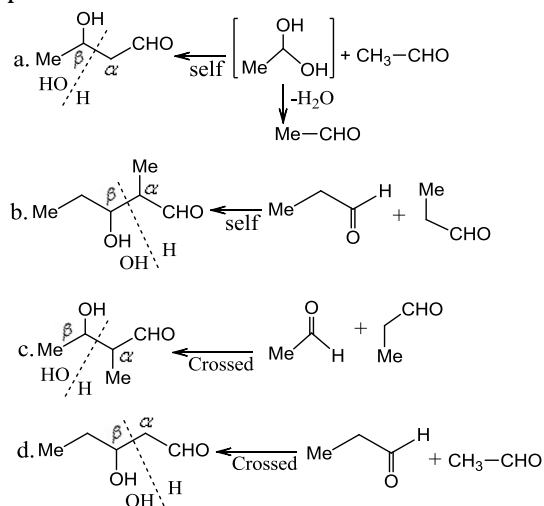
222 (a,b,d)



Chemically, H and D react in the same manner

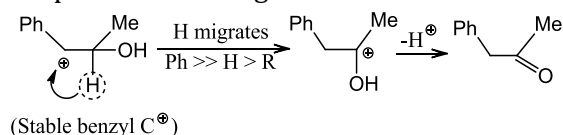
223 (c,d)

Proceed reverse to check the self and cross product



224 (a,b,c)

In (a), (b), and (c) (Pinacol-Pinacolone rearrangement) the products are correct. In (d), the product is wrong

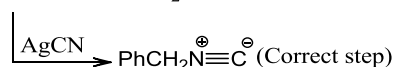
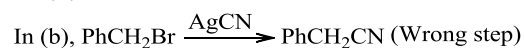


229 (a,b)

Here, (a) and (b) are Perkin reactions, but (c) and (d) are Knoevenagel reactions

230 (a,c)

In (b),



In (d), NaBH_4 does not reduce ($\text{C} \equiv \text{N}$) group to (CH_2NH_2) group

232 (a,d)

Dianion is more resonance stabilised than anion.

So dianion is better H^- donor than anion

Moreover, (a) is better H^- donor than (c), due to statistical factor because (a) has two H atoms

which can be lost as H^- ion

Decreasing order of H^- donor:

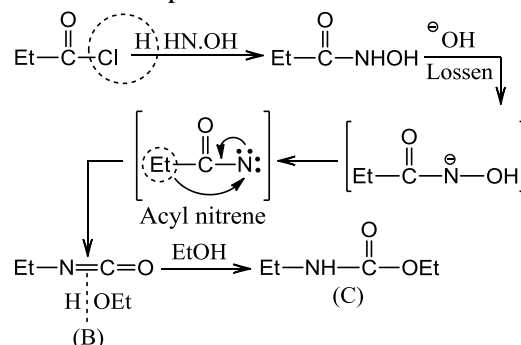
(a) > (c) > (b) > (d)

(Best)

(Least)

236 (b,c)

It is an example of Lossen reaction



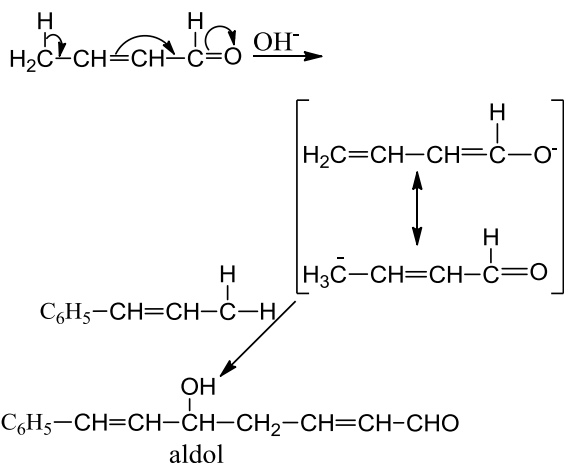
237 (a,c,d)

($\text{C}=\text{O}$) group is not keto but is a lactam groups

(cyclic amide) and cyclic ether is called oxolane

238 (a,b,d)

Removal of γ -hydrogen of crotonaldehyde provides more stable allylic carbanion, hence γ -carbon (not α) provides the carbanion (nucleophile) for carbonyl carbon of cinnamaldehyde



240 (a,b)

More EDG means more negative charge density on the C of (C – H) group and consequently more easily the H^{\oplus} ion is lost

Me (three H.C. structures) > Et (Two H.C. structures) > *i*-Pr (one H.C. structure) > Ph (standard)

Decreasing order of \ominus donor:

(b) > (c) > (d) > (a)
(Best) (Least)

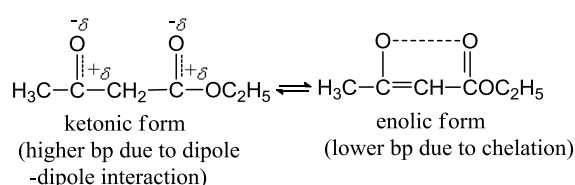
243 (b)

Lactam (cyclic amide) linkage is cleaved to give product in (b)

244 (a,c,d)

Arndt-Eistert reaction

245 (a,d)



Ketonic form discharge the colour of Br_2 in CCl_4

246 (a,b,c,d)

(a), (b) (c), and (d) are the steps of mechanism of reduction of $RCOOH$ to RCH_2OH by LAH

247 (b,d)

LAH reduces (COCl) group to alcohol (CH_2OH) group but less reactive LBAH reduces (COCl) group to (CHO) group

248 (c,d)

Semicarbazone formation from cyclohexanone is kinetically stable but thermodynamically less stable and *vice versa* for semicarbazone formation from benzaldehyde as the electronic effect activate the aldehyde group in cyclohexanone but delocalisation of electrons in benzaldehyde makes the aldehyde group deactivate

Hence, the semicarbazone formation for cyclohexanone is more faster than that of benzaldehyde

251 (a,c)

More EDG means more negative charge density on the C of (C – H) group and consequently more easily the H^{\oplus} ion is lost

Me (three H.C. structures) > Et (Two H.C. structures) > *i*-Pr (one H.C. structure) > Ph (standard)

Decreasing order of \ominus donor:

(b) > (c) > (d) > (a)
(Best) (Least)

257 (a,d)

Wittig reaction proceeds by SN^2 mechanism.

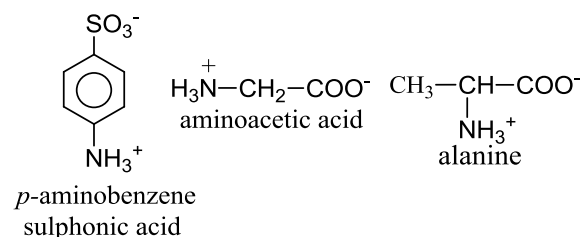
Thus, reactivity of RX in SN^2 reaction is

$1^\circ > 2^\circ > 3^\circ$ RX

In (a) and (d), 1° RX is used

258 (a,c,d)

In $p - NH_2C_6H_4COOH$, $-COOH$ group is very weak so it can't transfer H^+ to the weakly basic amino. All other three forms Zwitter ions

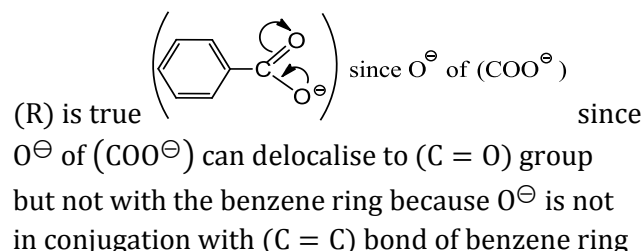


259 (a)

Since 3-phenol propanoic acid is 1° RX , preparation by both methods can occur

262 (d)

$PhCOOH$ (II) is more acidic than (I) due to (–I) and (+R) effects of (Ph) group. (I) is less acidic due to (+I) effect of its R's of the sides of the ring, so (A) is false



263 (c)

The product is $CH \equiv CH$ which reacts with Tollens reagent to give $(Ag - C \equiv C - Ag)$ (white ppt.)

So (A) is true, but (R) is false

264 (d)

Highly branched carboxylic acids are less acidic than unbranched acids. The +I effect of alkyl groups in branched one increases the magnitude of negative group. The COO^- group is shielded from solvent molecules and can't be stabilised by solvation as effectively as in unbranched carboxylic acids

266 (c)

Acrylic acid ($\text{CH}_2 = \text{CH} - \text{COOH}$) does not show geometrical isomers

267 (a)

CH_3^- ion is much stronger nucleophile due to +I effect of $\text{C}^\ominus\text{H}_3$ group

268 (b)

The high degree of polarity in HX as well as in carbonyl bond shows the easy addition of HX on carbonyl bond but as soon as the addition products are formed, the products loses to HX to show the backward reaction

269 (b)

Both form silver salt (RCOOAg), soluble in HNO_3 . HCOOH gives positive Tollens test

270 (d)

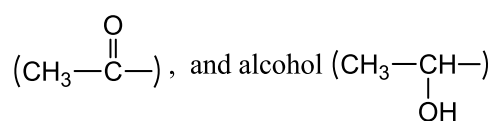
Both fumaric acid and maleic acid have two ionisable protons. At first sight, since the structures are identical, it might have been expected that the ionisation constants would be the same. However,

272 (c)

$\text{CH}_3\text{CO} -$ group in acetophenone being electron withdrawing reduces the electron-density at the benzene ring, thereby preventing further electrophilic substitution

273 (c)

Only aldehyde ($\text{CH}_3 - \text{CHO}$), ketone



Groups undergo haloform reaction. Acid does not undergo haloform reaction. α -H atoms are present in acetic acid. Hence, Statement (I) is true but Statement (II) is false

275 (d)

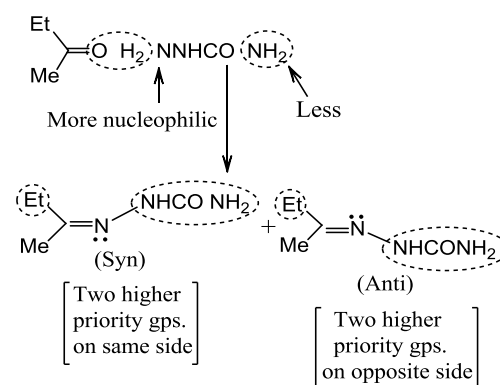
Due to intermolecular H-bonding in *p*-hydroxybenzoic acid (I), they have high boiling point; however, there is intramolecular H-bonding in *o*-hydroxybenzoic acid (II), due to which they have low boiling point

Hence, Statement (I) is false but Statement (II) is true

276 (d)

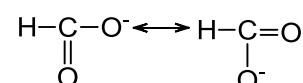
The product is wrong:

The semicarbazone formation occurs with more nucleophile ($\text{NH}_2\text{NHCONH}_2$) side



277 (a)

In formate ion, resonance gives rise to identical bond lengths

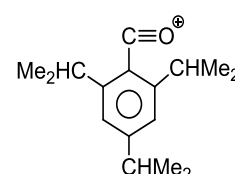


278 (b)

Both carbon and oxygen are non-metals and try to complete their octet. In $\text{R} - \text{C} \equiv \text{O}^+$ each has complete octet, whereas in $\text{R} - \text{C}^+ = \text{O}$, carbon atom has incomplete octet

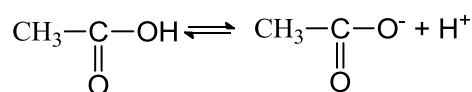
282 (a)

Although acid (I) is sterically hindered, acylium ion (A) is formed as the intermediate which minimises strain. This ion is resonance stabilised due to delocalisation of π e^- 's



283 (a)

The product is MeNH_2 (methyl amine). It is an example of Claisen-Schmidt rearrangement reaction

$$\text{H}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{OH} \rightleftharpoons \text{H}-\underset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{O}^- + \text{H}^+$$


The anion left after the removal of α -hydrogen is stabilised by resonance effect

The carboxyl group ($-\text{COOH}$) is an electron withdrawing group and therefore deactivates the benzene ring towards electrophilic attack. Therefore, benzoic acid does not give Friedel-Craft's reaction.

- (**a** → **r**), Haloform reaction
- (**b** → **p**), M.P.V. reduction
- (**c** → **t**), Birch reduction, reduces terminal (C = C) bond
- (**d** → **q**), Wolff-Kishner reduction (C = O ⇒ to -CH₂)
- (**e** → **s**), Clemmensen reduction first converts (C = O) to (-CH₂) and then H₂/Pt reduces (C = C) to (C - C) bond

The reaction scheme illustrates the synthesis of 1-phenyl-2-propyne from cyclohexanone through several steps:

- Cyclohexanone** is reduced by LAH to **Cyclohexanol**.
- Cyclohexanol** is treated with H^+ to form a carbocation intermediate.
- The carbocation is oxidized by $\text{O}_3/\text{Red.}$ to **1,4-cyclohexadiene-1-carboxylic acid**.
- 1,4-cyclohexadiene-1-carboxylic acid** is converted to **1,4-cyclohexadiene-1-carbonyl chloride** using SOCl_2 .
- The carbonyl chloride is reduced by **DIBAL-H** to **1,4-cyclohexadiene-1-carbaldehyde**.
- 1,4-cyclohexadiene-1-carbaldehyde** is treated with H_3O^+ to form **1,4-cyclohexadiene-1,4-dicarbaldehyde**.
- 1,4-cyclohexadiene-1,4-dicarbaldehyde** is converted to **1,4-cyclohexadiene-1,4-dichloride** using PCl_5 .
- 1,4-cyclohexadiene-1,4-dichloride** is treated with 2NaNH_2 to form **1-phenyl-2-propyne**.

Grignard reagent = CH_3MgX
 Clemmensen reduction = $\text{Zn} - \text{Hg}/\text{Conc HCl}$
 Rosenmund reduction = $\text{H}_2/\text{Pd} - \text{BaSO}_4$
 Wolff-Kishner reduction = $\text{N}_2\text{H}_4/\text{KOH}/\text{CH}_2\text{OH}$

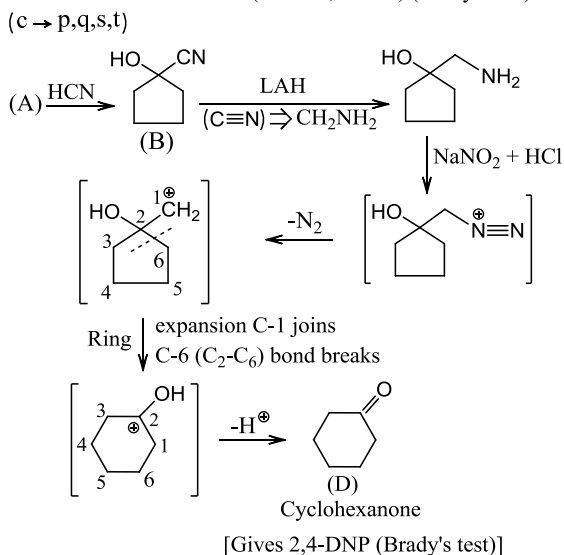
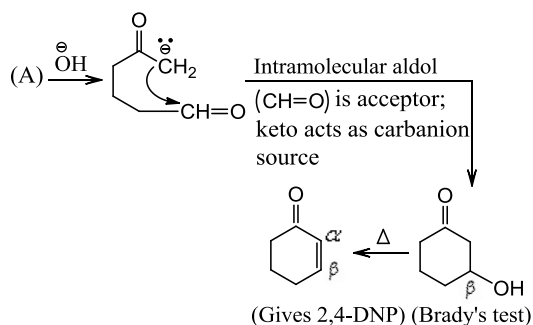
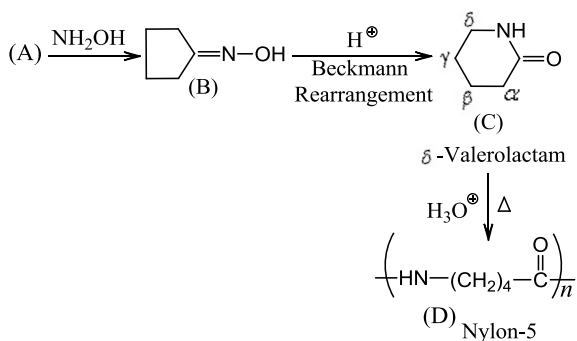
The group containing ($-\text{NH}_2$) has migrated from C to N and the same group [after removal of (NH_2) group] must be anti-position to the (OH) group in oxime

Remove the ($-\text{COOH}$) group from acid and put the group in syn-position to the (OH) group in oxime

All statement are self-explanatory

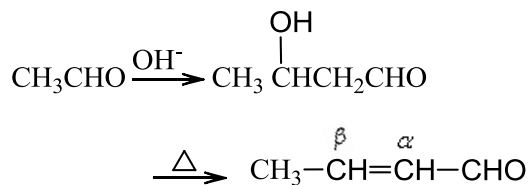
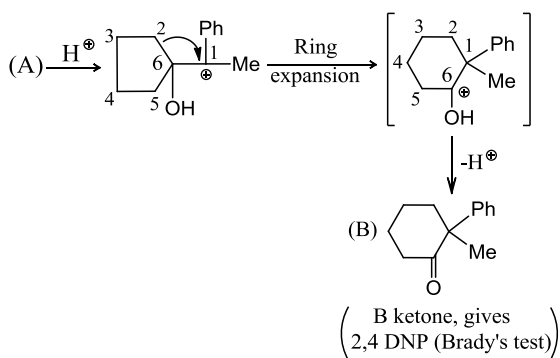
	List I	List II
2.	CH_3CONH_2 and PCl_5 Acetonitrile	
3.	$-\text{NO}_2$ group strengthening	Acid
4.	Lactic acid active compound	Optically
5.	CH_3COOH and Na Hydrogen gas is liberated	

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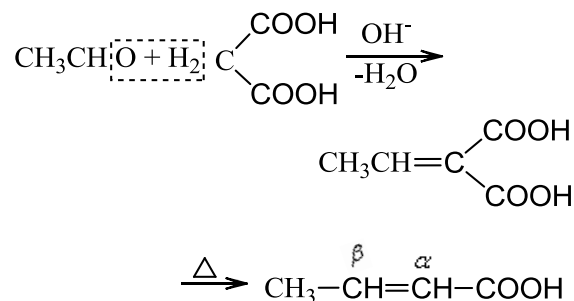


(d \rightarrow p, q, s, t)

It is an example of Pinacol-Pinacolone rearrangement reaction

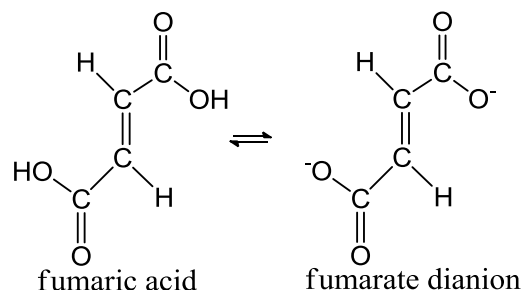
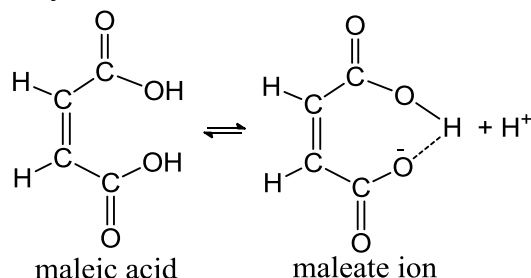


In second test tube



310 (c)

Maleic acid is stronger for the first ionisation but weaker for the second. The reason for this is believed to be due to the fact that hydrogen bonding can occur in the maleate anion whereas this is not possible for the corresponding fumarate anion. Thus, the former anion is stabilised with respect to its acid and so there is a driving force for ionisation which is absent in the case of Fumaric acid. Furthermore, since the maleate anion is stabilised by H-bonding, the fumarate anion ionises to the dianion more readily than the former



Presence of $-\text{CH}_3$ group in acetate ion shows +I. Effect and thereby intensifying charge on O^- of acetate ion than formate ion or acetate ion is destabilised. Thus formate ion is more stable than acetate ion and HCOOH loses proton more easily. The HVZ reaction brings about halogenation only at the α -carbon of the fatty acid in case the acid has two α -hydrogens, α -dihalo product will be

308 (d)

All the statements given above are correct

309 (c)

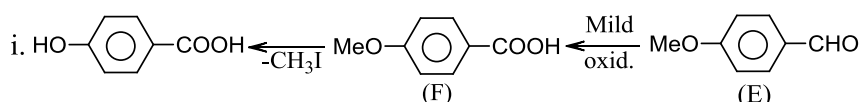
In first test tube

311 (b)

315 (a)

Product (B) is formed

317 (b)



Answer of Q.No. 20 (b)

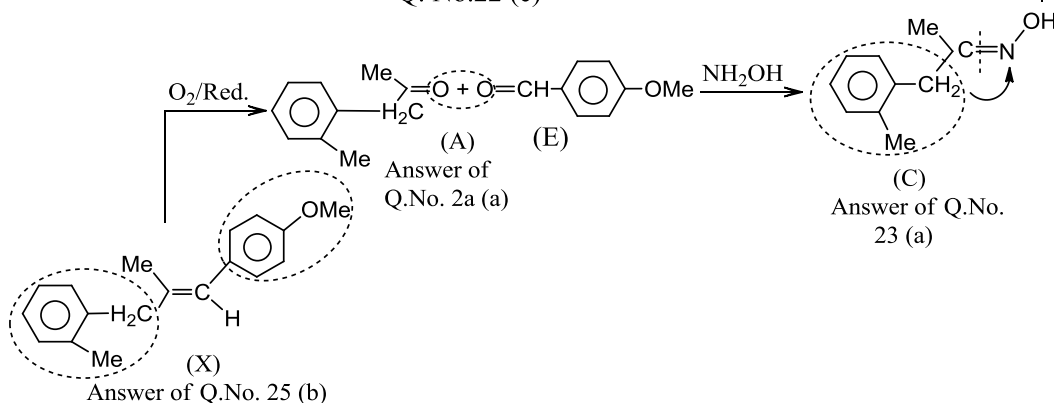
Phthalic acid

Answer of Q. No. 21 (c)

Answer of Q. No. 22 (c)







Backmann re-arrangement

(Anti-elimination) Put the alkyl gp. (R') in anti position to (OH) gp. of oxime.,



iii. Similarly, proceed reverse to get the structure of (X) by joining (A) and (E) as shown above. (X) is a *trans*-isomers because its melting point is high

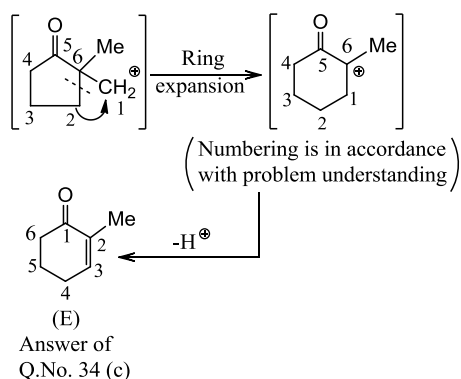
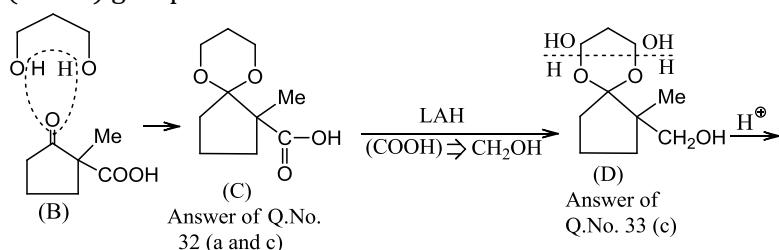
318 (d)

Test	CHO  Me (A)	CH_2CHO  OH (B)	COCH_3  OH (C)	COOH  Me (D)	OCH=CH_2  OH (E)  OH
i. Tollens test (aliphatic and aromatic aldehydes)	+ve	+ve	-ve	-ve	-ve

ii. FeCl_3 test (Phen-olic compo-unds)	-ve	+ve	+ve	-ve	+ve
iii. Iodo-form test	-ve	-ve	+ve	-ve	-ve
iv. $\text{NaH} - \text{CO}_3$ test (acids)	-ve	-ve	-ve	+ve	-ve

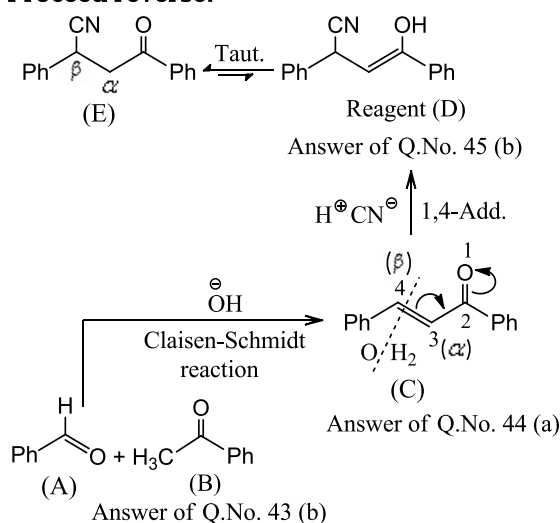
319 (d)

All reagents are used in haloform reactions, which convert $(\text{MeCO}-)$ group followed by hydrolysis to give (COOH) group



321 (b)

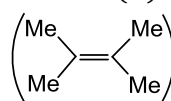
Proceed reverse:



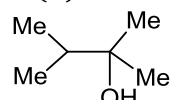
$(\text{Me}_2\text{C} = \text{O})$

iii. Thus, compound (F) would be isopropyl alcohol (Me_2CHOH)

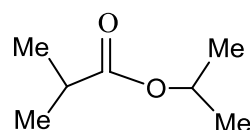
iv. Since (D) is obtained from (C), (C) would be



v. (B) would be



vi. Structures of (D) and (F) suggest that ester (A) should be

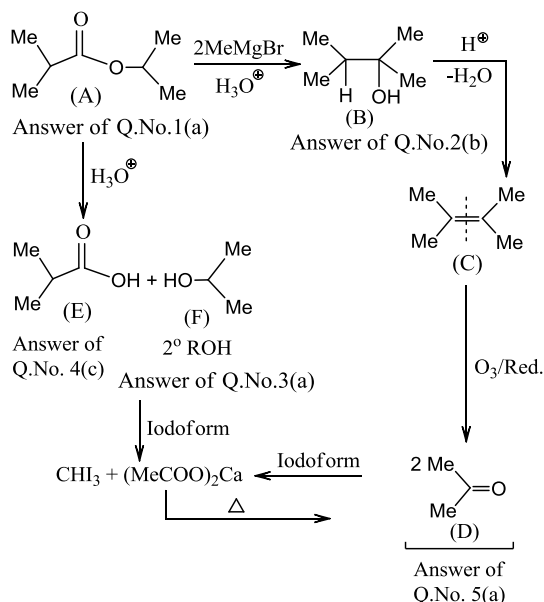


Reactions:

324 (a)

Proceed reverse:

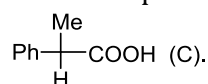
- Acetone obtained from (G) suggests that (G) is calcium acetate, $(\text{CH}_3\text{COO})_2\text{Ca}$
- Therefore, compound (D) is acetone



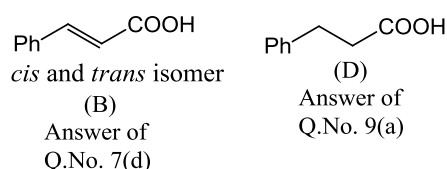
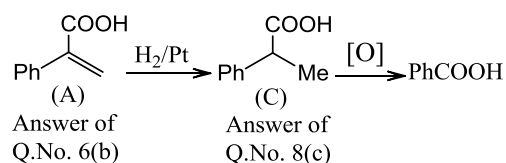
325 (b)

Formation of (E) suggests monosubstituted acid and reaction of 1 mol of H_2 with (A) and (B) shows one ($\text{C}=\text{C}$) bond. There are 6 D.U. [4 D.U. for (Ph) group, 1 D.U. for (COOH), and 1 D.U. for ($\text{C}=\text{C}$)] in both (A) and (B)

Chiral compound with nine C atoms would be



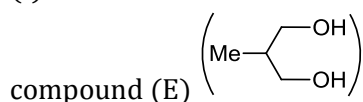
Reactions:



Here, (C) and (D) can be distinguished quantitatively by H.V.Z. reaction. (C) has one α -H atom and would give monochlorinated product, whereas (D) has two α -H atoms and would give dichlorinated product. The chlorine content in the chlorinated derivatives of (C) and (D) is determined by quantitative methods

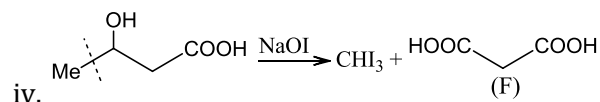
326 (a)

i. From the structures given in the problem, (A) is (I). Since with LAH it would give achiral



ii. (B) is (IV), since ethers are inert to oxidation

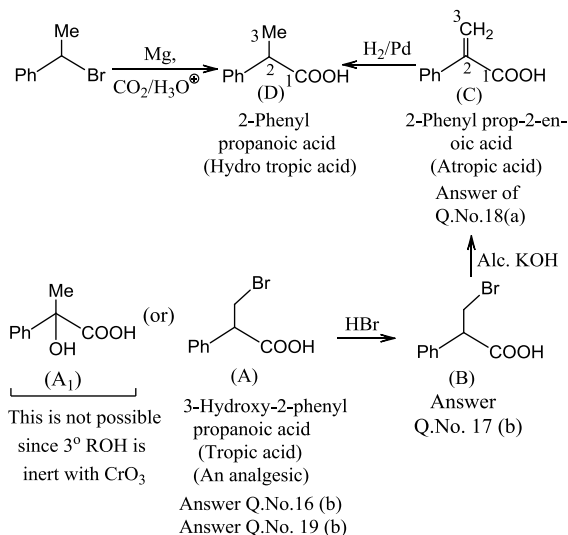
iii. Iodoform test is shown by (II), so (C) is (II)



327 (b)

Proceed reverse:

Structure of (D) is:



328 (a)

ortho-Compounds are steam volatile

