Carbonyl Compounds

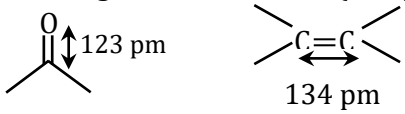
SOLUTIONS

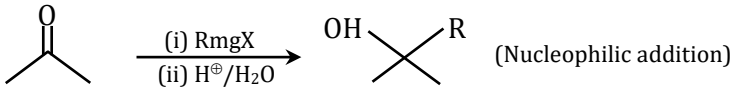
EXERCISE - O

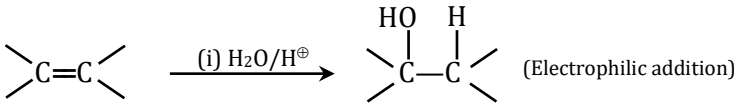
1. **Ans. (A)**
In X ; more stable carbanion is formed by removing H(A)
In Y ; more stable carbanion is formed by removing H(D)

2. **Ans. (B)**
Aldehyde groups which are not directly connected to benzene ring or do not have benzene ring are called aliphatic aldehydes.

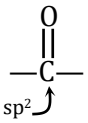
3. **Ans. (D)**
Carbon–Oxygen bond is polar due to E.N. difference hence force of attraction decreases therefore bond length decreases than (C=C) bond length.



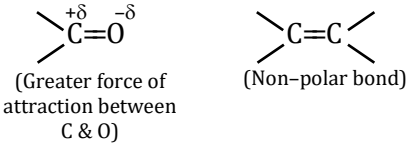




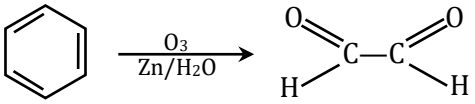
4. **Ans. (D)**



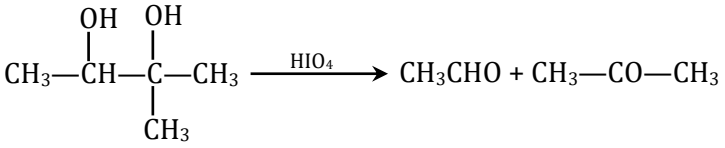
5. **Ans. (A)**
Due to polar character of carbonyl group, the double bond of a typical carbonyl group is shorter and stronger than the double bond of a typical alkene.



6. **Ans. (D)**
The reaction involved is :

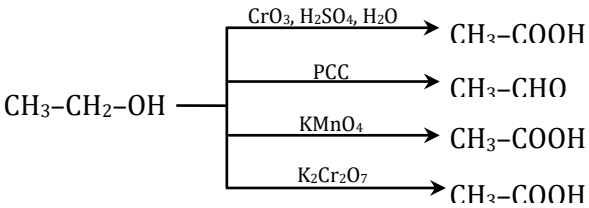


7. **Ans. (B)**
The reactant will undergo oxidative cleavage with HIO_4 as :



8. **Ans. (B)**

The reactions involved are

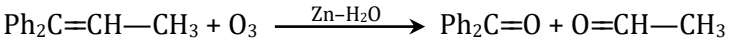


Hence, suitable reagent for this conversion is PCC.

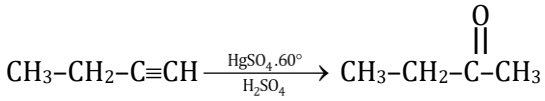
9. **Ans. (D)**

MnO_2 is used for allylic or benzylic oxidation.

10. **Ans. (B)**



11. **Ans. (A)**



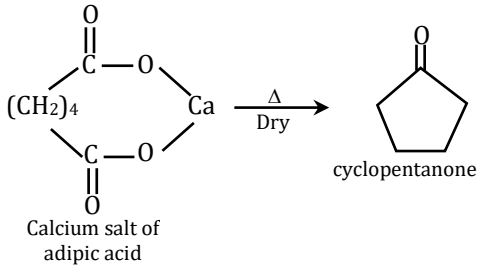
12. **Ans. (D)**

Ozonolysis of 2-butene gives accetadehyde.

13. **Ans. (D)**

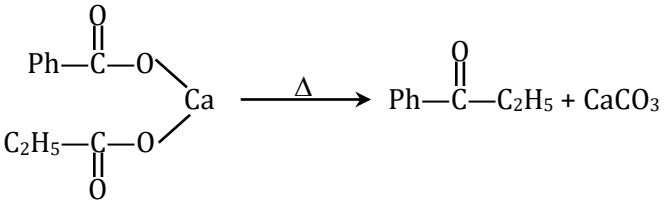
Only ethyne on hydration gives acetaldehyde.

14. **Ans. (B)**

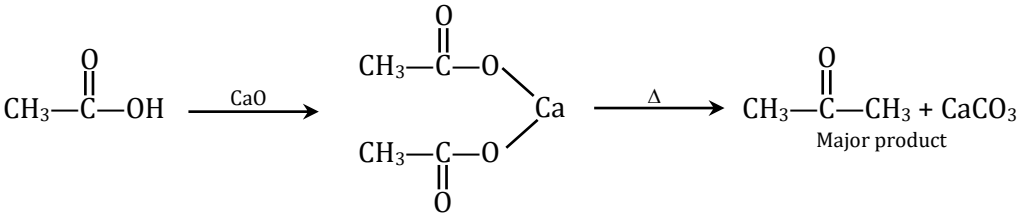


15. **Ans. (A)**

The possible product is

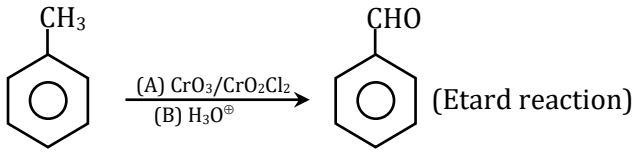


16. **Ans. (B)**



17. Ans. (C)

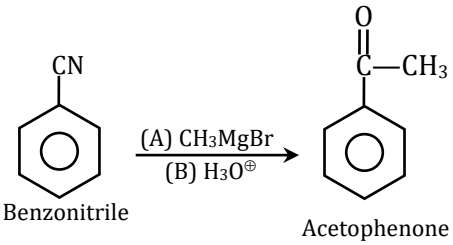
The Etard reaction is :



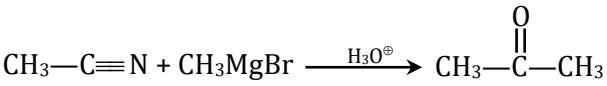
(Etard reaction)

18. Ans. (B)

The hydrolysis will form acetophenone

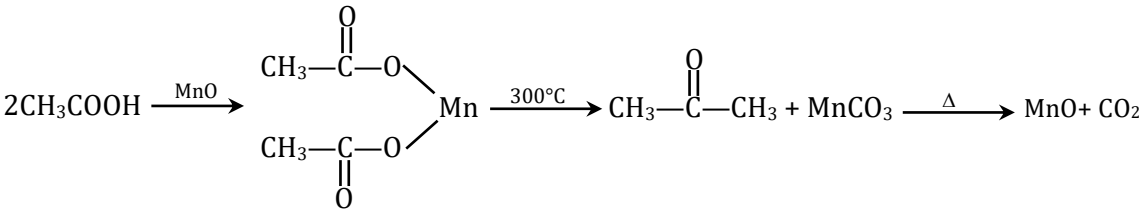


19. Ans. (B)

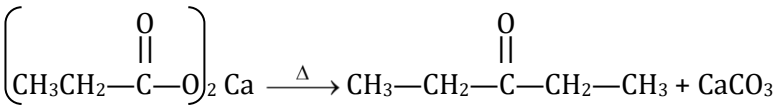


20. Ans. (B)

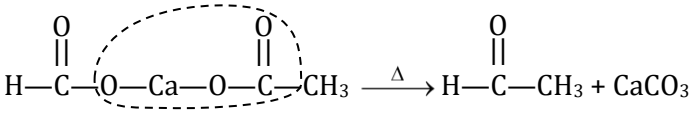
The product formed is



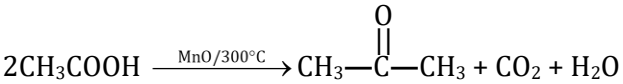
21. Ans. (A)



22. Ans. (A)



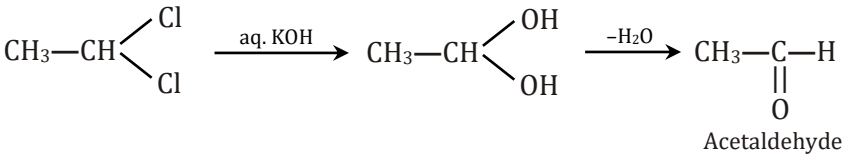
23. Ans. (C)



24. Ans. (A)

Rate of decarboxylation $\propto$ Stability of carbanion

25. Ans. (A)



26. Ans. (D)

$HgSO_4/H_2SO_4$ is KUCHEROV's Reaction.

27. Ans. (B)

$BaSO_4$ is used as a catalytic position to reduce the activity of Pd-catalyst to prevent further reduction of aldehyde to alcohol.

28. Ans. (B)

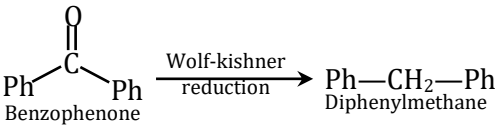
Rosenmund reduction

29. Ans. (C)

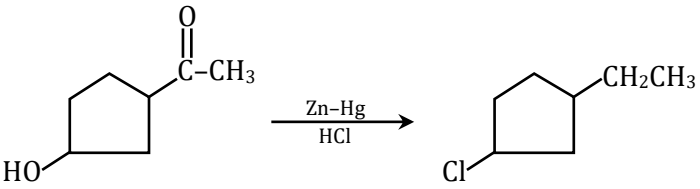
$LiAlH_4$ can reduce aldehyde, ketone and ester to corresponding Alcohols.

30. Ans. (D)

Reduction of  group to alkane is wolf-kishner reduction



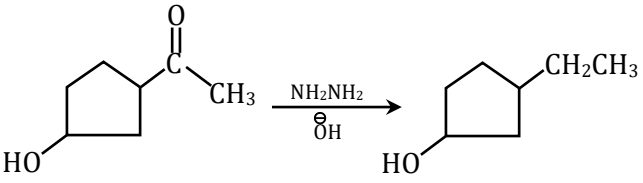
31. Ans. (B)



Clemmenson reduction followed by substitution of $\overset{\ominus}{O}H$ with $Cl^{\ominus}$.

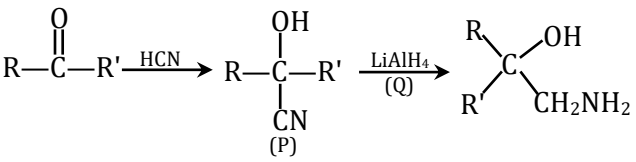
32. Ans. (B)

The given conversion can be carried out as :

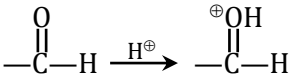


$NH_2NH_2/\overset{\ominus}{O}H$ (Wolf Kishner reduction is best because basic medium doesn't affect OH group)

33. Ans. (A)

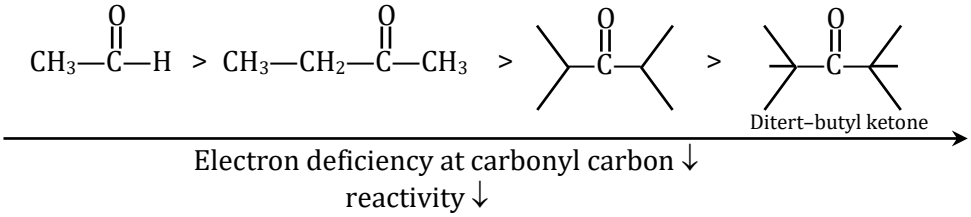


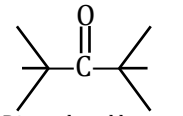
34. **Ans. (B)**



Electrophilicity of carbonyl carbon increases in acidic medium. So, in acidic medium reaction is fast.

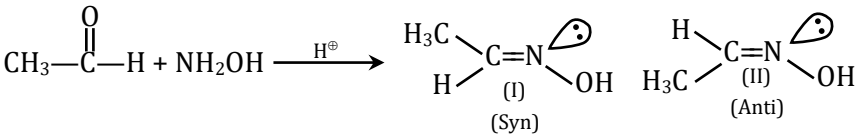
35. **Ans. (D)**





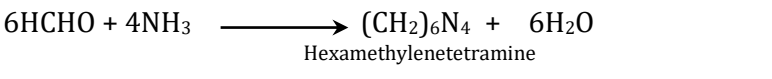
Highly hindered Attack not possible (least reactive).

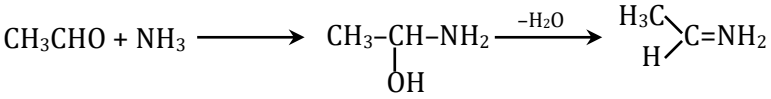
36. **Ans. (B)**

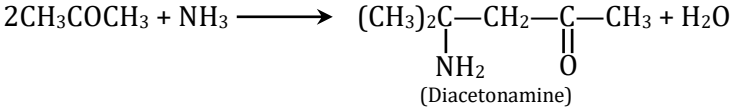


I and II are Geometrical isomerism.

37. **Ans. (D)**

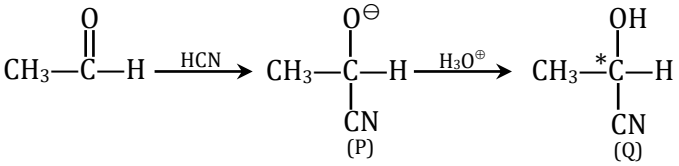






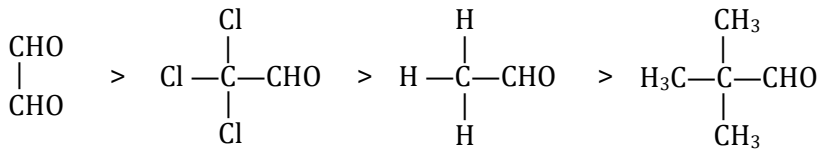
38. **Ans. (D)**

The reaction involved is



39. **Ans. (D)**

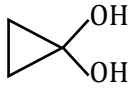
More electrophilic and less crowded carbonyl carbon ⟶ Higher the rate of nucleophilic addition.



So, order will be

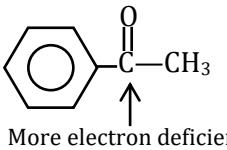
IV > II > III > I

40. Ans. (A)

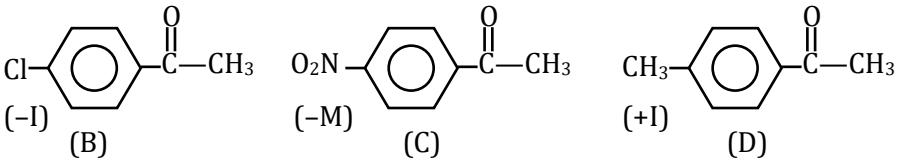


(ring strain)

41. Ans. (A)

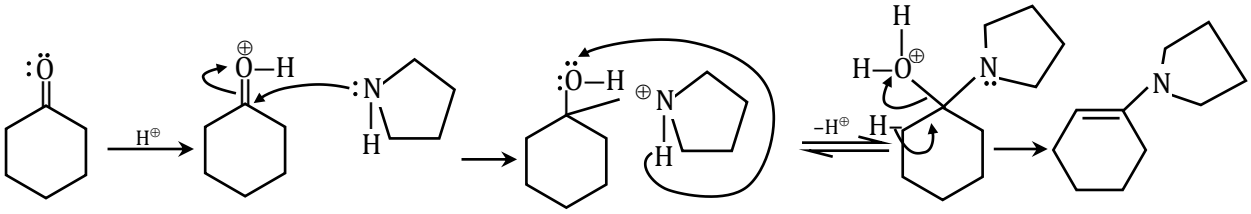


More electron deficient → more rate of hydration → more will be K_{eq}



Order will be : 3 > 2 > 1 > 4

42. Ans. (B)



43. Ans. (C)

The reaction involved are :

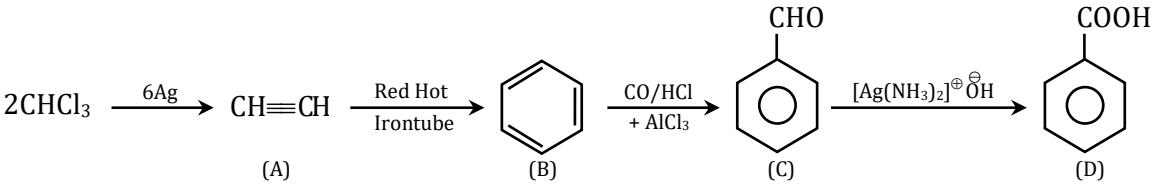
$CH_3–CH_2–C\equiv CH \xrightarrow[(ii)\ H_2O]{(i)\ O_3} CH_3–CH_2–COOH + HCOOH$

(Propionic acid) (Formic acid)

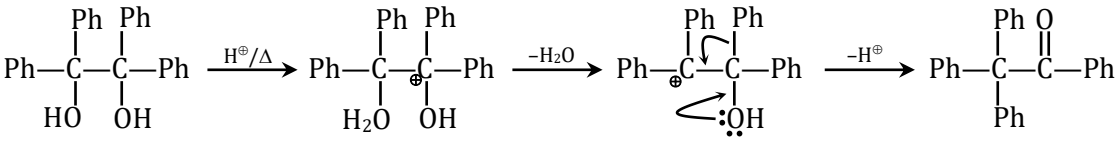
$CH_3–C\equiv C–CH_3 \xrightarrow[(ii)\ H_2O]{(i)\ O_3} CH_3COOH$ (Acetic acid)

44. Ans. (C)

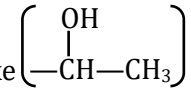
The complete reaction sequence is



45. Ans. (A)

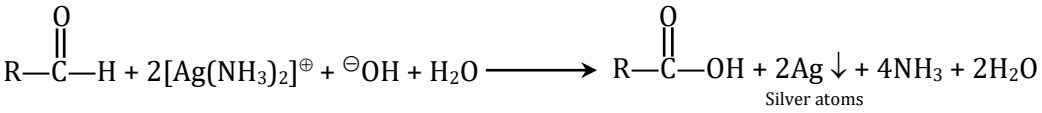


46. Ans. (C)

Methyl Ketones and alcohols like  will give Haloform reaction.

47. Ans. (B)

The reaction involved in Tollen's test is :



48. Ans. (B)

Aromatic aldehydes do not give Fehling's test.

49. Ans. (B)

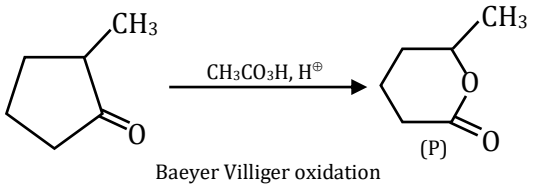
Aldehyde reacts with Benedict's reagent (blue solution) and give brick–red precipitates of $Cu_2O(s)$.

50. Ans. (D)

Brick–red colour of Cu_2O are obtained after both Fehling test and Benedict test.

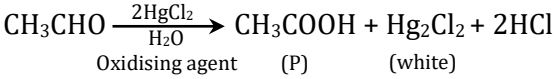
51. Ans. (B)

The product P formed is

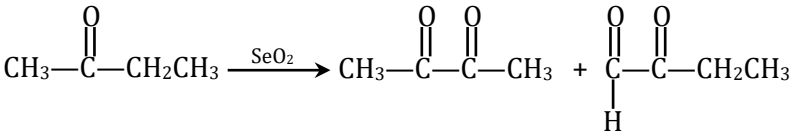


52. Ans. (C)

The reaction involved is



53. Ans. (C)

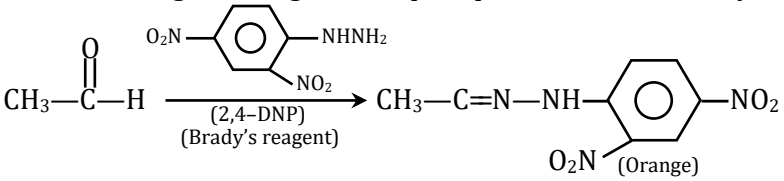


54. Ans. (C)

Conc. HNO_3 at very high temperature convert ketone to carboxylic acid.

55. Ans. (D)

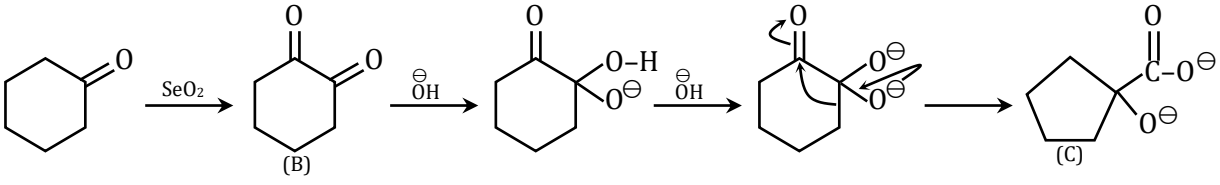
2,4–DNP will give orange colour precipitate with acetaldehyde



56. Ans. (D)

$NaHCO_3$ do not react with ketone have due to steric crowding. So, except 1 all reagent give positive test. Here aliphatic aldehyde present (given in enol form) so 4,5,6 give positive test.

57. Ans. (C)

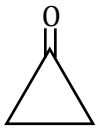


58. Ans. (A)

$CCl_3—CHO \Rightarrow$ No α–H $\Rightarrow$ No aldol condensation

Chloral

59. Ans. (C)



$\Rightarrow$ Highly strained ring easily gives cross product with maximum yield with Aldehyde.

60. Ans. (B)

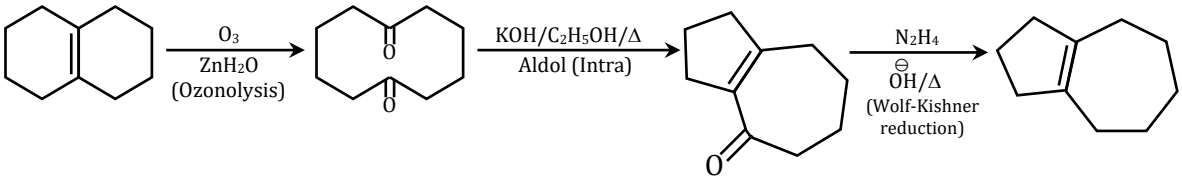
The reaction involved in Cannizzaro reaction is

$$\begin{matrix}CHO\\|\\CHO\end{matrix} \xrightarrow[\text{Conc.}]{\text{NaOH}} \underset{\text{(product)}}{\begin{matrix}CH_2OH\\|\\COO^{\ominus}Na^{\oplus}\end{matrix}}$$

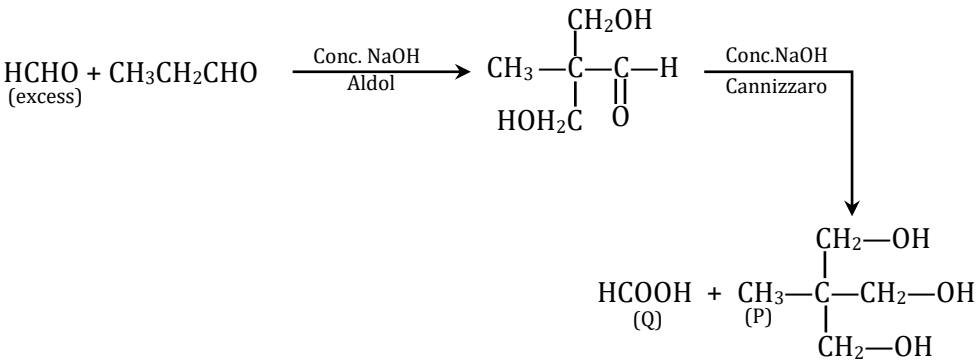
61. Ans. (B)

$H^{\ominus}$ shift is rate determination step of reaction.

62. Ans. (B)

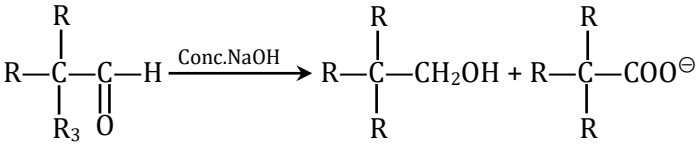


63. Ans. (D)

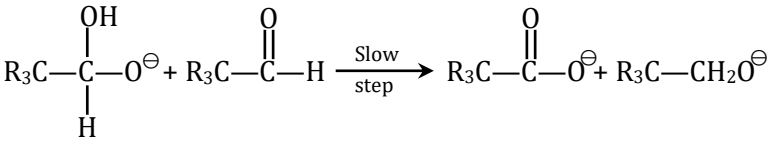


64. Ans. (D)

Cannizzaro reaction

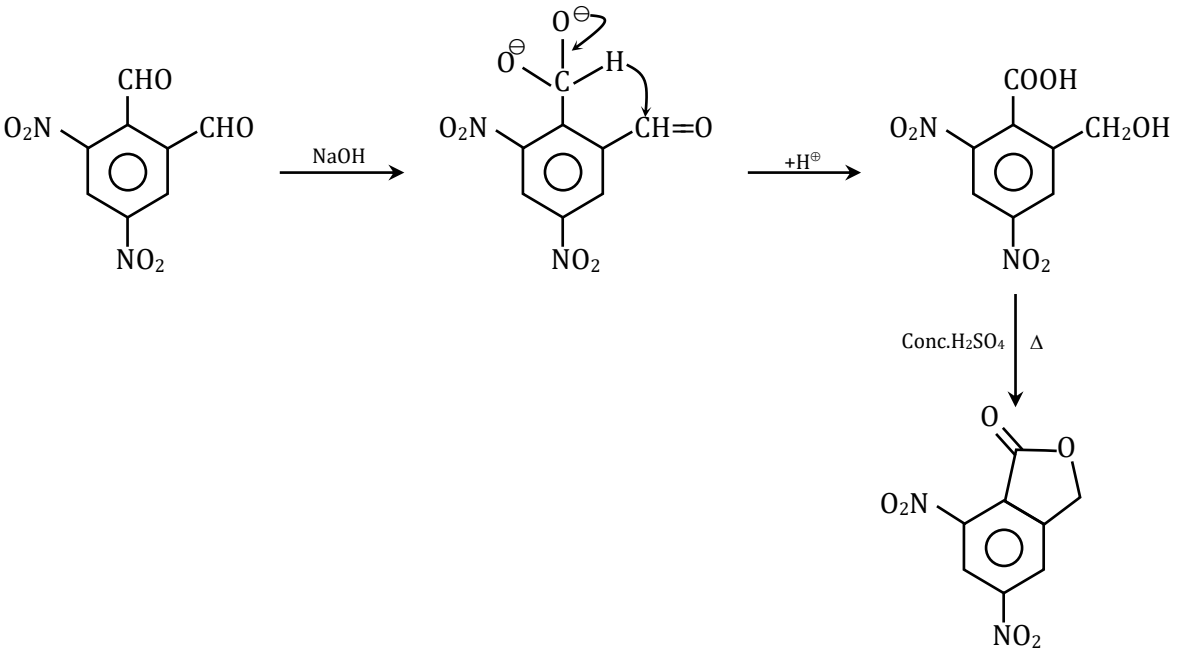


In above rate determining step is transfer of hydride ion.



Cannizzaro reaction is disproportion

65. Ans. (A)

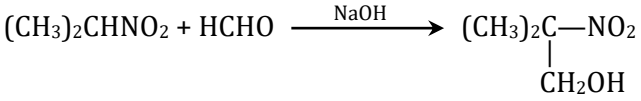


66. Ans. (B)

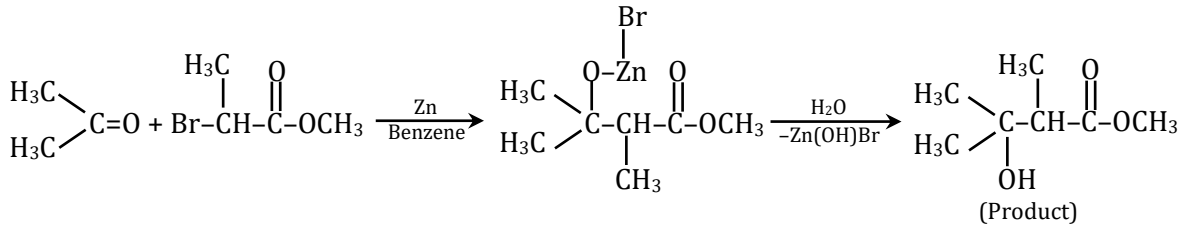
More reactive carbonyl oxidized & cross reaction carbonyl compound will reduce.

So, nitro benzaldehyde oxidized & p–methoxy benzaldehyde reduced.

67. Ans. (B)



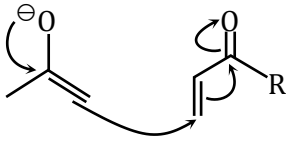
68. Ans. (B)



69. Ans. (A)

In perkin reaction, starting material is aromatic aldehyde.

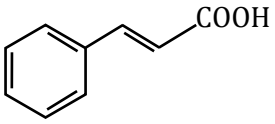
70. Ans. (A)



(α, β-Unsaturated carbonyl compound act as Michael acceptor)

71. Ans. (D)

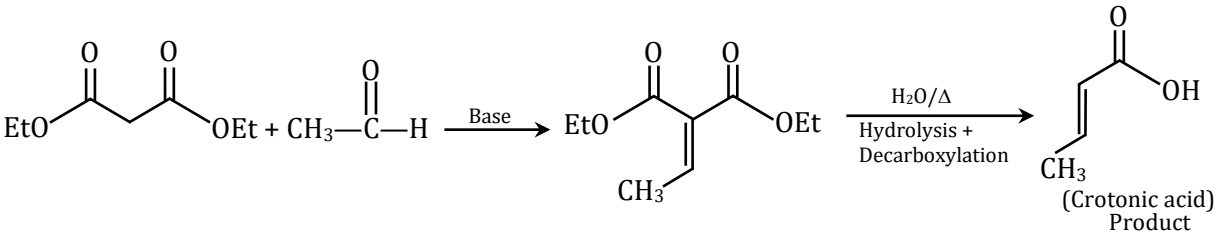
Both Perkin and Knoevenagel condensation can be used to prepare cinnamic acid.



(Cinnamic acid)

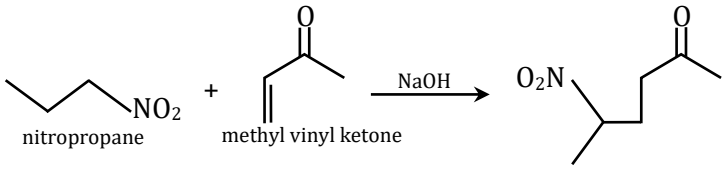
72. Ans. (B)

The given reaction is Knoevenagel condensation. The product formed is

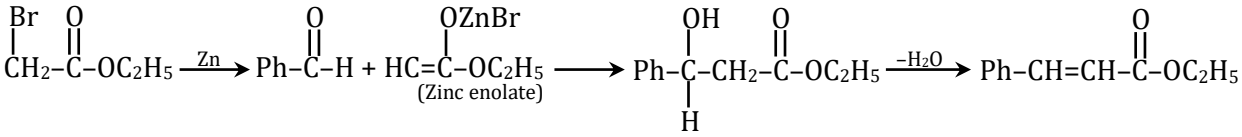


73. Ans. (B)

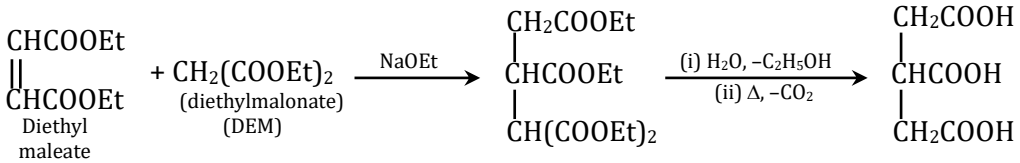
The combination of nitropropane (Michael donor) and methyl vinyl ketone (Michael acceptor) will give Michael addition reaction.



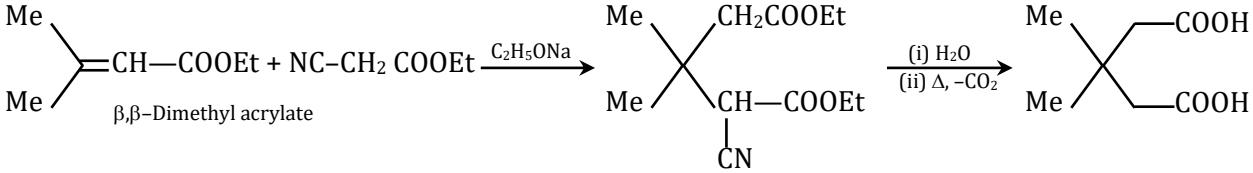
74. Ans. (A)



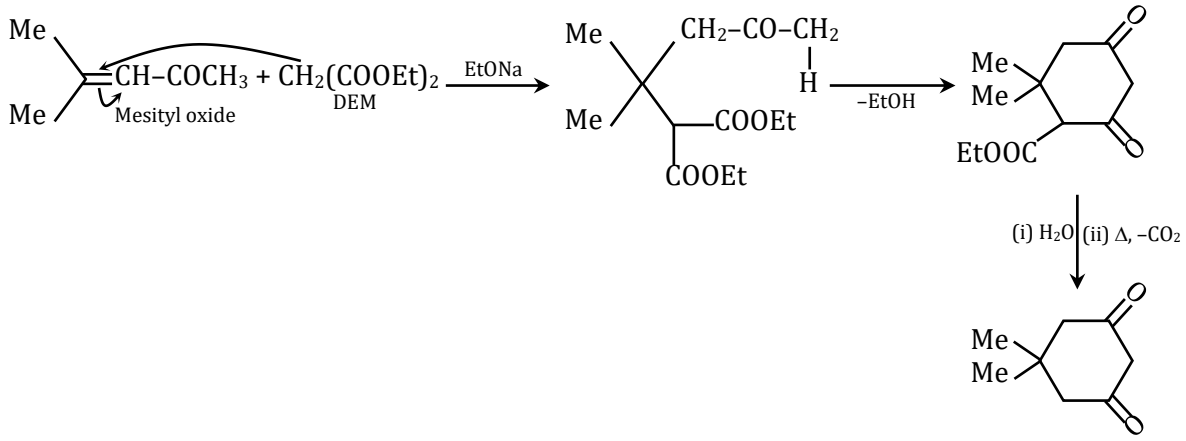
75. Ans. (C)



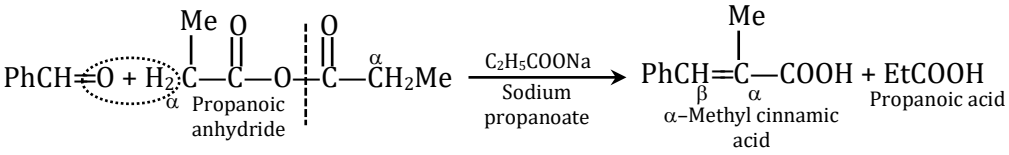
76. Ans. (B)



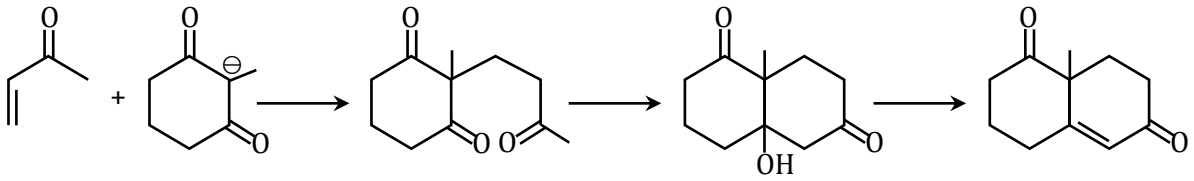
77. Ans. (B)



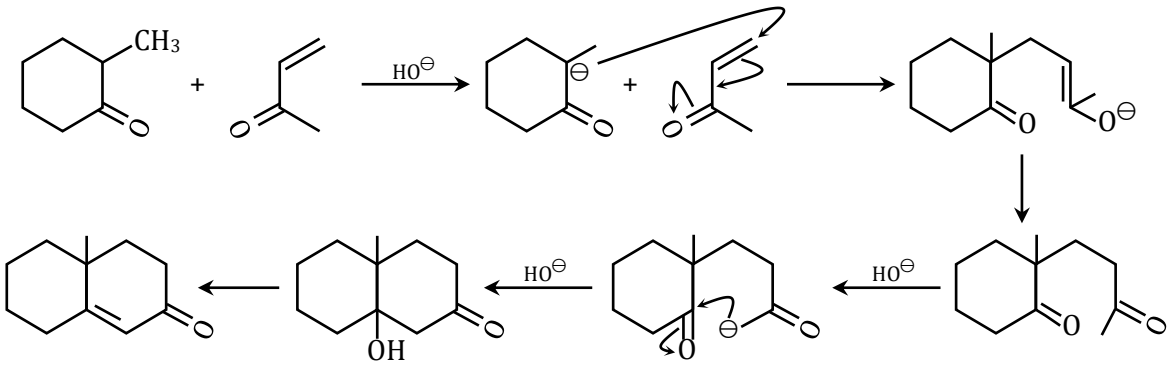
78. Ans. (A)



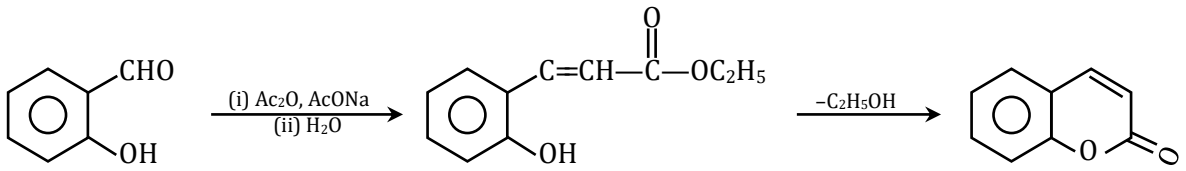
79. Ans. (C)



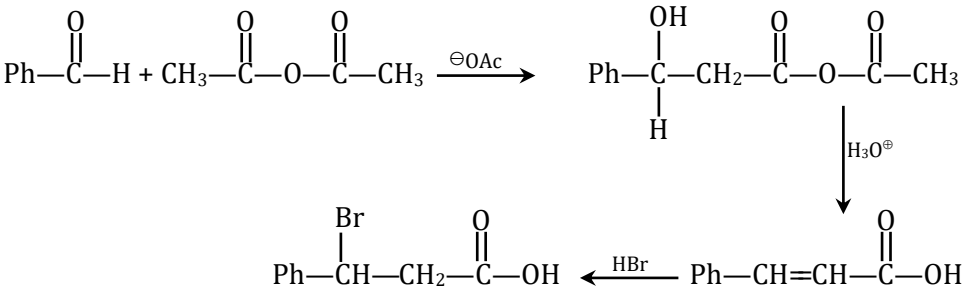
80. Ans. (C)



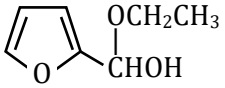
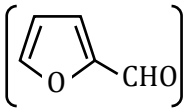
81. Ans. (B)



82. **Ans. (A)**



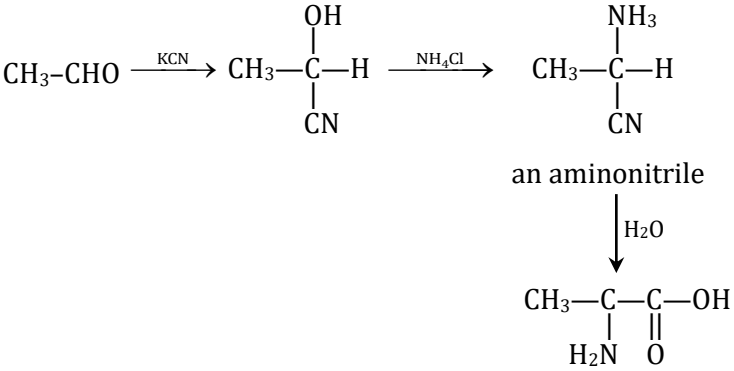
83. **Ans. (C)**

Compound  formed by the reaction of furfural  with ethanol is a hemiacetal.

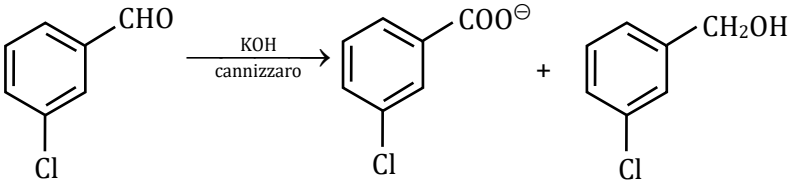
84. **Ans. (C)**

Industrial production of acetaldehyde is done by oxidation of ethylene.

85. **Ans. (A)**

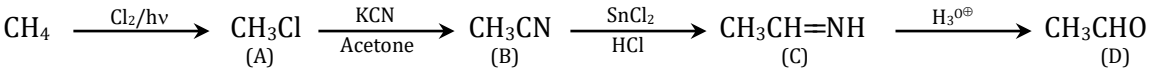


86. **Ans. (A)**



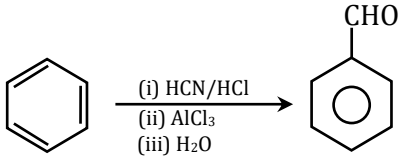
87. **Ans. (C)**

The complete reaction sequence is :



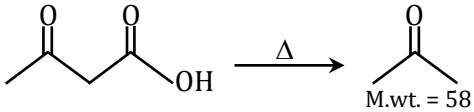
88. **Ans. (C)**

The reaction involved is



(Gattermann Formylation)

89. **Ans. (D)**

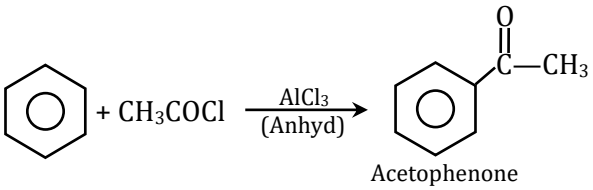


90. **Ans. (D)**

Wurtz reaction is a compiling reaction used for synthesis of higher chain hydrocarbons

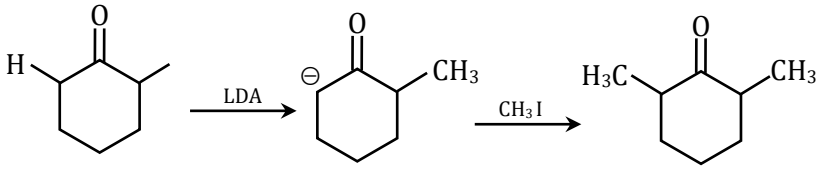
91. **Ans. (A)**

Friedel–craft's acylation of benzene with acetyl chloride gives acetophenone as product.



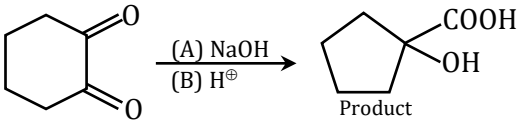
Acetophenone

92. **Ans. (C)**



93. **Ans. (B)**

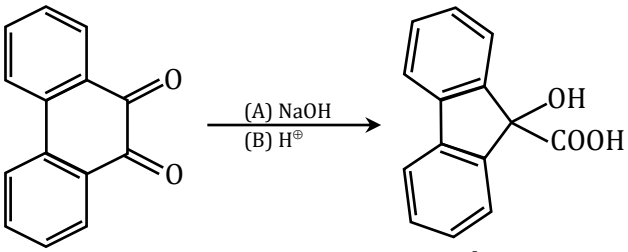
Benzil – Benzilic rearrangement reaction:



Product

94. **Ans. (D)**

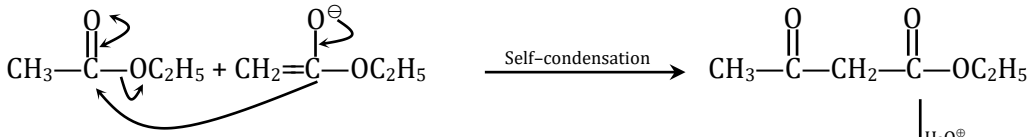
Benzil–Benzilic rearrangement reaction

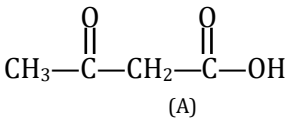


Product

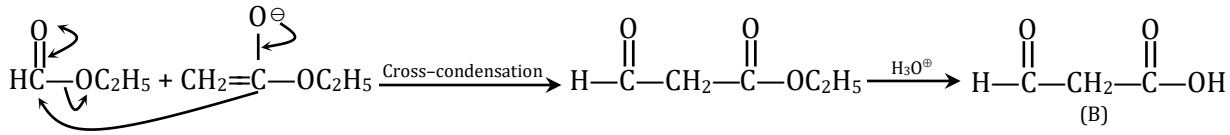
95. **Ans. (D)**

The reaction involved is



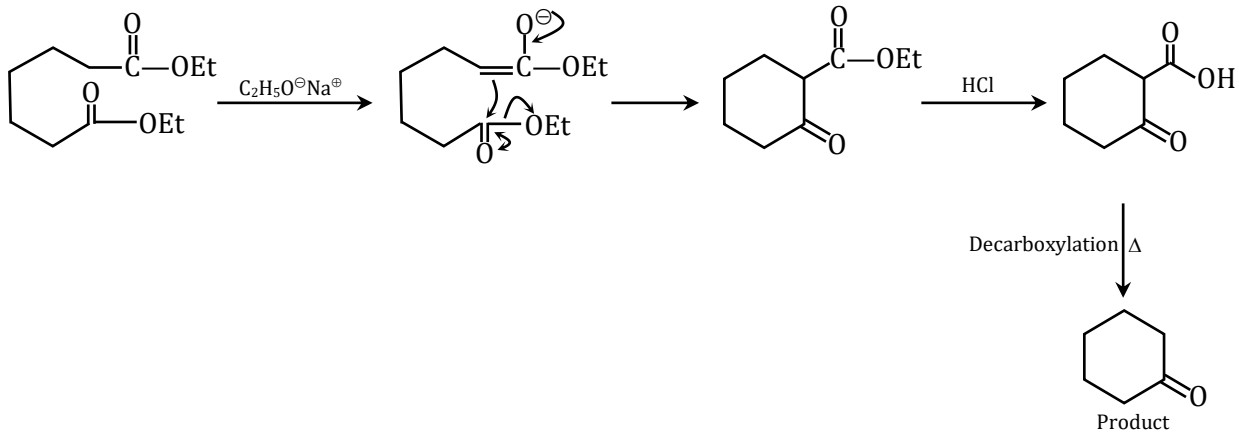


(A)

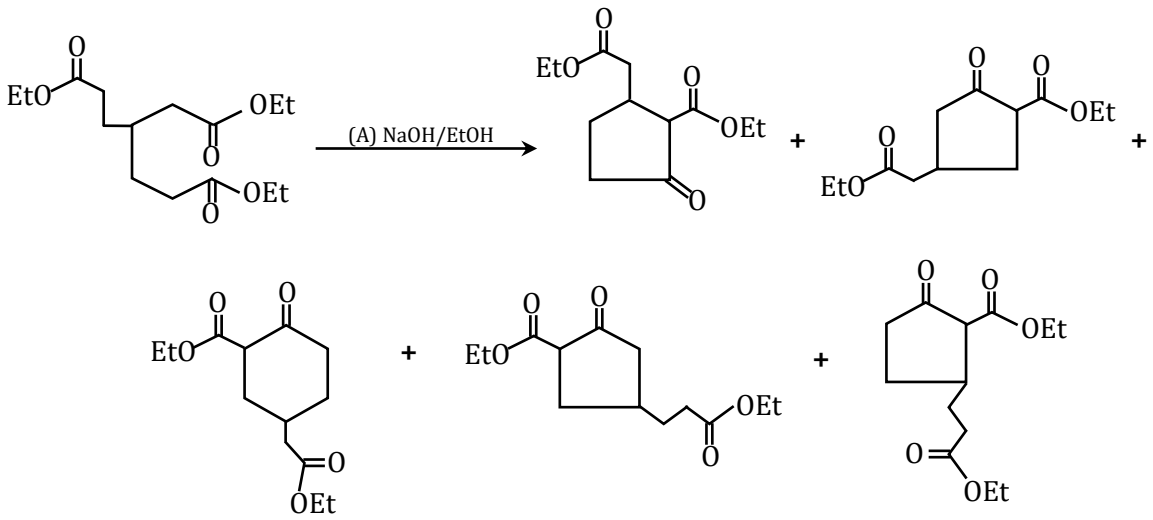


(B)

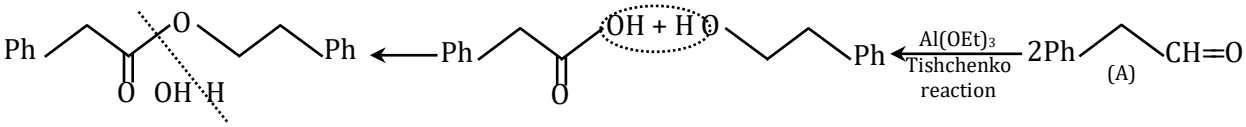
96. Ans. (B)



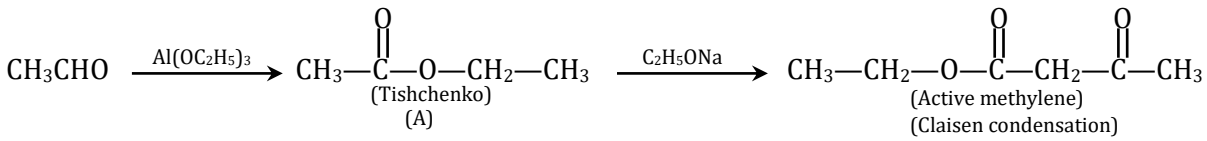
97. Ans. (D)



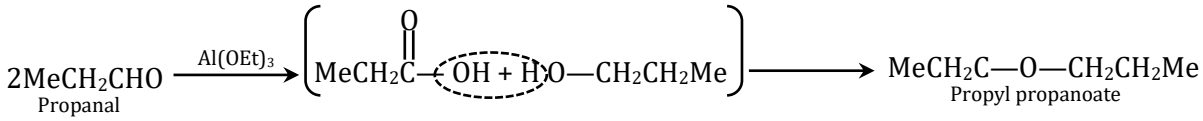
98. Ans. (A)



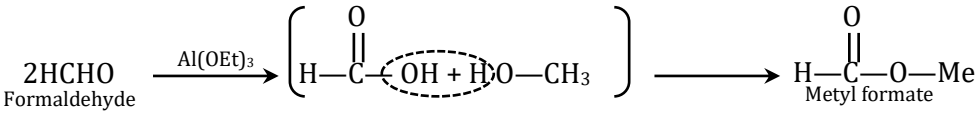
99. Ans. (A)



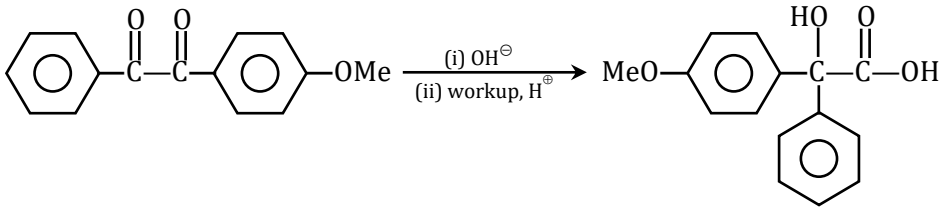
100. Ans. (A)



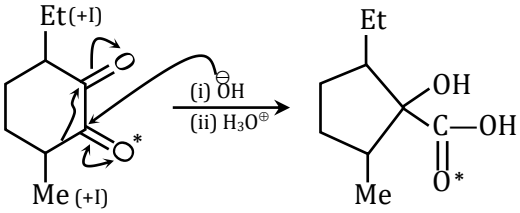
101. Ans. (C)



102. Ans. (B)



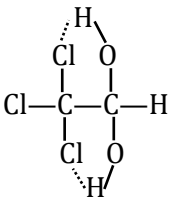
103. Ans. (A)



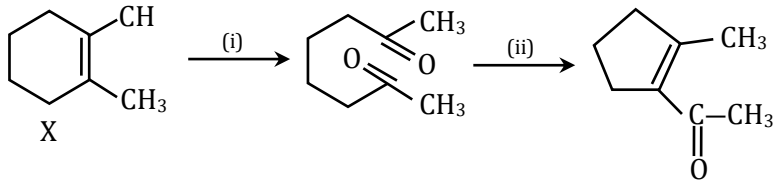
+I → –Et > –Me so –OH attack at –C=O group have Me at α–position.

104. Ans. (C)

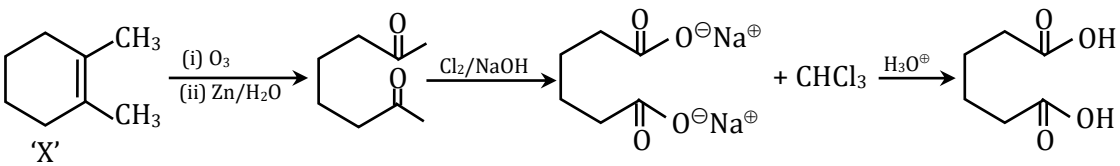
Rate of hydration of (C) chloral is very high, as it form H-bond stabilized chloral hydrate.



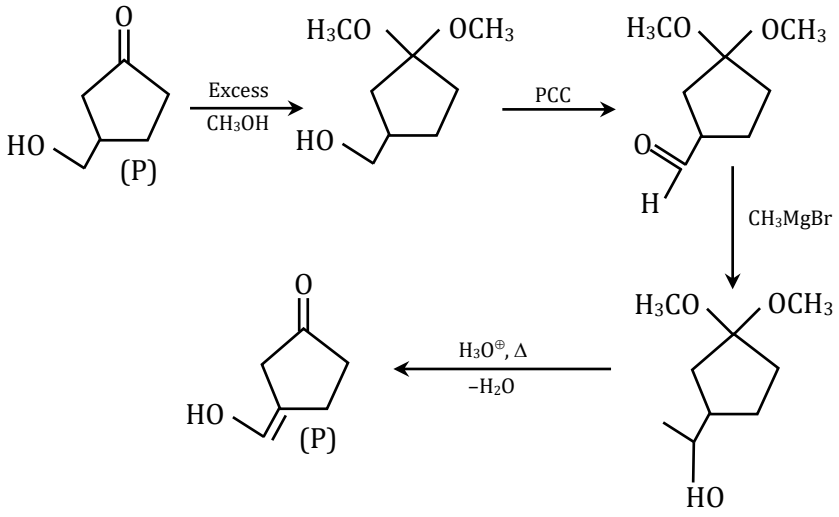
105. Ans. (C)



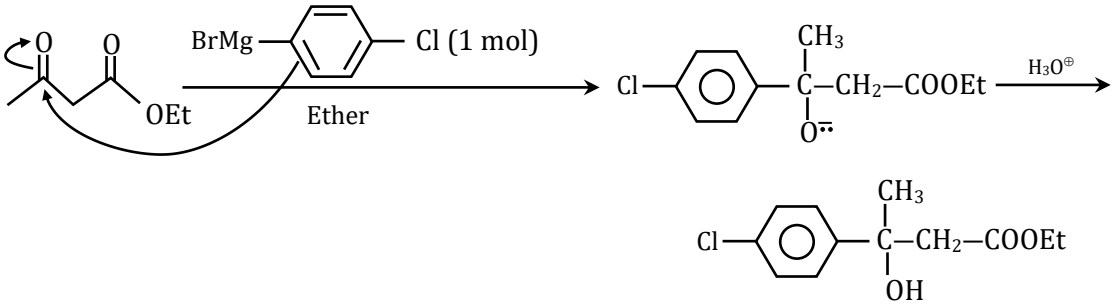
106. Ans. (C)



107. Ans. (B)

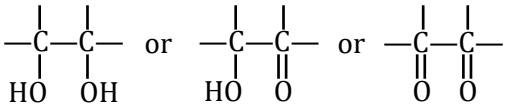


108. Ans. (A)



Ketone is more reactive than ester towards Grignard reagent.

109. Ans. (A,D)



Types compounds show reaction with HIO_4

110. Ans. (A,B,C)

PCC partially reduces 1° alcohol to aldehyde.

$KMnO_4$ and CrO_3 oxidizes 1° alcohol two carboxylic acid

111. Ans. (A,B,D)

$MnO_2 \rightarrow$ selectively oxidizes allylic & benzylic alcohol so here benzylic alcohol only oxidize.

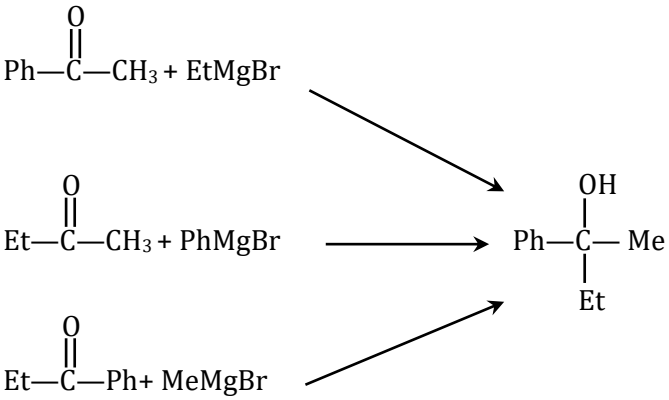
Rest reagent oxidizes both –OH group

112. Ans. (A,D)

Aldehydes and Methyl ketones give $NaHSO_3$ test

Acetophenone doesn't give product on reaction with $NaHSO_3$ due to steric crowding.

113. Ans. (A,B,C)

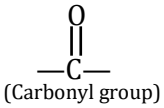


114. Ans. (A,B,C,D)

Stability of carbonyl group hydrate depends upon following factor :

(A) Steric factor (B) Intra-H-Bonding

115. Ans. (A,B)



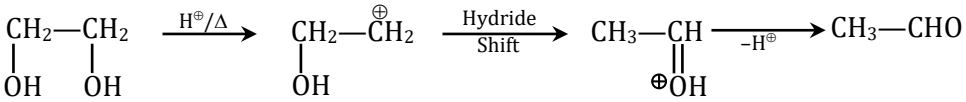
(A) –I effect = decreases electron deficiency at carbonyl carbon so reactivity increases.

(B) Reactivity $\propto \frac{1}{\text{Steric crowding}}$

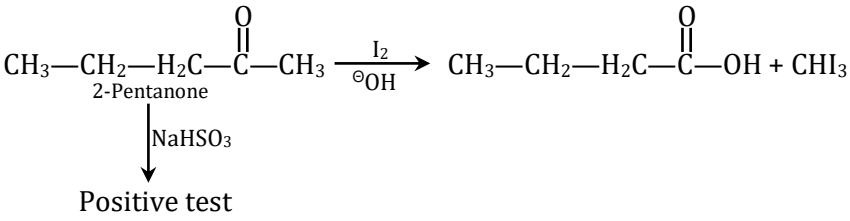
So, it is correct (C) Reactivity $\propto \frac{1}{+I}$

So, it is incorrect

116. Ans. (A,B,C)



117. Ans. (A,B)



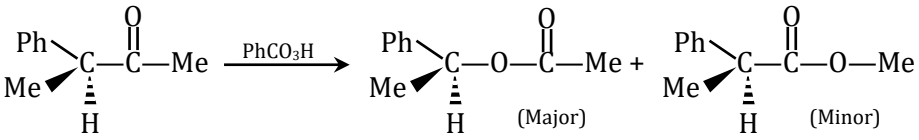
But 3-pentanone can't give positive test with I_2/ NaOH and $NaHSO_3$. But both will give the test with NaCN/HCl & 2, 4–DNP.

118. Ans. (A,C)

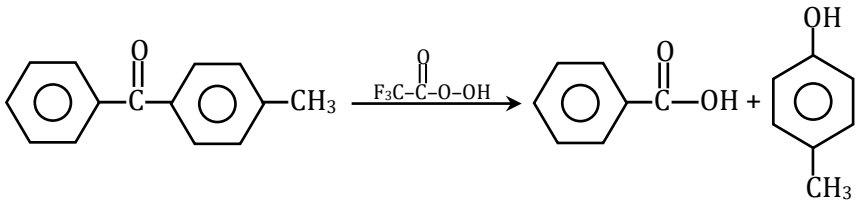
All the given reagent can oxidise aldehyde to carboxylic acid.

119. Ans. (A,B)

This is Baeyer villiger oxidation and the methyl group is the weakest migrating group



120. Ans. (B,C)



121. Ans. (B,C)

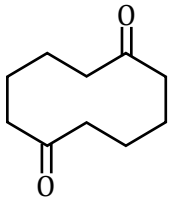
In A & C Alkyl group migrate from carbon to electron deficient carbon & nitrogen respectively. BVO & in cummenehydroperoxide, Alkyl group migrate towards electron deficient Oxygen.

122. Ans. (A,C,D)

For silver mirror test compound must have an aldehydic group or α-hydroxy aldehyde/ketone. Here Ph—OH can't give silver mirror test.

123. Ans. (B,C,D)

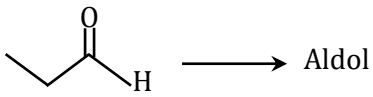
Compounds having α–H to the carbonyl group shows aldol reaction



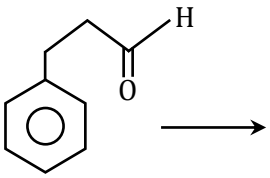
it has 8 α–H so it shows aldol reaction

Rest of the compounds do not have α–H so do not show aldol reaction.

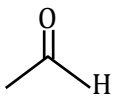
124. Ans. (A,B)



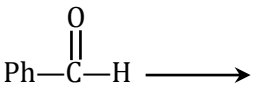
Aldol



Aldol



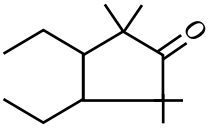
Haloform & aldol



Haloform

125. Ans. (A,B,D)

Compounds don't have α-H can never show aldol condensation reaction.



⟶ Can't show aldol

Rest compounds A,B and D show aldol condensation due to α–H present on it.

126. Ans. (A,B,D)

Carbonyl compounds having α-H/D show aldol but not cannizzaro reaction.

$CCl_3—\overset{\overset{O}{\|}}{C}—H$ It shows nucleophilic substitution reaction.

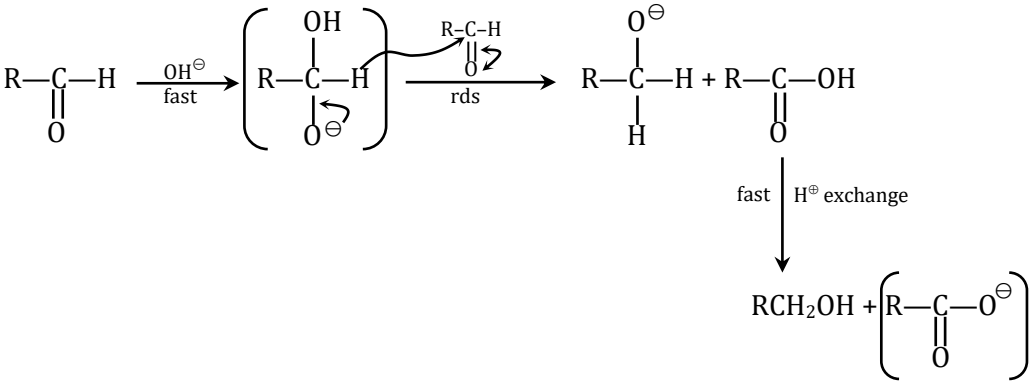
$$CCl_3—\overset{\overset{O}{\|}}{C}—H \xrightarrow{NaOH} CHCl_3 + HCOONa$$

127. Ans. (A,B,C)

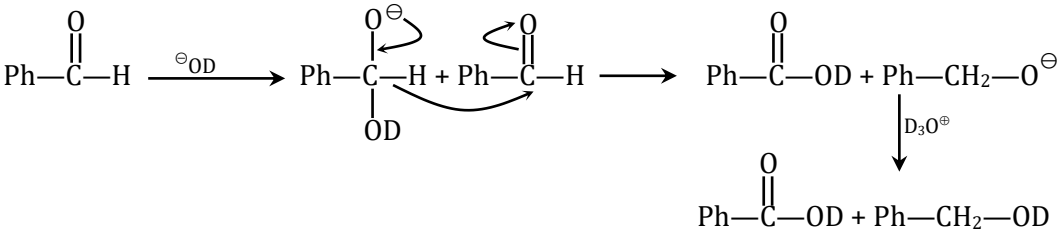
Carbonyl compounds having α-H/D show aldol but not cannizzaro reaction.

$D_3C—\overset{\overset{O}{\|}}{C}—H$ have α–D hence it shows aldol but can't cannizzaro.

128. Ans. (A,B,C,D)



129. Ans. (A,C)



130. Ans. (B,C)

Compounds having α-H give aldol reaction

$H—\overset{\overset{O}{\|}}{C}—H$, $(CH_3)_3C—\overset{\overset{O}{\|}}{C}—H$ don't have α-H so no aldol reaction takes place.

131. Ans. (A,B,C)

$$CH_3—\overset{\overset{O}{\|}}{C}—CH_2—CH_3 \xrightarrow{D_2O(excess)OH^{\ominus}} CD_3—\overset{\overset{O}{\|}}{C}—CD_2—CH_3$$

Similarly, all aldehyde/ketone having α-H can undergo deuterium exchange

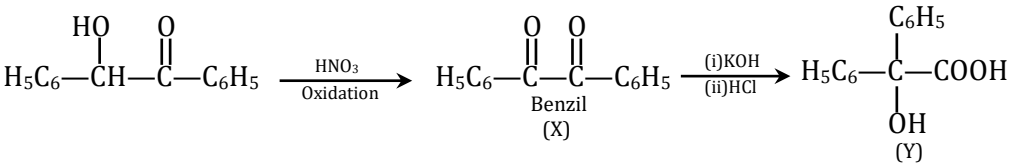
132. Ans. (A,B,D)

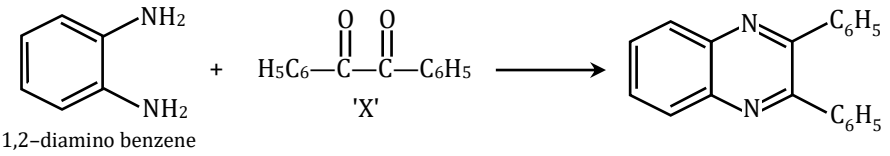
(A) it is Perkin reaction and it will give Ph—CH=CH—COOH (Cinnamic acid)

(B) it is Knoevenagel condensation and the given reaction forms cinnamic acid.

(D) it is reformatsky reaction and the given reaction also give cinnamic acid.

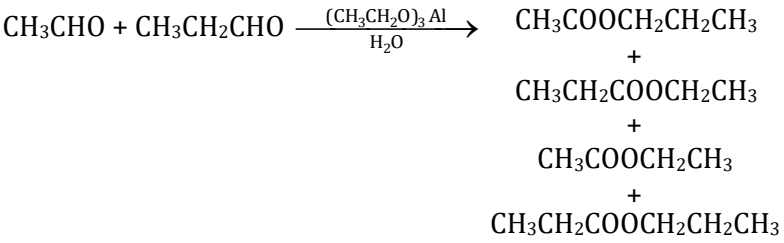
133. Ans. (A,B,C)



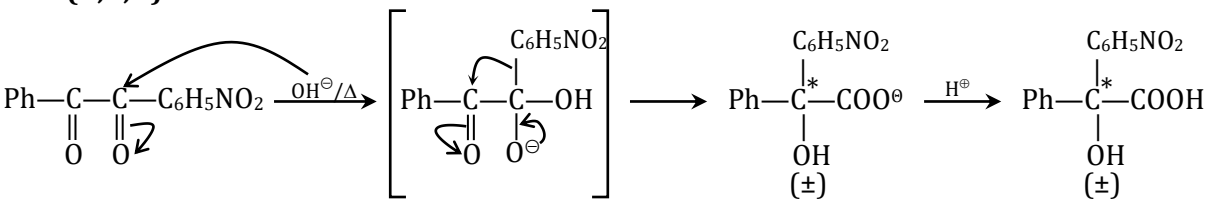


134. Ans. (A,B,C,D)

The reaction involved is

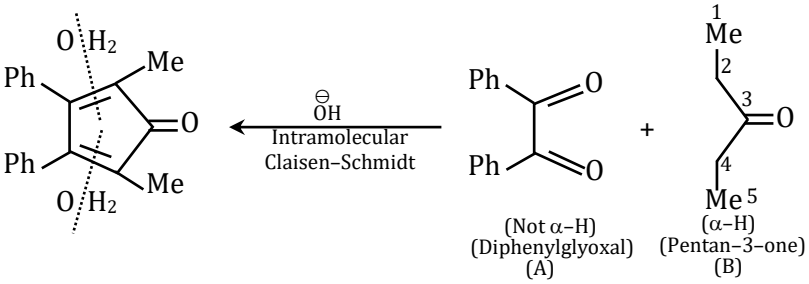


135. Ans. (A,B,D)



It is Benzil-benzilic acid rearrangement reaction.

136. Ans. (A,B)



137. Ans. (C)

Here x > 7, it is because HCN is weak acid. So, base is req. to remove H^+ from HCN to produce good Nucleophile ($CN^{\ominus}$).

138. Ans. (A)

For nucleophilic addition reaction medium should be slightly acidic, hence value of $y \leq 4.5$.

Here y = 1.5 is not correct because it is highly acidic.

139. Ans. (A)

(A) 2° alcohol so give Lucas test.
Also give haloform test. (q,r)

(B) Haloform test, 2,4—DNP test(q,t)

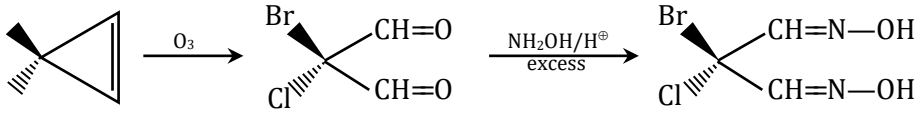
(C) It give the test with $NaHCO_3$ (P)

(D) $\begin{matrix}3H—C=O\\ |\\ H—C=O\end{matrix}$ → tollen test = positive

2,4 DNP test = positive

EXERCISE - S

1. Ans. (4)



Total isomeric product = 4

cis–cis
trans–trans
cis R trans
trans S cis

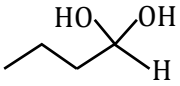
2. Ans. (3)

For silver mirror test compound must have an aldehydic group or α-hydroxy aldehyde/ketone.

Ph—CHO, $CH_3—\underset{\underset{\text{(α–hydroxy aldehyde)}}{}}{\overset{\overset{O}{\|}}{C}}—\overset{OH}{\overset{|}{CH_2}}$, $CH_3—\underset{\underset{\text{(α–hydroxy ketone)}}{}}{\overset{\overset{O}{\|}}{C}}—\overset{OH}{\overset{|}{CH}}—CH_3$ will give tollens test

3. Ans. (6)

1. Acetaldehyde 2. Benzaldehyde 3. Formaldehyde

7. 

8. Crotonaldehyde 9. 3–hydroxy–2–butanone

4. Ans. (7)

Aldehydes, α–hydroxy ketones, α–hydroxy aldehydes give positive tollens test.

Compounds are 1, 2, 3, 6, 7, 9, 10

5. Ans. (4)

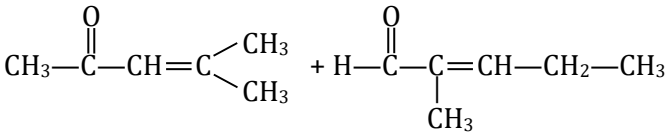
Generally compound having $\left(—\overset{\overset{O}{\|}}{C}—CH_3\right)$ group will give haloform test and also active methylene so A,E,F don't give haloform test.

6. Ans. (12)

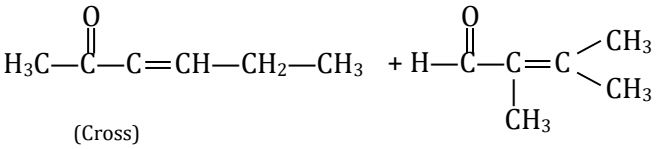
$CH_3—CH=O + CH_3CH_2—CH=O \xrightarrow{HO^{\ominus},\ \Delta}$ $CH_3—\overset{*}{C}H—\overset{*}{C}H—CHO$ (D) + $CH_2(CH_3)—\overset{*}{C}H—\overset{*}{C}H—CHO$ (D)

+ $CH_3—CH_2—\overset{*}{C}H—CH_2—CHO$ (B) + $CH_3—\overset{*}{C}H—CH_2—CHO$ (B)

7. Ans. (6)



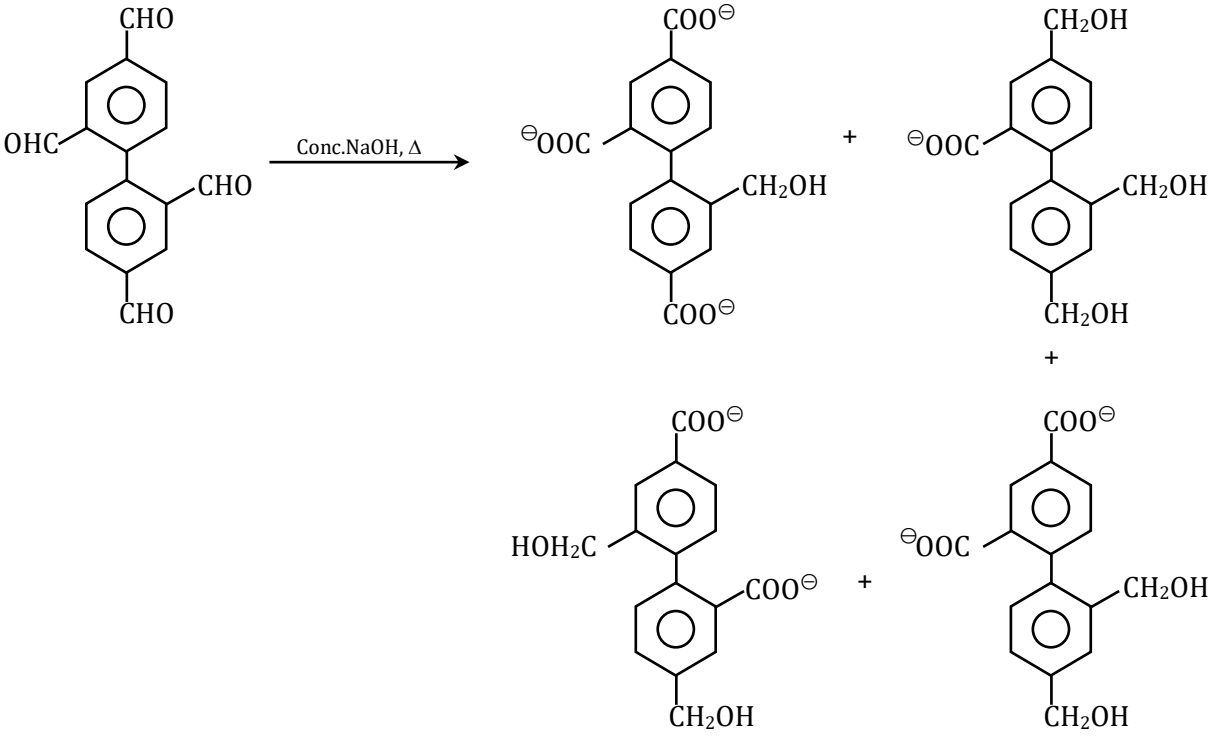
(Self) (Self) (E+Z) (B)



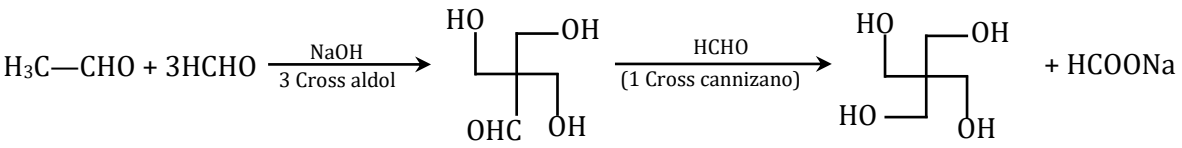
(Cross) (E+Z) (B) (Cross)

Total possible product = 1 + 2 + 2 + 1 = 6

8. Ans. (4)

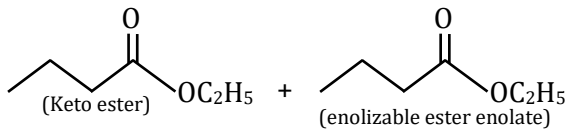


9. Ans. (1)



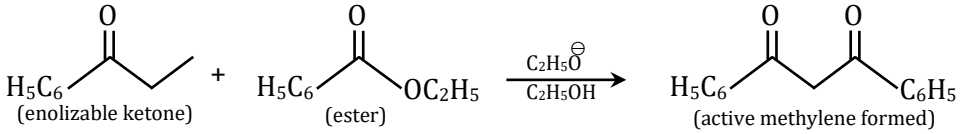
10. Ans. (4)

Enolate of esters attack on keto form of ester of active methylene product formed in Claisen ester condensation.

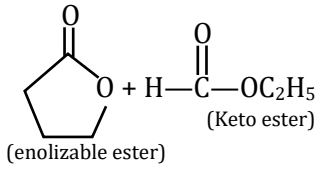
(A) 

So Claisen condensation occur.

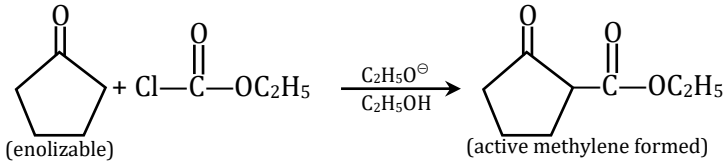
(B) No ester is present so no Claisen ester condensation takes place.

(C) 

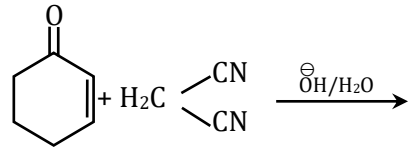
So Claisen ester condensation occur.

(E) 

(Claisen condensation occur)

(F) 

So Claisen condensation in nature.

(G) 

No ester, no Claisen condensation reaction

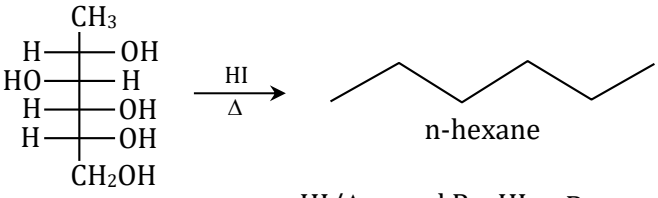
(H) No ester presents so not a Claisen condensation reaction.

a,c,e,f are Claisen condensation in nature.

EXERCISE - JEE (Main) PYQ

1. Ans. (4)

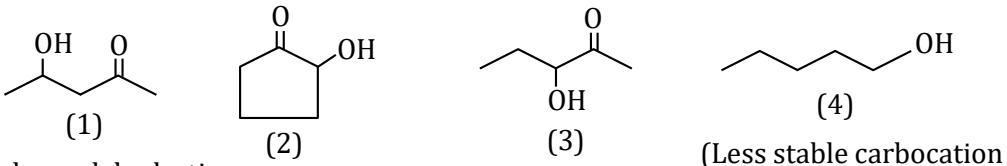
Glucose on prolonged heating with HI gives n-hexane as product.



HI/Δ or red P + HI Remove all oxygen from the group

2. Ans. (1)

Rate of dehydration in acidic conditions $\propto$ stability of carbocation formed after removal of H_2O.



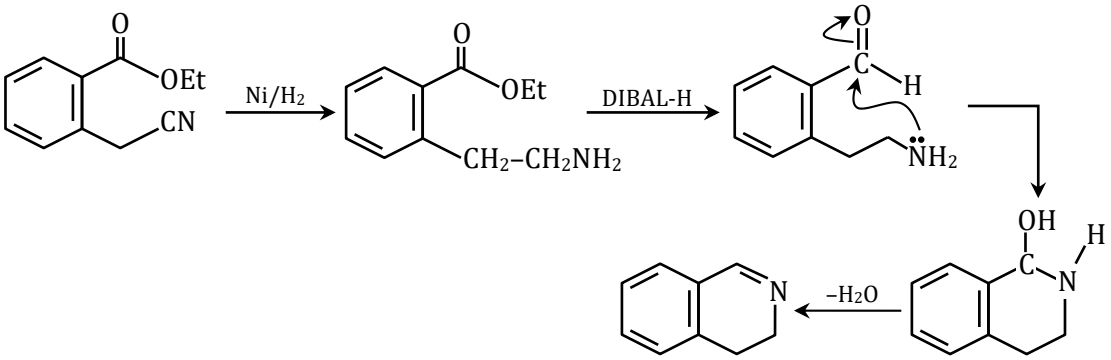
Undergo dehydration easily

Form highly unstable Carbocation

(Less stable carbocation Will form)

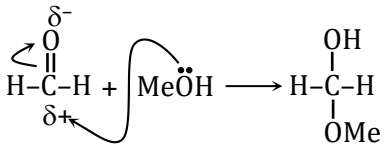
3. Ans. (2)

The reaction involved is:

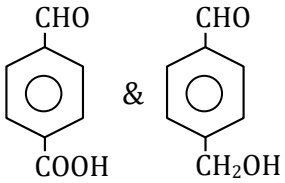


4. Ans. (1)

The reactivity of HCHO towards nucleophilic addition reaction is more due to less hinderance and absence of electron donating group. Also MeOH is a less hindered nucleophile. So, Reaction will be fast.



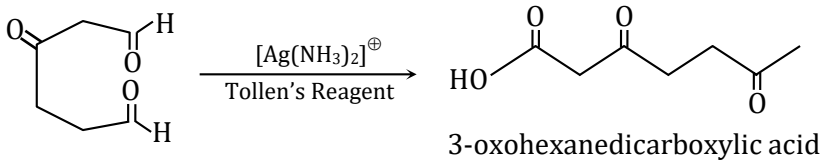
5. Ans. (2)



These compound carry active-H or acidic H directly connected to O-atom. So, alkane Product will be obtained on reaction with 1eq. of Grignard reagent and Grignard regent will not react with carbonyl carbon.

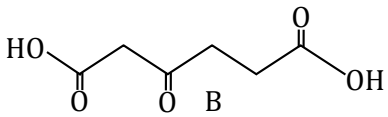
6. Ans. (1)

Given : X absorbs = 2 H_2 molecules , so DOU = 2

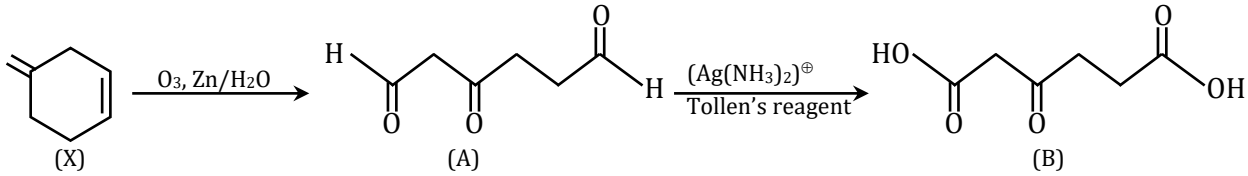


3-oxohexanedicarboxylic acid

B → 3-oxohexanedicarboxylic acid

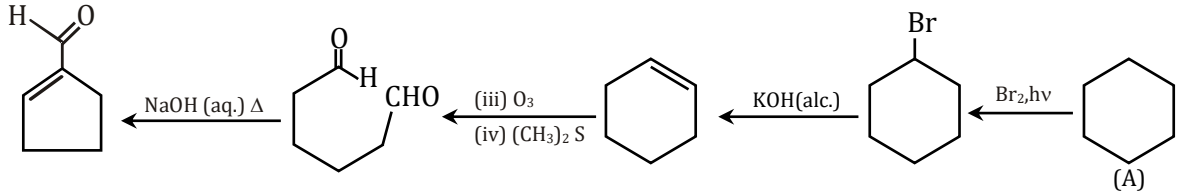


Going in opposite direction we get.

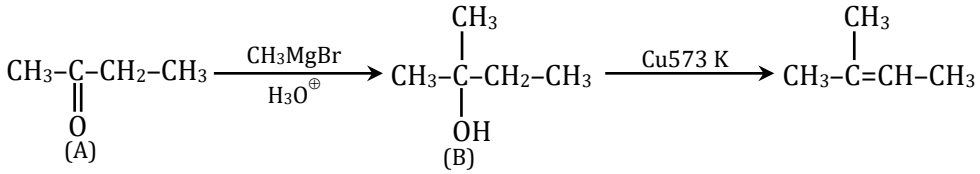


7. Ans. (3)

The compound A can be :



8. Ans. (66.65 to 66.70)



C ⇒ 12 × 4 = 48

H ⇒ 8 × 1 = 8

O ⇒ 16 × 1 = 16

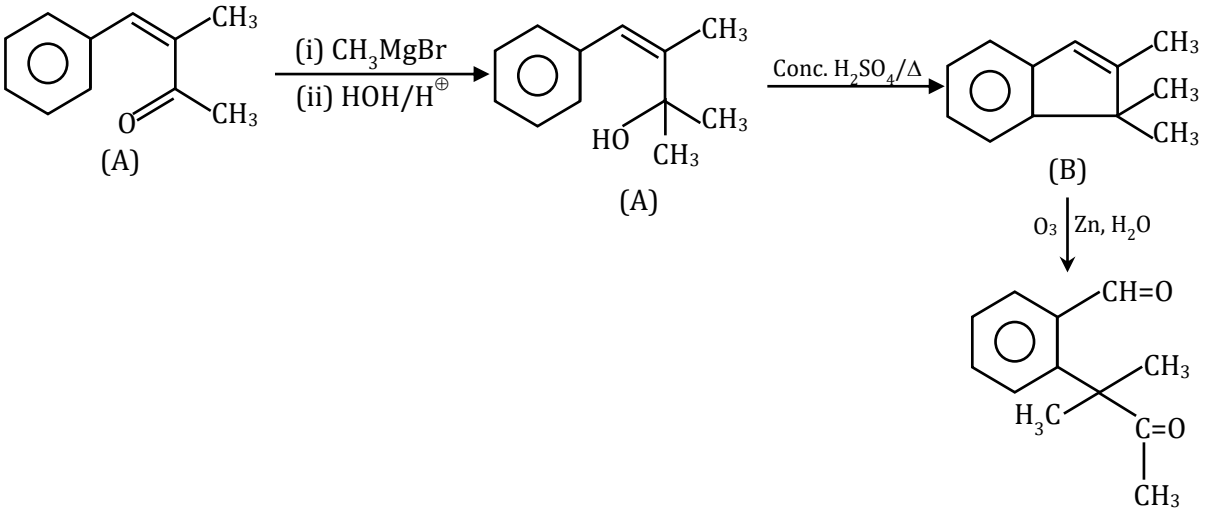
———————

Total 72

$\%\ \text{of C} = \frac{48}{72} \times 100 = 66.67\ \%$

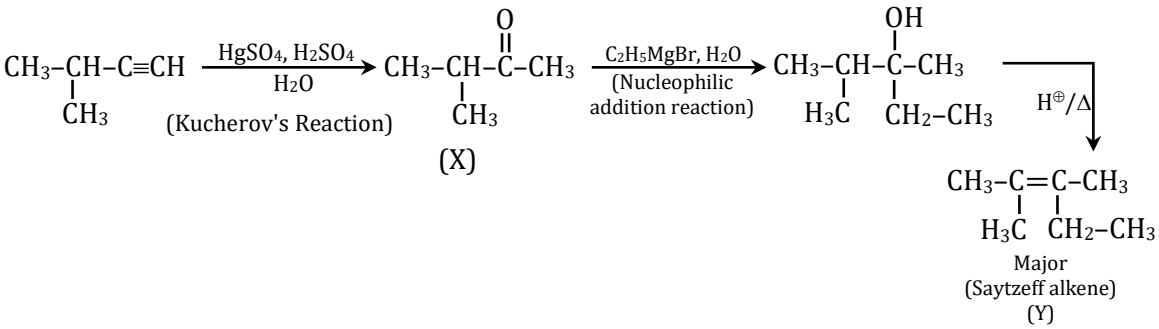
9. Ans. (4)

The complete reaction sequence is :

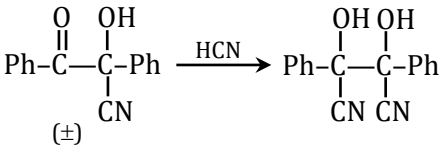


10. Ans. (3)

The complete reaction sequence is:



11. Ans. (3)



3 stereoisomers

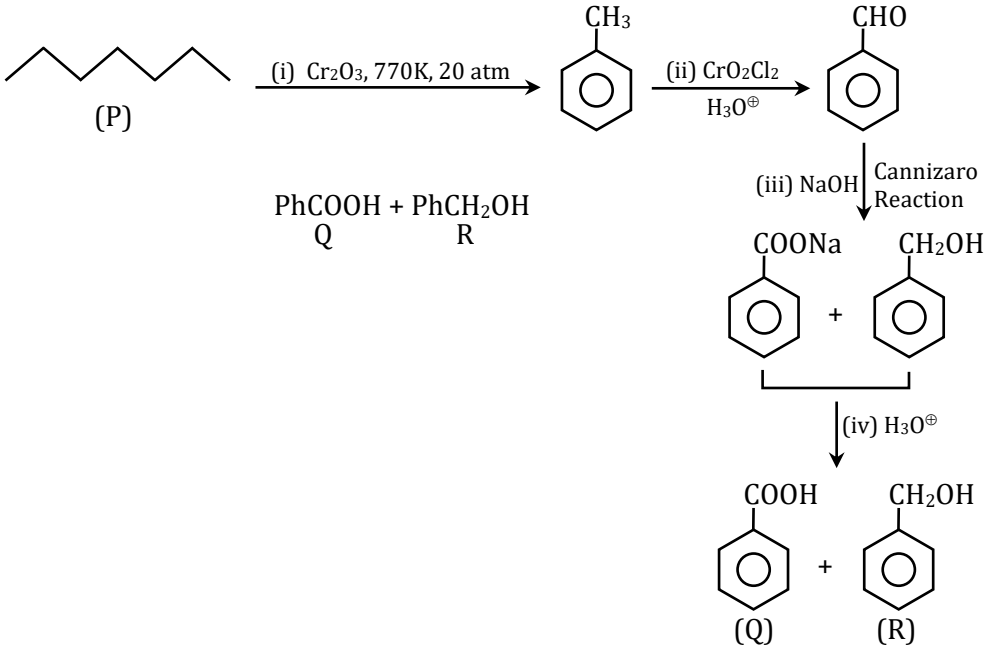
12. Ans. (1)

For Assertion :Acetal and ketals are basically ethers hence they must be stable in basic medium but should break down in acidic medium.

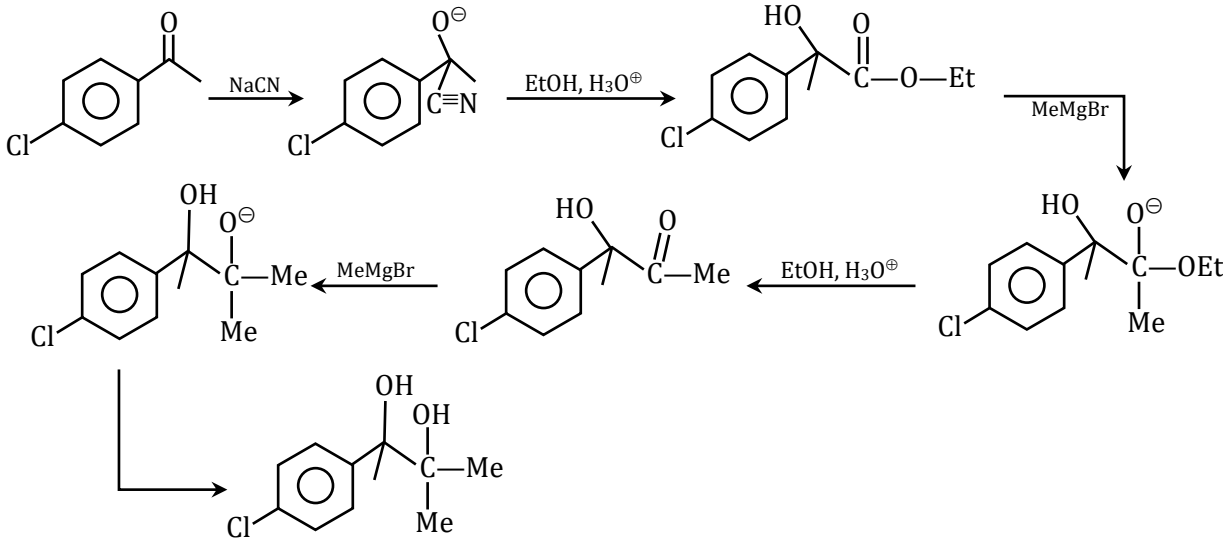
Hence assertion is correct.

For reason: Alkoxide ion ($RO^{\ominus}$) is not considered a good leaving group hence reason must be false

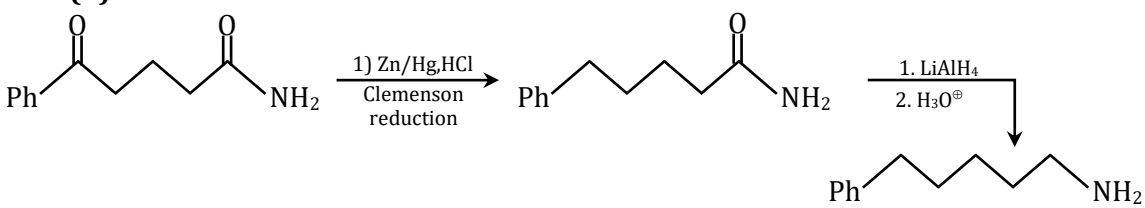
13. Ans. (1)



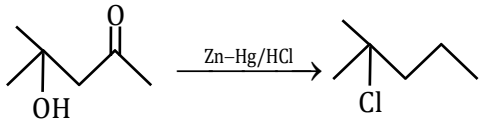
14. Ans. (2)



15. Ans. (3)

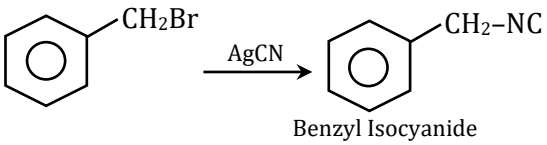


16. Ans. (1)

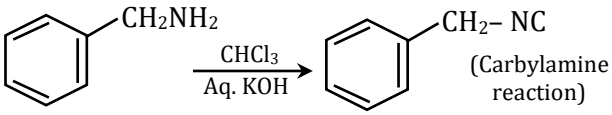


The acid sensitive alcohol group reacts with HCl, hence Clemmenson reduction is not suitable for above conversion.

17. Ans. (3)

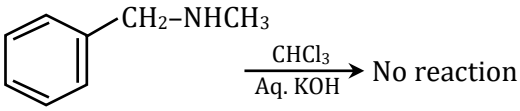


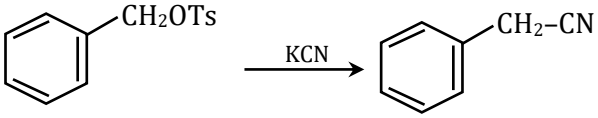
Benzyl Isocyanide



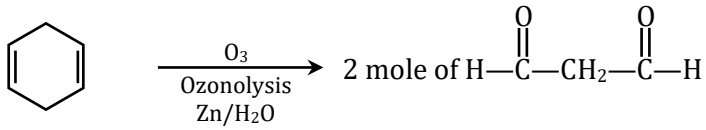
(Carbylamine reaction)

Benzyl Isocyanide



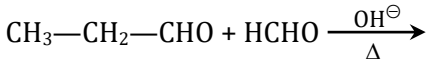


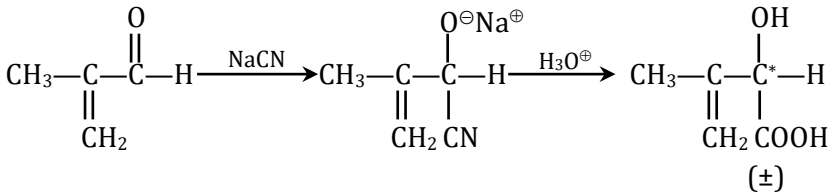
18. Ans. (4)



(C_6H_8)
(Cyclohexa-1), 4-diene)

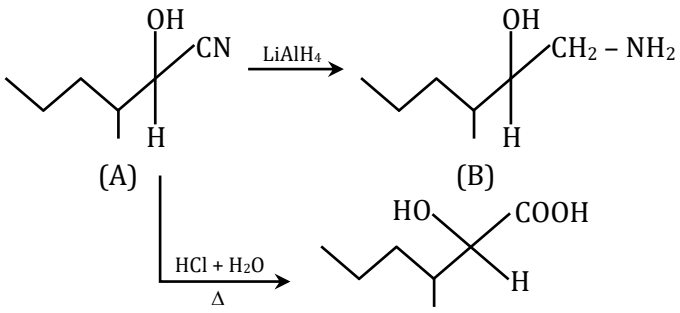
19. Ans. (3)



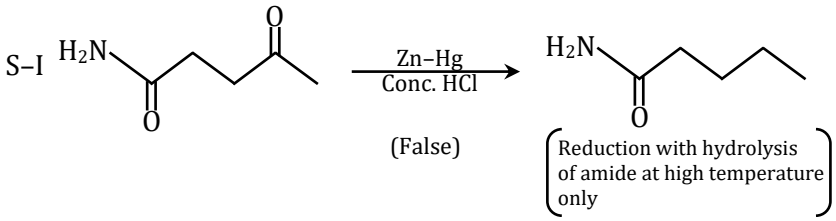


Carboxylic acid will give CO_2 gas, with $NaHCO_3$ solution

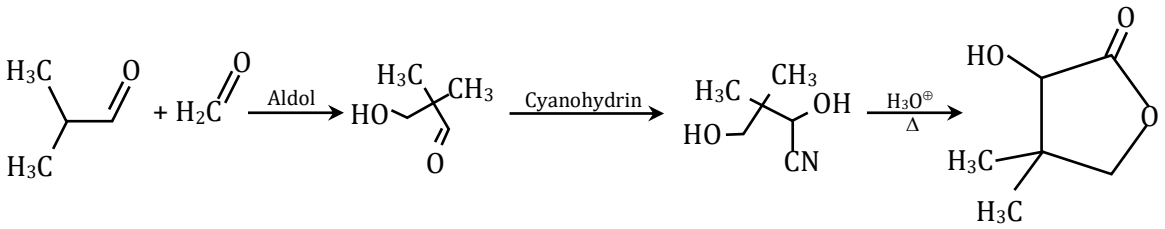
20. Ans. (4)



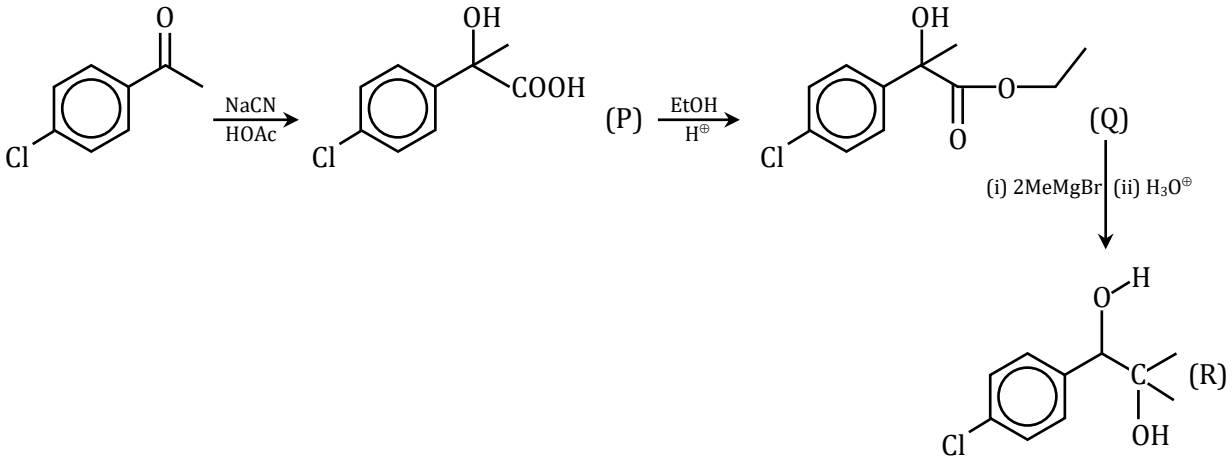
21. Ans. (3)



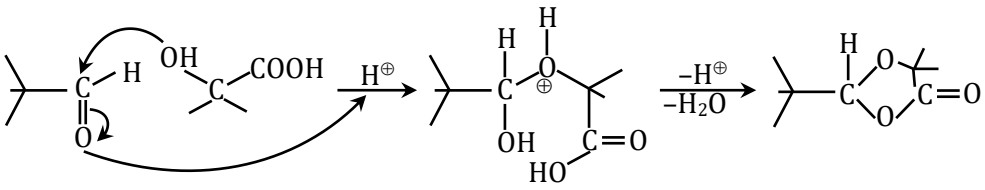
22. Ans. (1)



23. Ans. (2)

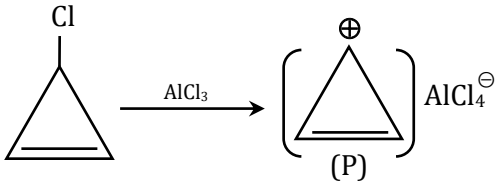


24. Ans. (2)

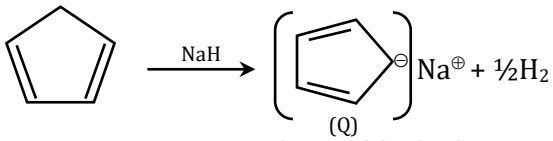


EXERCISE - JEE (Advanced) PYQ

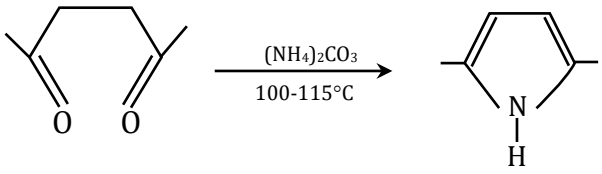
1. Ans. (A,B,C,D)



2π electron (delocalized)
(Aromatic Nature)

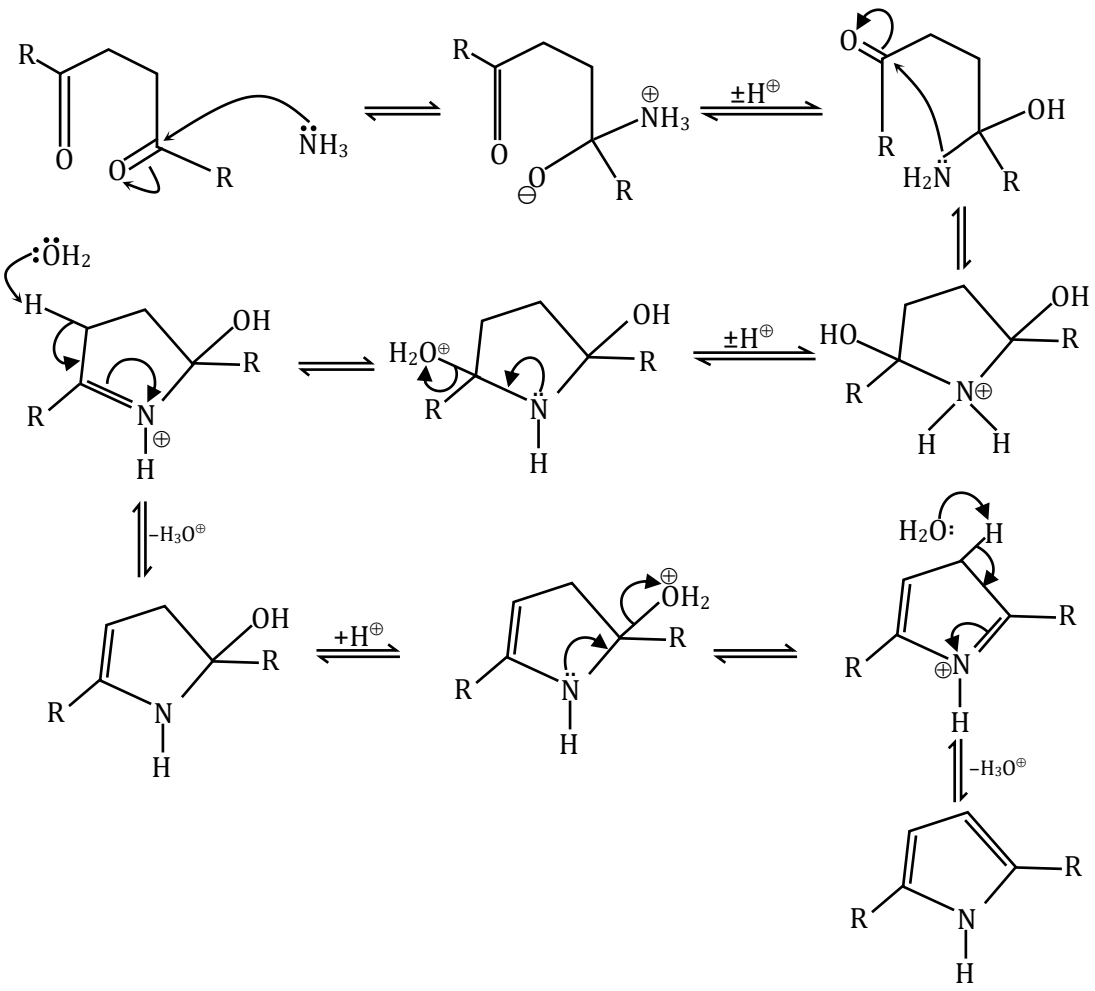


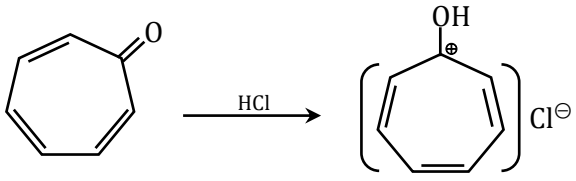
6π electron (delocalized)
Aromatic Nature)



(R)6π-electron (delocalized)
Aromatic nature

Mechanism :



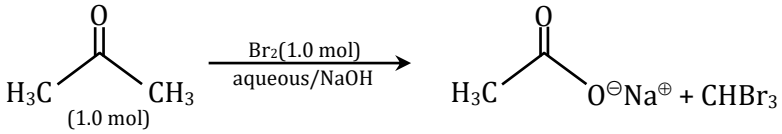


(S)

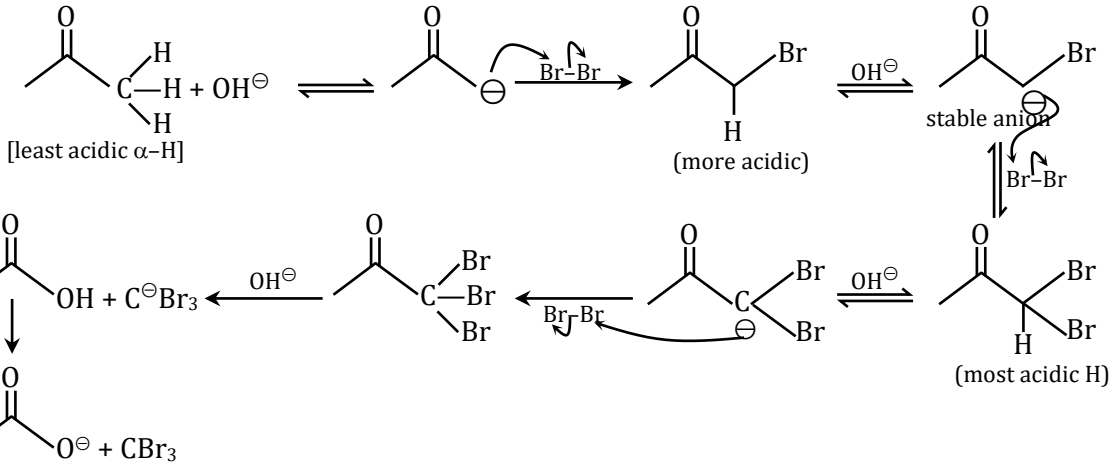
6π electron (delocalized) (Aromatic)

2. Ans. (C)

Reaction I :

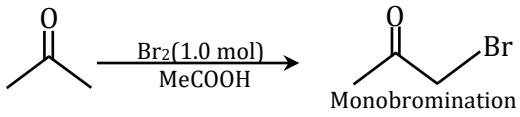


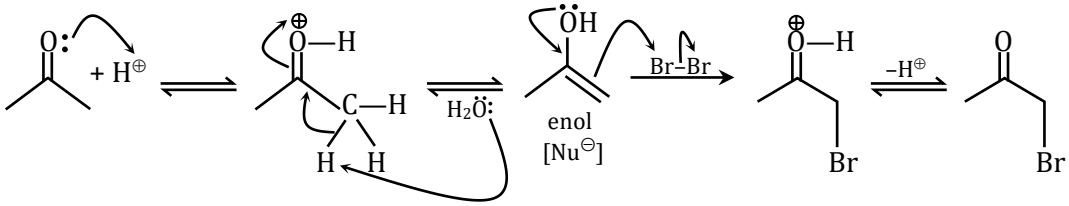
Mechanism



In basic medium halogenation does not stop with replacement of just one hydrogen and poly halogenation takes place because α-haloketones are more reactive towards base and haloform reaction takes place In above reaction Br_2 is limiting reagents.

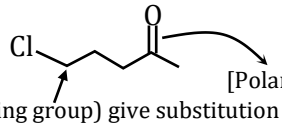
Reaction II :





Further bromination is less favourable because of less amount of Br_2 & α hydrogen is not sufficiently acidic so rate will be slow.

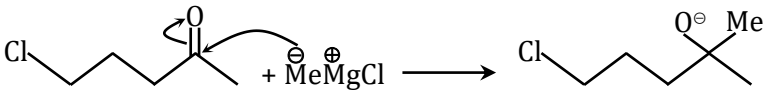
3. Ans. (D)



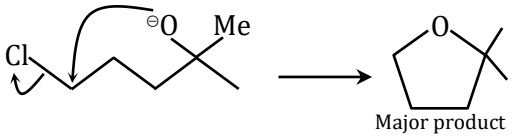
[Polar π-bond give nucleophilic addition reaction]

(Leaving group) give substitution

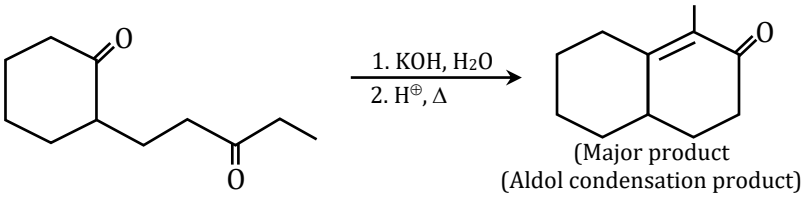
(i) Grignard reagent prefer to give nucleophilic addition on polar π-bond and form anion intermediate.



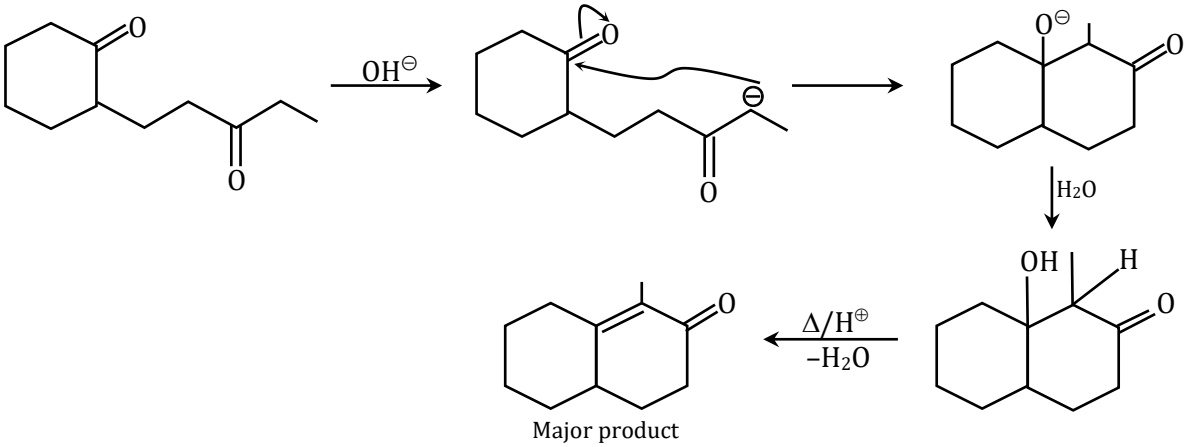
(ii) In next step anion give intramolecular nucleophilic substitution reaction & form 5 membered ring.



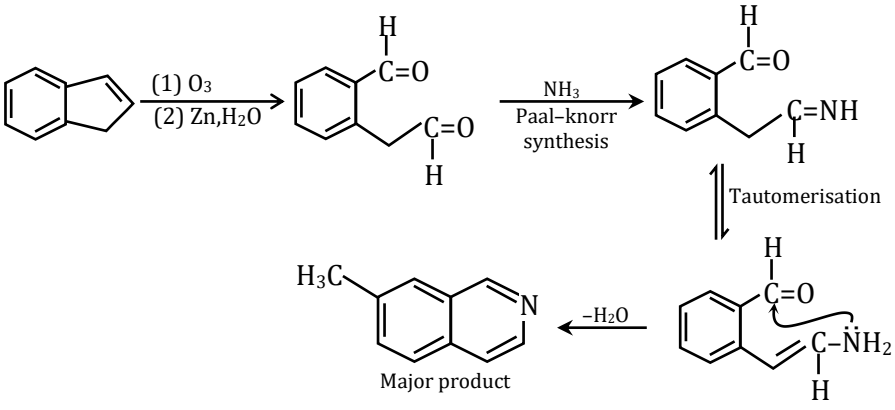
4. Ans. (A)



Mechanism :



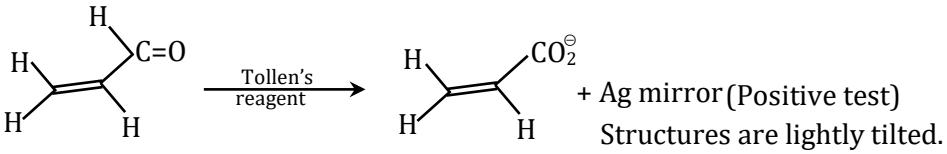
5. Ans. (A)

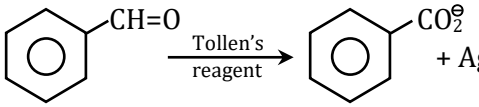


6. **Ans. (A,B,C)**

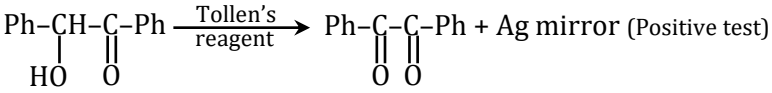
Tollens's test is given by compounds having aldehyde group. Also α-hydroxy carbonyl gives positive Tollen's test.

(A) Acraldehyde

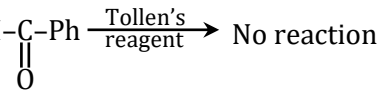


(B) Benzaldehyde 

+ Ag mirror (Positive test)

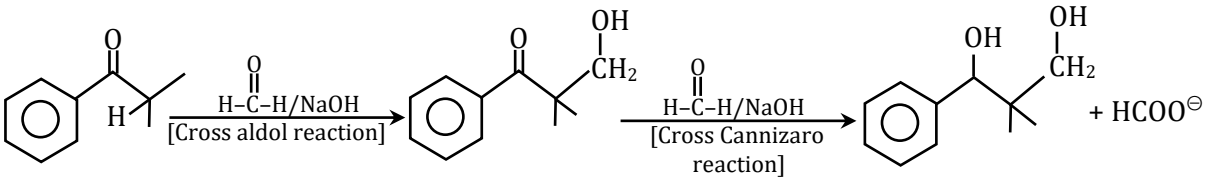
(C) Benzoin 

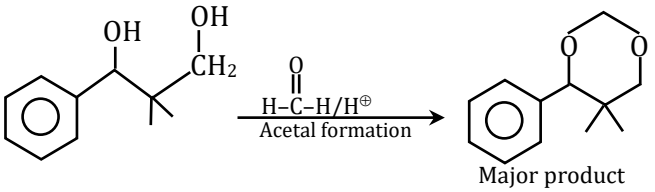
+ Ag mirror (Positive test)

(D) 

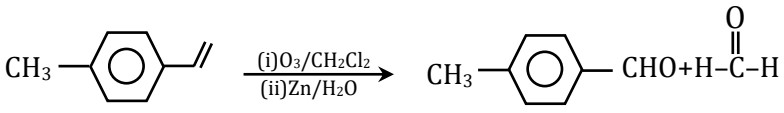
No reaction

7. **Ans. (A)**



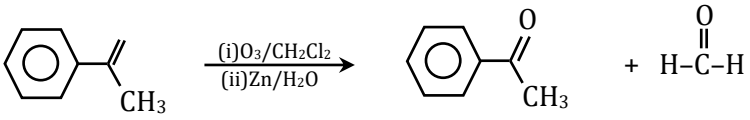


8. **Ans. (A,C)**

(A) 

(P)

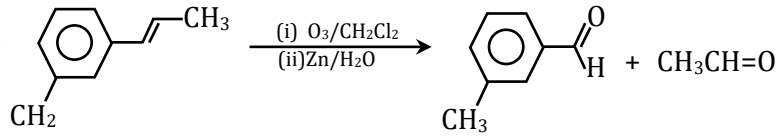
(Q)
Give Cannizzaro reaction
but no haloform



(R)

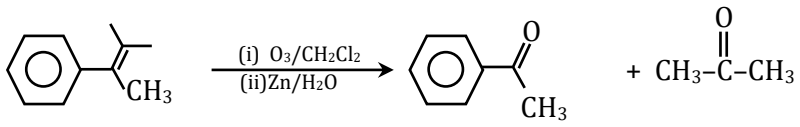
(S)
no Cannizzaro
but give haloform

(B) Product of ozonolysis of R is having 9 carbon.

(C) 

(P) (Q)

Give Cannizzaro reaction but no haloform

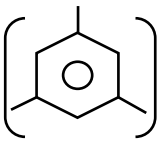


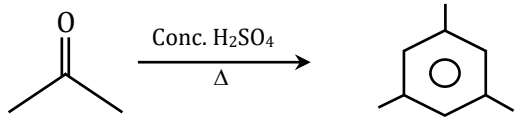
(R) (S)

no Cannizzaro but give haloform

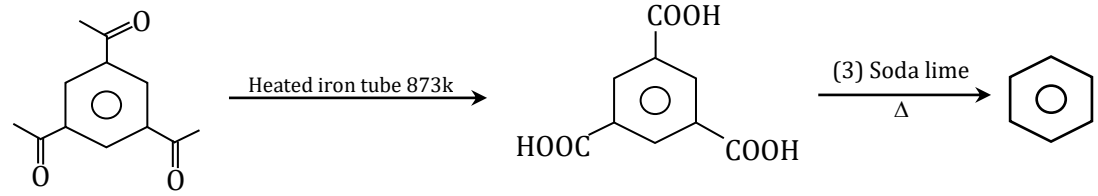
(D) Product of ozonolysis of R is having 9 carbon.

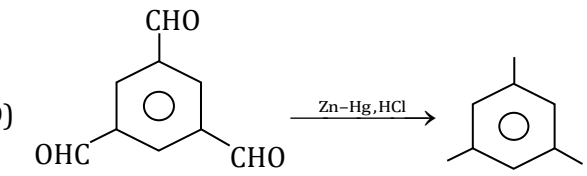
9. Ans. (A,B,D)

1,3,5–trimethyl benzene  can be obtained by :

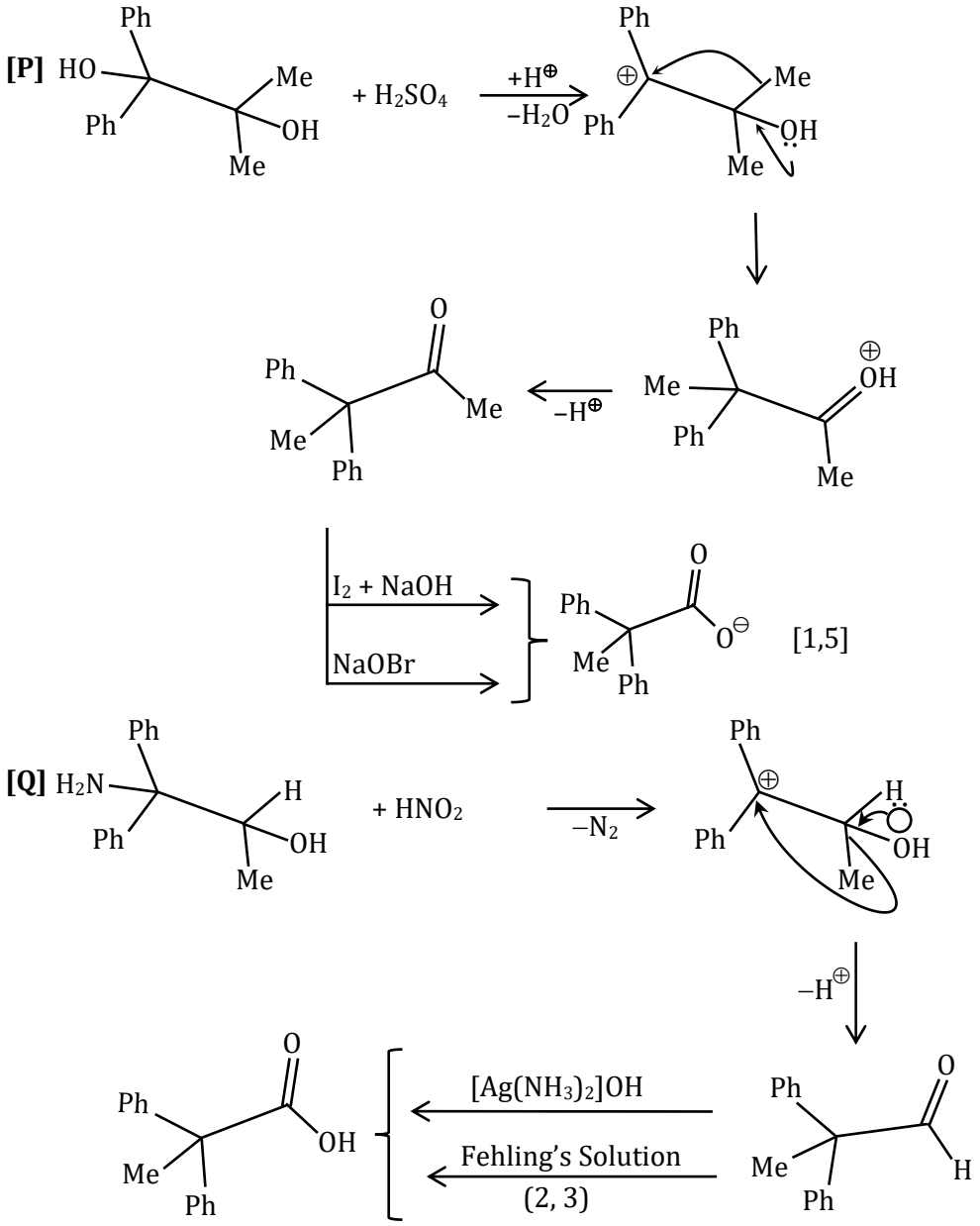
(A) 

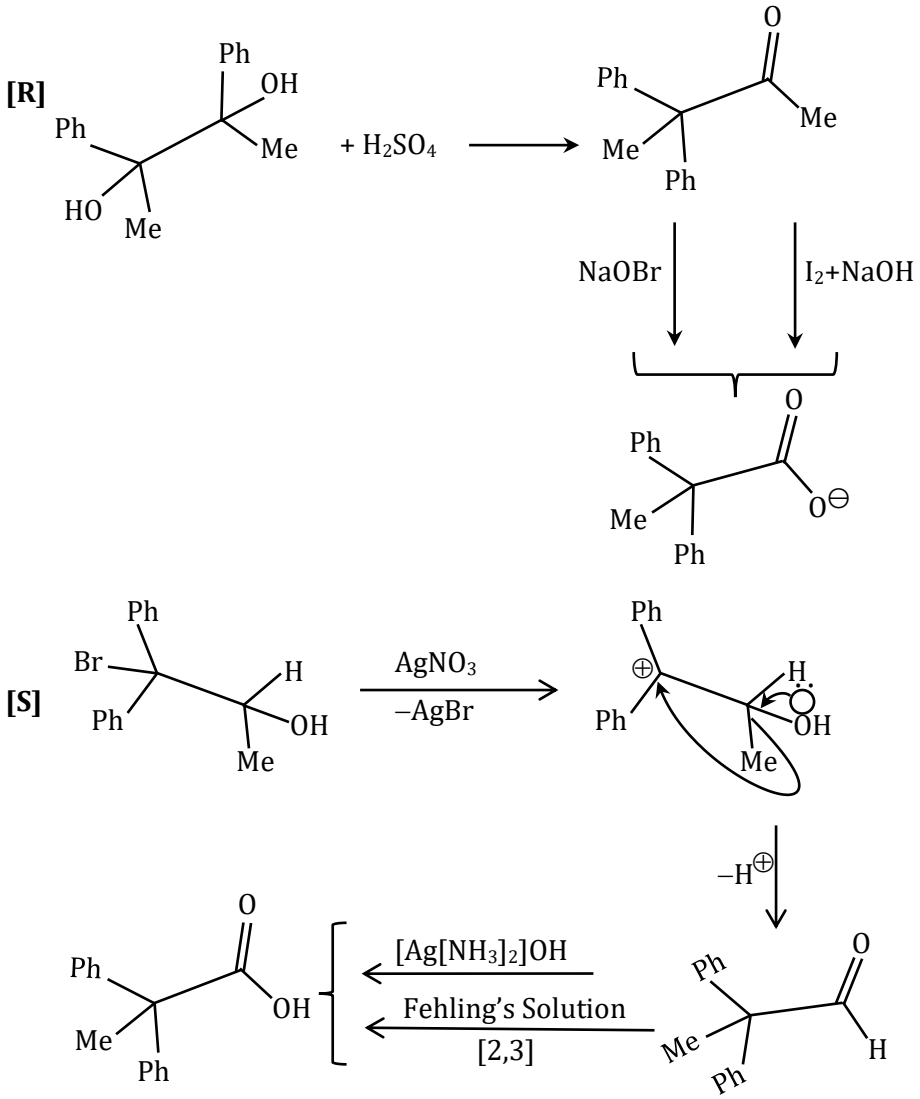
(B) 

(C) 

(D) 

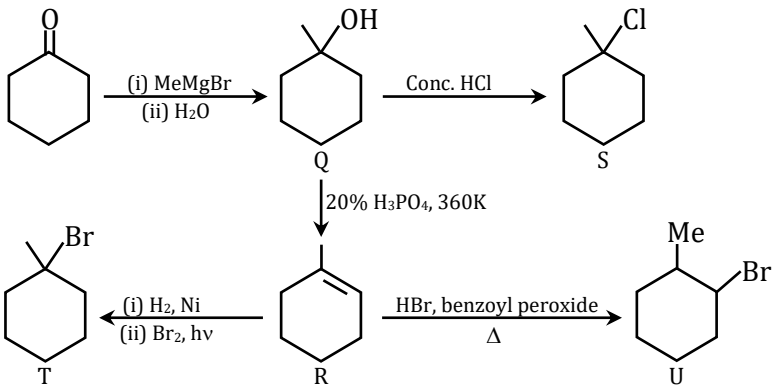
10. Ans. (D)


[P]
HO
Ph
Me
Ph
OH
Me
+ H2SO4
+H⊕
–H2O
Ph
Me
Ph
OH
Me
O
Ph
Me
Me
Ph
–H⊕
Ph
Me
OH
Ph
Me
I2 + NaOH
NaOBr
O
Ph
Me
O⊖
Ph
[1,5]
[Q]
H2N
Ph
H
Ph
OH
Me
+ HNO2
–N2
Ph
Ph
H
OH
Me
–H⊕
O
Ph
Me
OH
Ph
[Ag(NH3)2]OH
Fehling's Solution
(2, 3)
O
Ph
Me
H
Ph



⇒ Option (D)

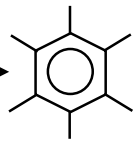
11. Ans. (B,D)



12. Ans. (1.62)

$Mg_2C_3 + 4H_2O \rightarrow 2Mg(OH)_2 + CH_3C \equiv CH$

$CH_3C \equiv CH \xrightarrow{NaMe_2} CH_3 - C \equiv C^{\ominus}Na^{\oplus} \xrightarrow{MeI} CH_3{-}C{\equiv}C{-}CH_3(0.075mmol)$ (Q)

$3CH_3 - C \equiv C - CH_3$ (0.75 mole) $\xrightarrow[\text{iron tube}\ 873K]{\text{red hot}}$ 

$(0.075 \times 0.4) \times \frac{1}{3}$

$= 0.01$ mole

The value of x = 162 × 0.01 = 1.62 gm

13. Ans. (3.20 OR 3.90 TO 3.91)

(P) (0.1 mole) $\xrightarrow[333K,\ 100\%\ \text{Kucherov reaction.}]{Hg^{2\oplus}/H^{\oplus}}$ $CH_3{-}\overset{O}{\overset{\|}{C}}{-}CH_3$ (0.01) mole $\xrightarrow{Ba(OH)_2/\Delta}$ $(CH_3)_2C = CH - \overset{O}{\overset{\|}{C}} - CH_3$ $\left(0.1 \times \frac{82}{100} \times \frac{1}{2}\right)$ 0.04 mole

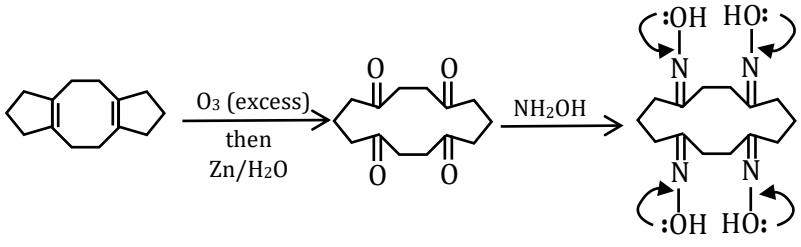
$(CH_3)_2C = CH - \overset{O}{\overset{\|}{C}} - OH + CHCl_3$

$\left(0.04 \times \frac{80}{100}\right) = 0.032$ mole

60 + 32 + 8 = 100

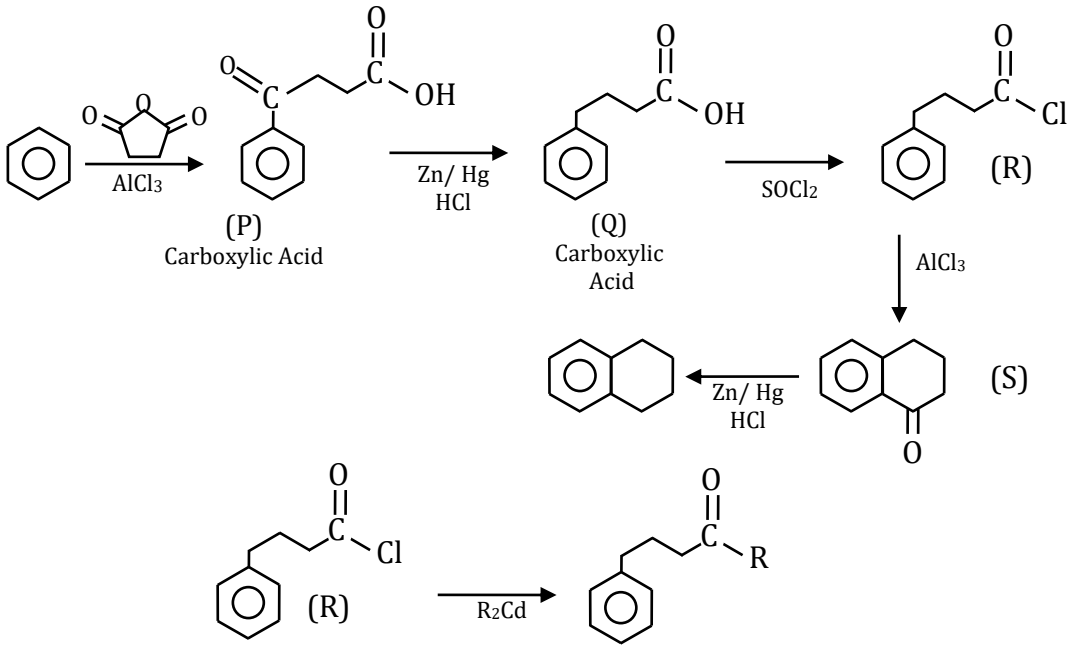
The value of Y = 0.032 × 100 = 3.2

14. Ans. (8 OR 12)



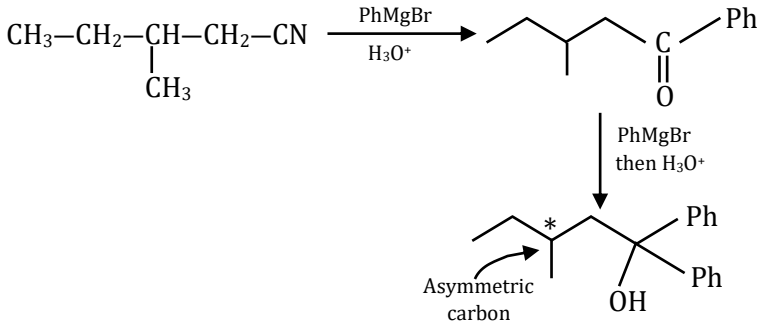
Total 12 atoms are sp^2 hybridised

15. Ans. (A,C)

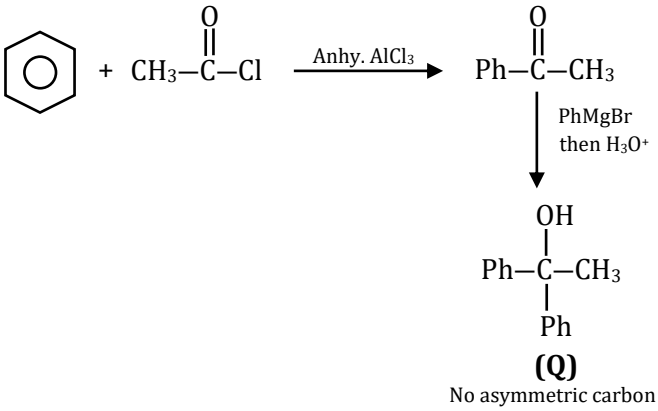


16. Ans. (C,D)

Formation of P

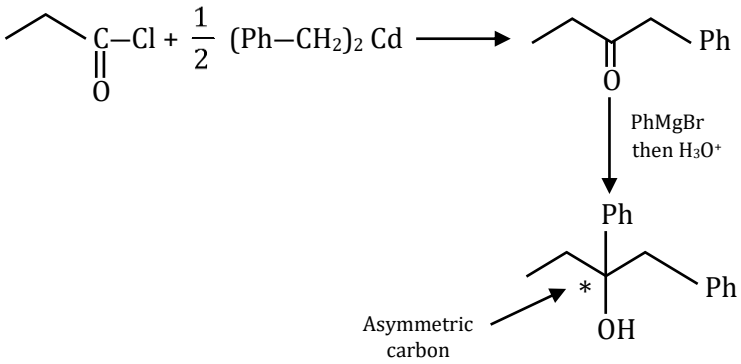


Formation of Q



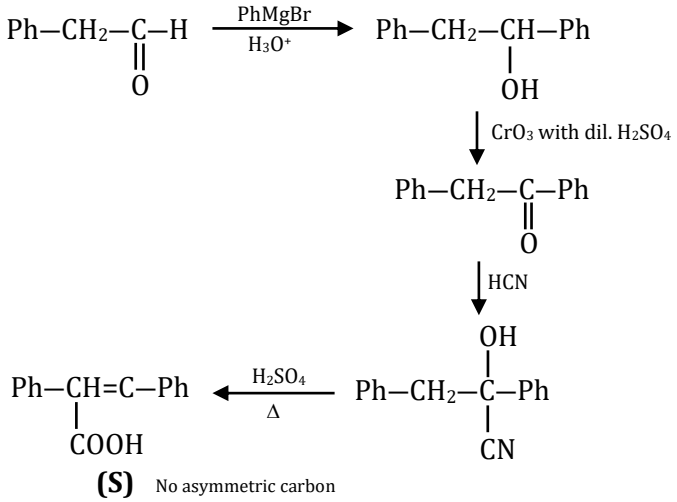
(Q)
No asymmetric carbon

Formation of R



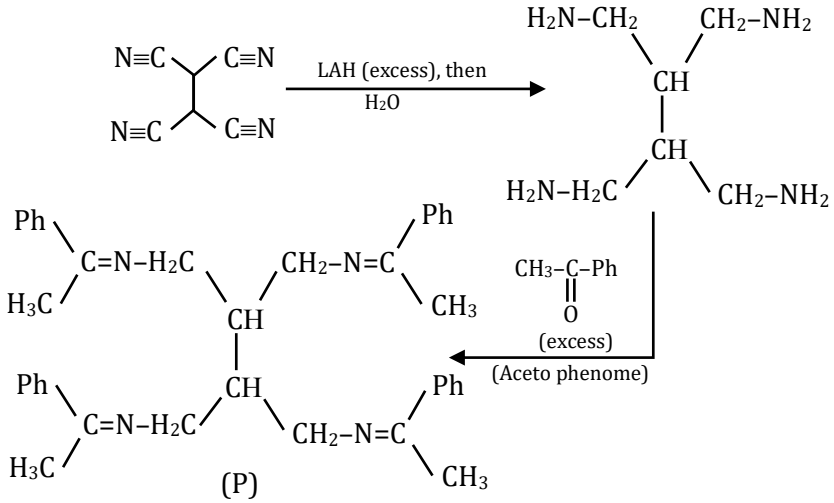
(R)

Formation of S



(S) No asymmetric carbon

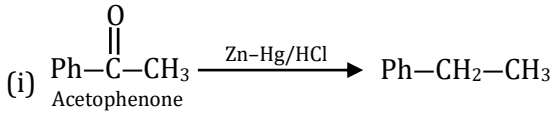
17. Ans. (28)

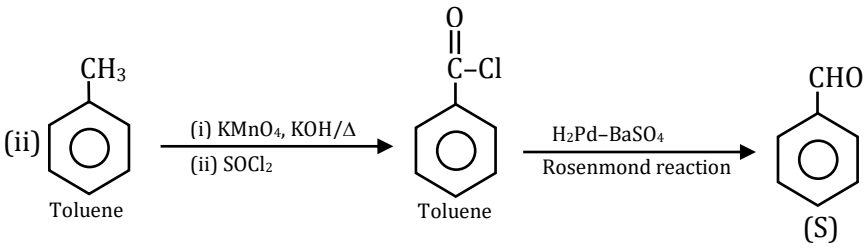


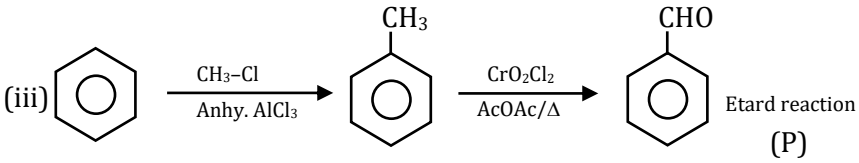
Total number of sp^2 hybridised C-atom in P = 28

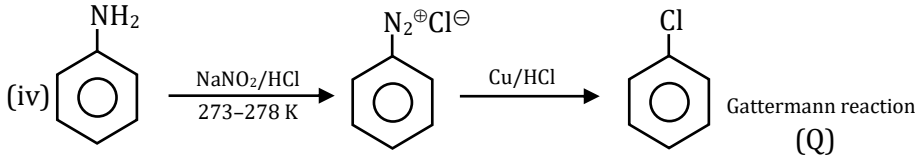
18. Ans. (D)

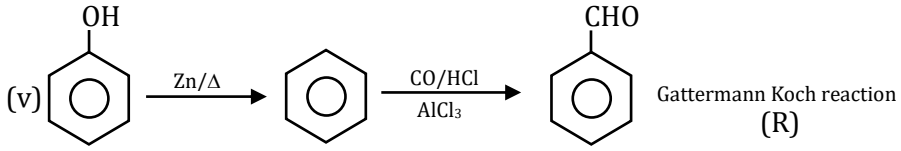
P → 3, Q → 4, R → 5, S → 2



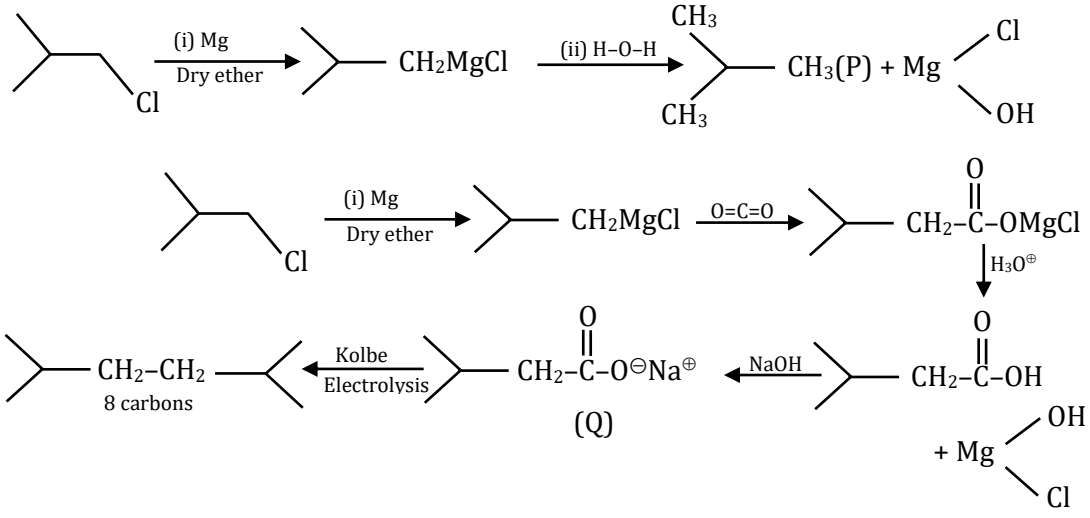


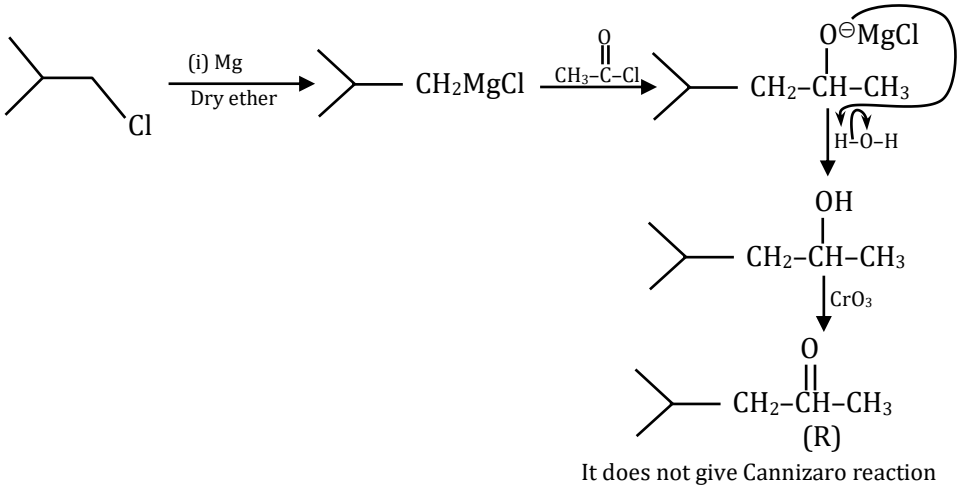




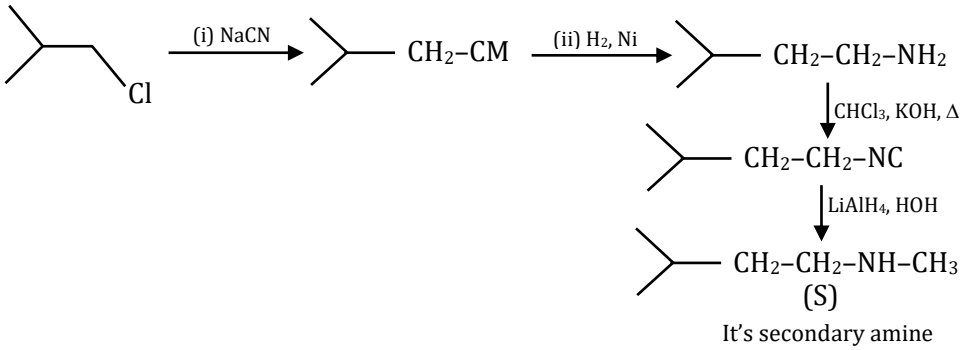


19. Ans. (B)





It does not give Cannizaro reaction

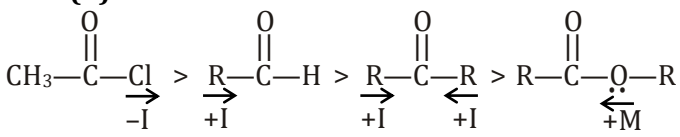


It's secondary amine

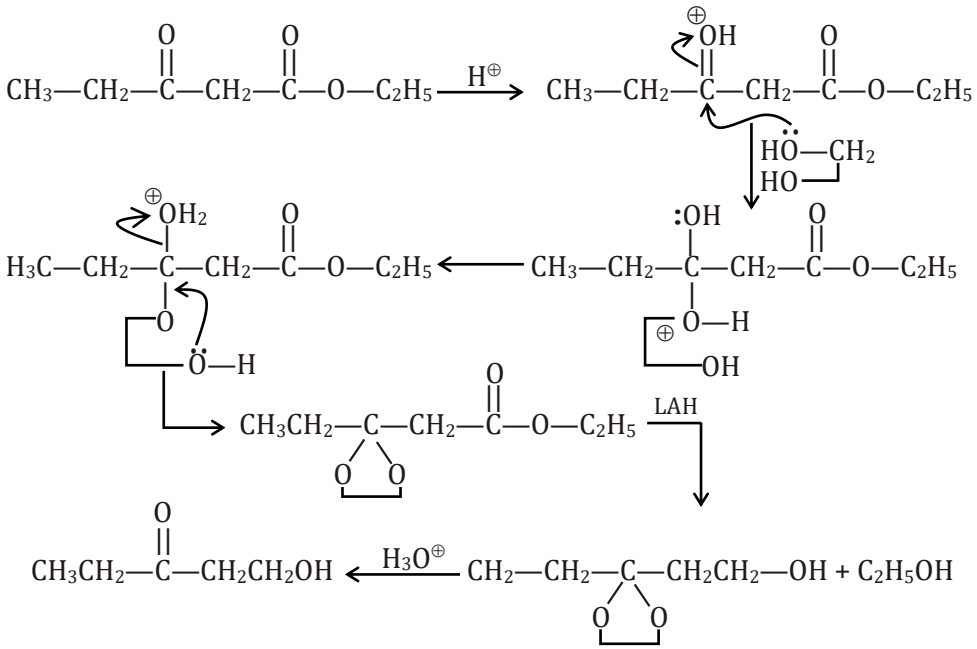
JEE (Main) Practice Paper

SECTION–A

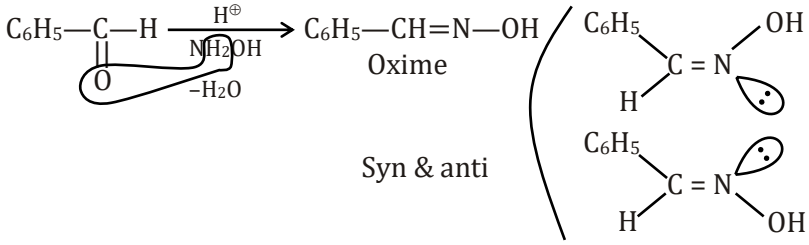
1. **Ans. (1)**



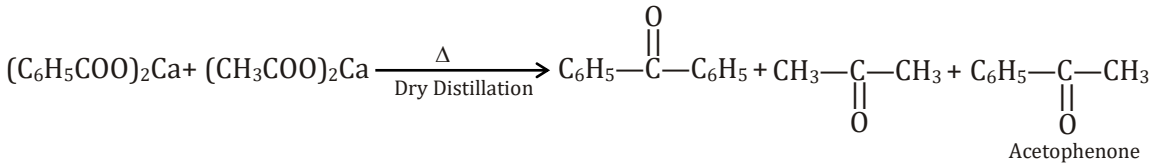
2. **Ans. (2)**



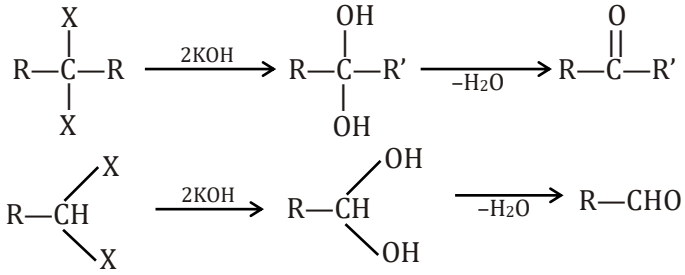
3. Ans. (3)



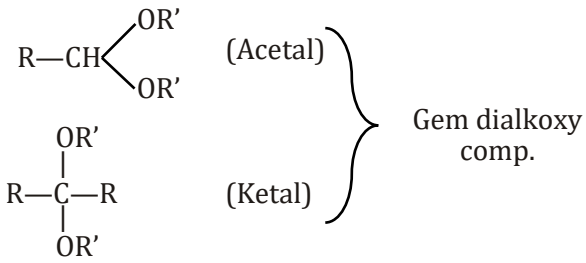
4. Ans. (3)



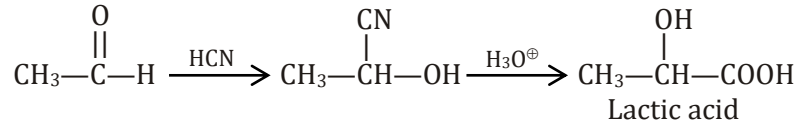
5. Ans. (3)



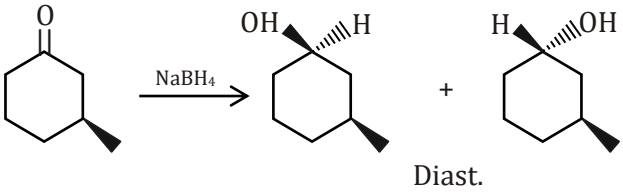
6. Ans. (4)



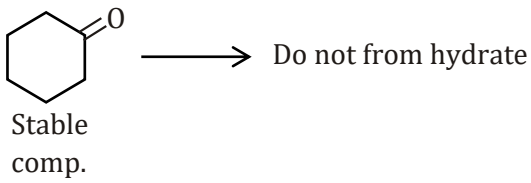
7. Ans. (3)



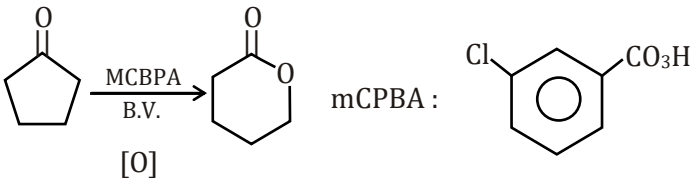
8. Ans. (1)



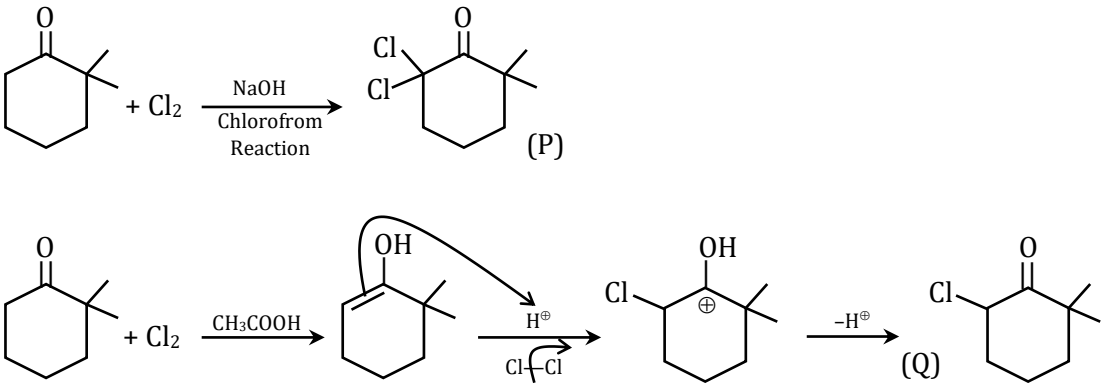
9. Ans. (4)



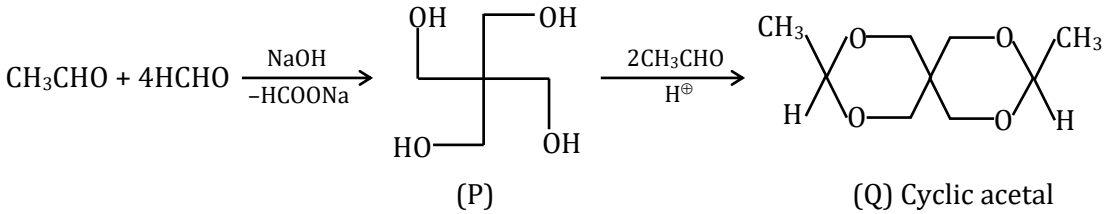
10. Ans. (4)



11. Ans. (3)

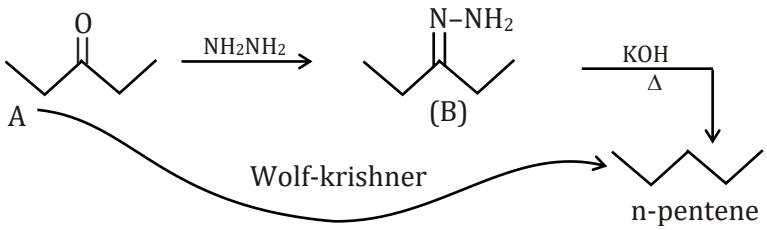


12. Ans. (4)

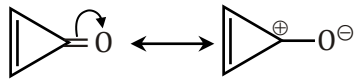


Total steroisomers = 2

13. Ans. (3)



14. **Ans. (2)**

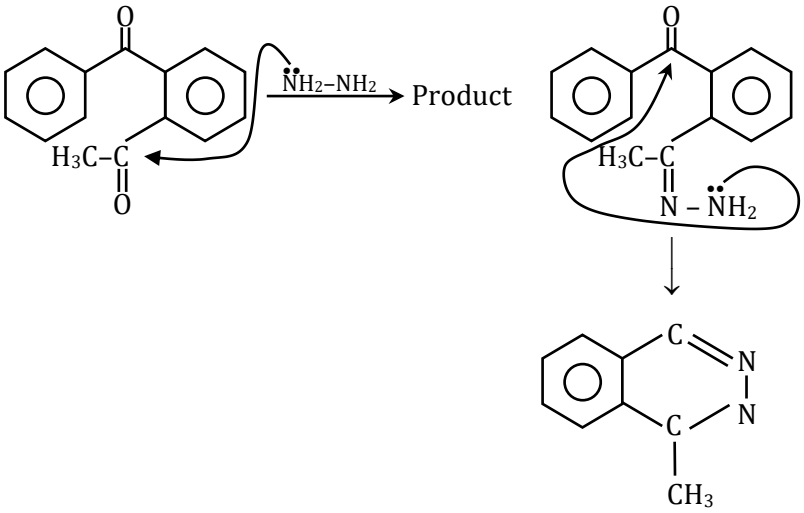


Quasi aromatic

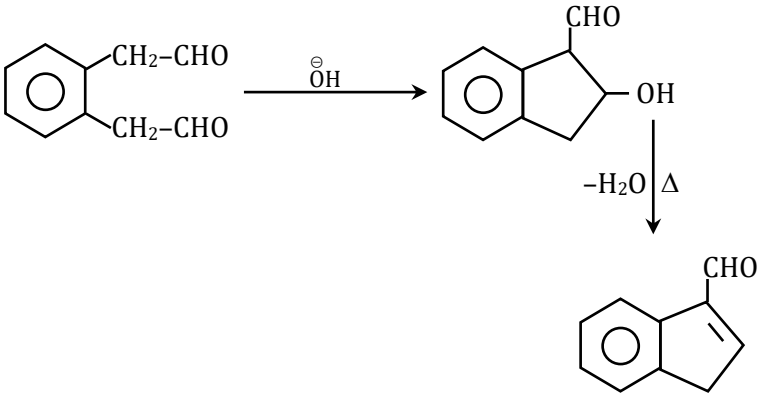
15. **Ans. (2)**

$$\text{Rate of hydration} \propto \text{EWG} \propto \frac{1}{\text{EDG}}$$

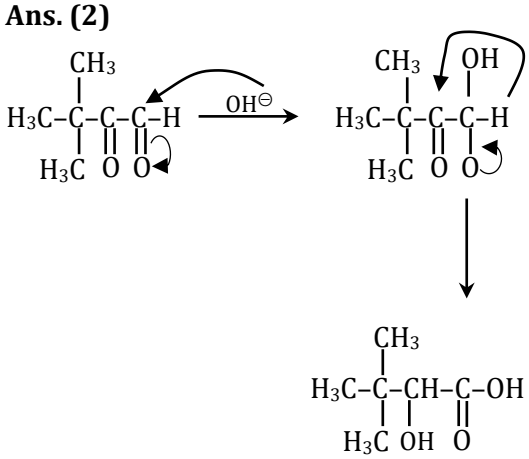
16. **Ans. (1)**



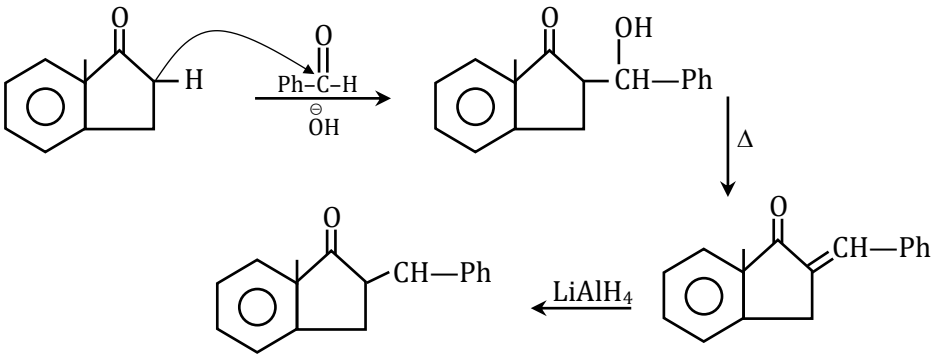
17. **Ans. (1)**



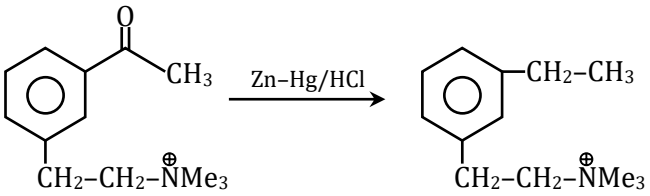
18. **Ans. (2)**



19. Ans. (1)



20. Ans. (2)



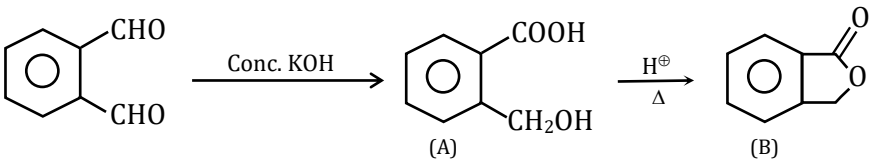
SECTION-B

1. Ans. (4)

The carbonyl compound which do not have α–hydrogen, shows Cannizzaro reaction

These compounds are a, e, h, and i

2. Ans. (2)



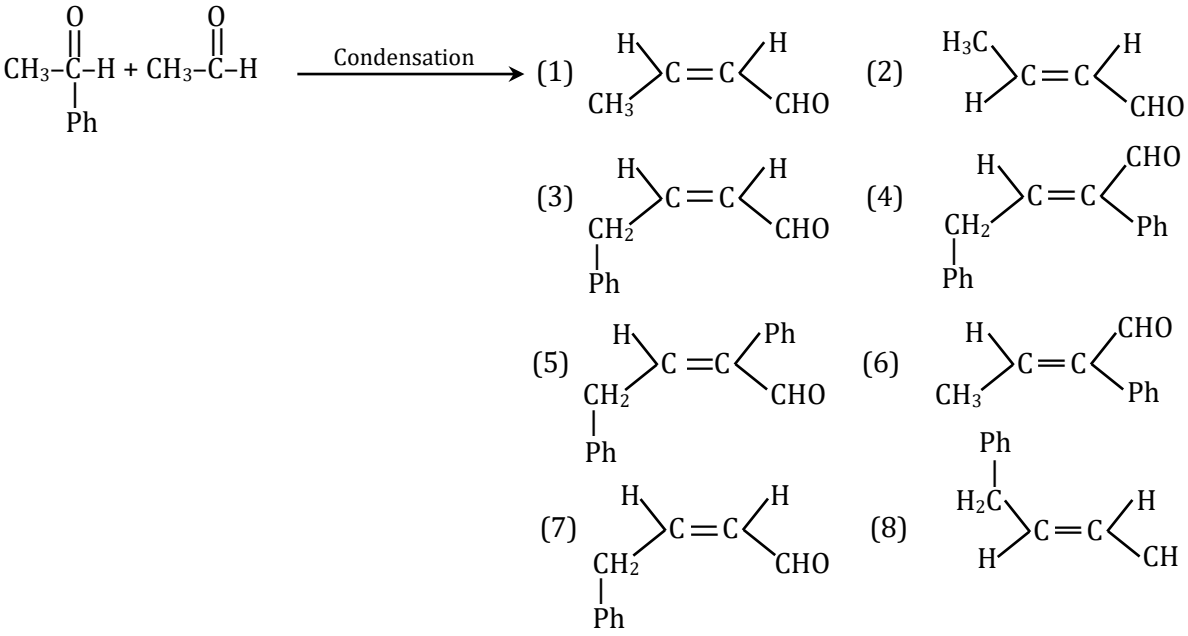
(A) (B)

molecular weight = 134

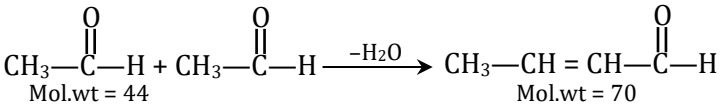
$$X = \frac{\text{molecular weight of (B)} - 2}{66}$$

$$X = \frac{134 - 2}{66} = 2$$

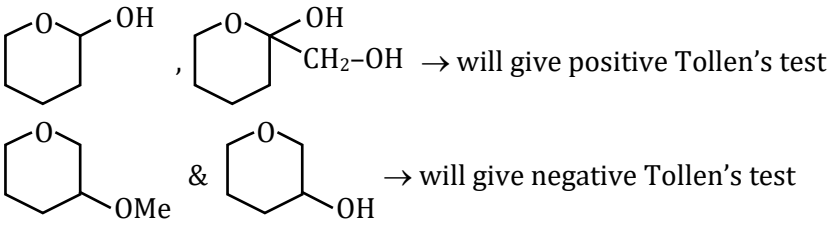
3. **Ans. (8)**



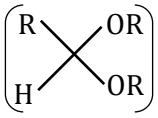
4. **Ans. (44)**



5. **Ans. (2)**

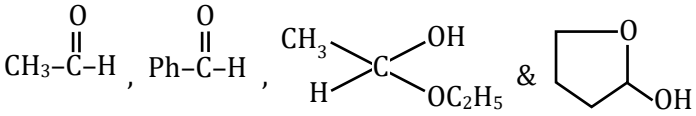


6. **Ans. (4)**

Acetal are  So, all given compounds can be classified as acetals. Except (iii).

7. **Ans. (4)**

Compounds which give positive tollen's test are following :-

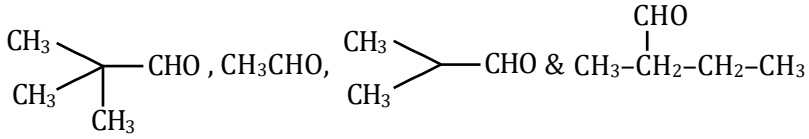


Total = 4

8. **Ans. (4)**

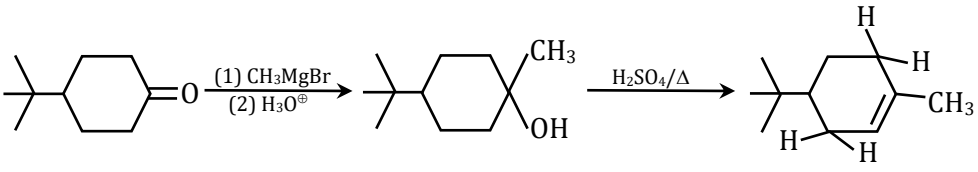
Aromatic aldehyde don't give Fehling & Benedict's test.

Compounds which give positive benedict's test are :-



9. **Ans. (7)**

The reaction involved is :



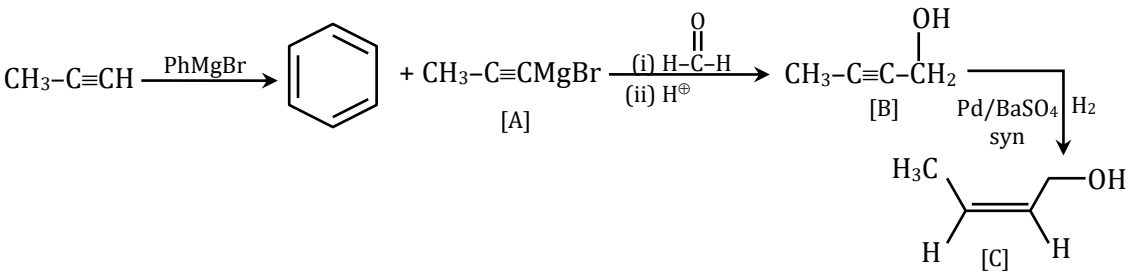
7αH
Major product

10. **Ans. (2)**

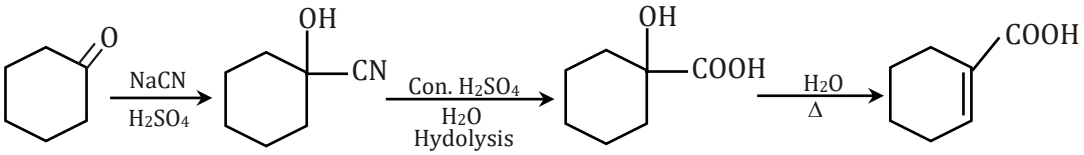
Zn—Hg/Conc.HCl and $NH_2NH_2/\overset{\ominus}{O}H$ are suitable reagents for above conversion

JEE (Advanced) Practice Paper

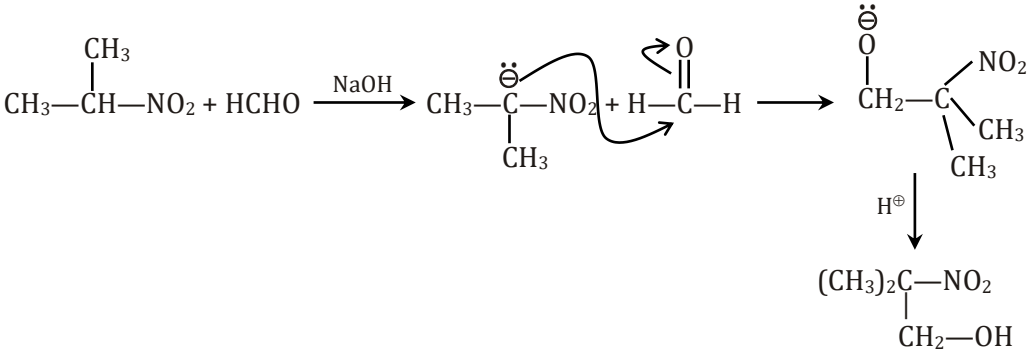
1. **Ans. (D)**



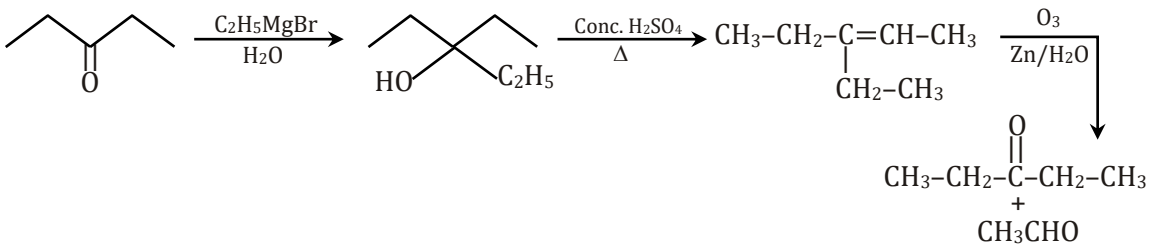
2. **Ans. (D)**



3. **Ans. (B)**



4. **Ans. (B)**



5. **Ans. (A,B)**

3-pentanone: $CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH_2-CH_3$ → $I_2 + NaOH$ ✗, $NaHSO_3$ ✗

2-pentanone: $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-CH_3$ → $I_2 + NaOH$ ✓, $NaHSO_3$ ✓

6. **Ans. (B,C)**

$CH_2(OH)-C(CH_3)=CH-CH_2-CH_3 \xrightarrow{MnO_2} H-\overset{\overset{O}{\|}}{C}-\overset{CH_3}{\overset{|}{C}}=CH-CH_2-CH_3$ (OI)

(B) OI $\xrightarrow{H_2/Ni}$ $CH_2(OH)-\overset{*}{C}H(CH_3)-CH_2-CH_2-CH_3$ (OA)

$CH_2(OH)-CH=C(CH_3)-CH_2-CH_3 \xrightarrow{MnO_2} H-\overset{\overset{O}{\|}}{C}-\overset{CH_3}{\overset{|}{C}}H=C-CH_2-CH_3$ (OI)

(C) OI $\xrightarrow{H_2/Ni}$ $CH_2(OH)-CH_2-\overset{*}{C}H(CH_3)-CH_2-CH_3$ (OA)

7. **Ans. (A,B,C)**

(B) $C_2H_5-\overset{\overset{O}{\|}}{C}-CH_3 + C_6H_5MgBr \longrightarrow C_2H_5-\overset{\overset{OH}{|}}{\underset{\underset{C_6H_5}{|}}{C}}-CH_3$

(A) $C_6H_5-\overset{\overset{O}{\|}}{C}-CH_3 + C_2H_5MgBr \longrightarrow C_6H_5-\overset{\overset{OH}{|}}{\underset{\underset{C_2H_5}{|}}{C}}-CH_3$

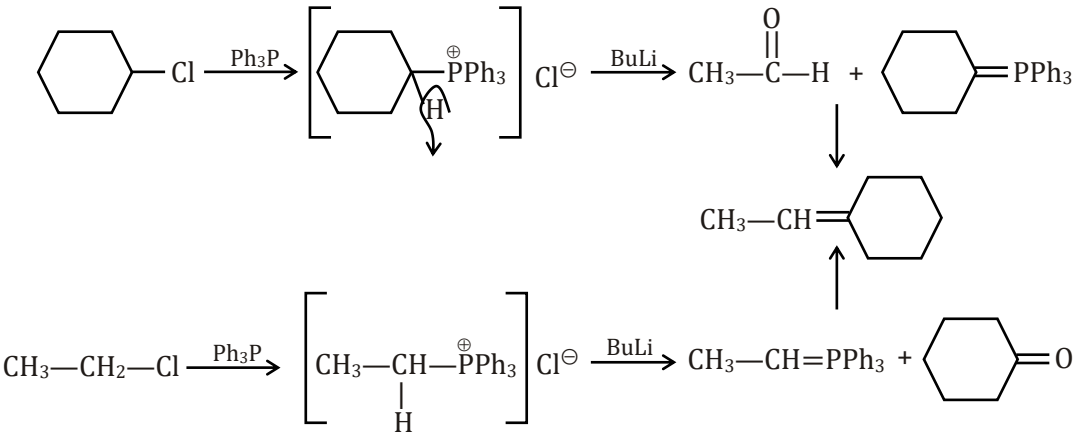
(C) $C_6H_5-\overset{\overset{O}{\|}}{C}-C_2H_5 + CH_3MgBr \longrightarrow C_6H_5-\overset{\overset{OH}{|}}{\underset{\underset{C_2H_5}{|}}{C}}-CH_3$

8. **Ans. (B,C)**

(B) $H-\overset{\overset{O}{\|}}{C}-H \xrightarrow{Aldol}$ ✗

(C) $CH_3-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}-\overset{\overset{O}{\|}}{C}-H \xrightarrow{Aldol}$ ✗

9. Ans. (A,B)



10. Ans. (A,B,C,D)

Stability of hydrates depends upon:-

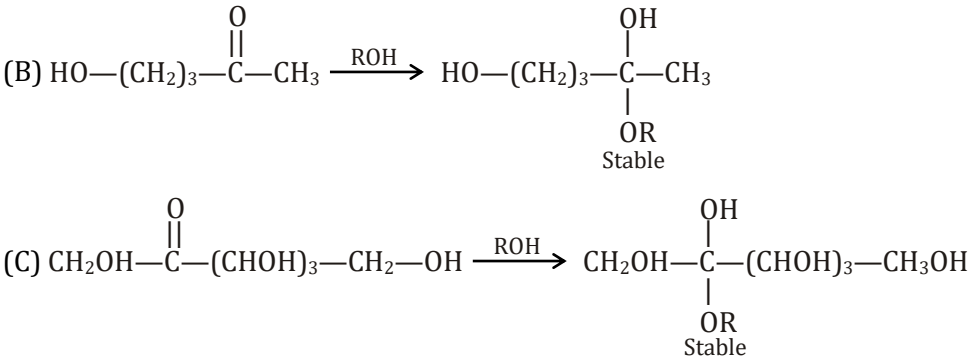
→ Steric hindrance

→ –I

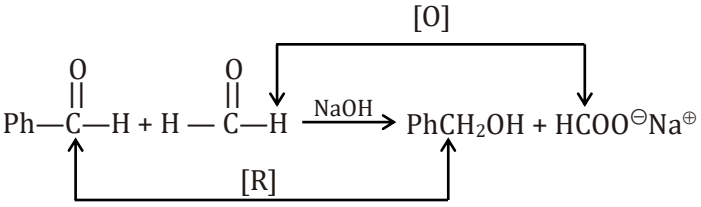
→ H-bonding (Intramolecular)

→ Angle strain

11. Ans. (B,C)

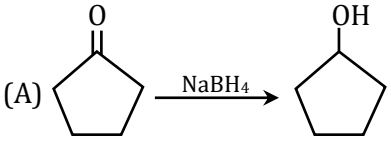


12. Ans. (A,D)



Most reactive carbonyl compound will be oxidized and less reactive compound will be reduced. So, HCHO will oxidized and PhCHO will be reduced.

13. Ans. (A)



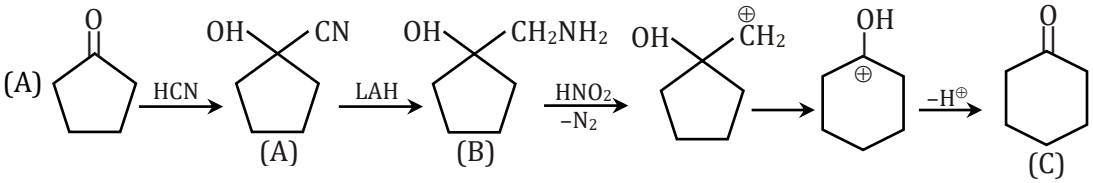
(B) $C_6H_5CHO + Ph–NH_2 \xrightarrow{H^{\oplus}} C_6H_5–CH=NPh$ Imine, Schiff's base

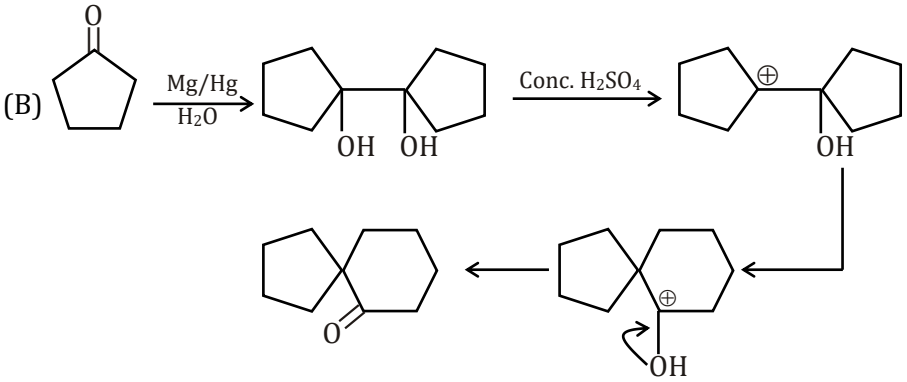
(C) $C_6H_5COCH_3 + CH_3CH_2{-}NH_2 \xrightarrow{H^{\oplus}}$ $\begin{matrix} C_6H_5 \\ CH_3 \end{matrix}\!\!>\!\!=N{-}CH_2{-}CH_3$ Imine, Schiff's base

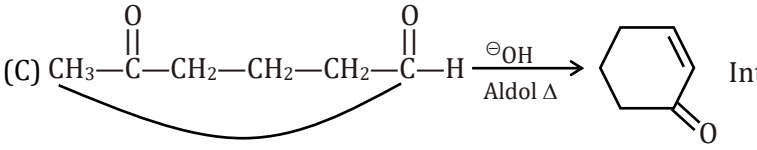
(D) $R\,CHO + 2\,R\,CH_2OH \xrightarrow{H^{\oplus}} RCH\!\begin{matrix} OCH_2R \\ OCH_2R \end{matrix}$ (acetal)

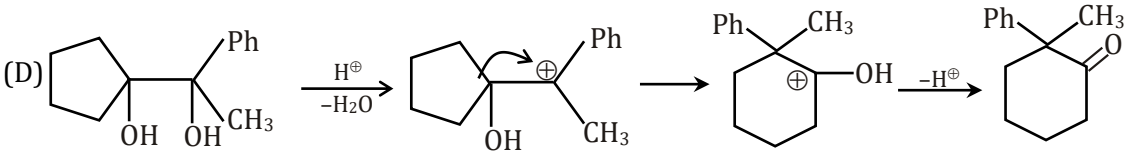
14. Ans. (D)

(A) P,Q,S ; (B) P,Q,S ; (C) P,Q,S ; (D) P,Q,S



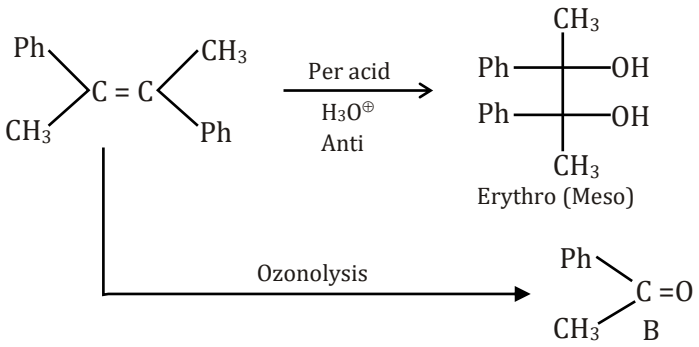






15. Ans. (D)

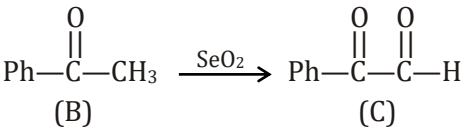
(A) is optically inactive



16. **Ans. (C)**

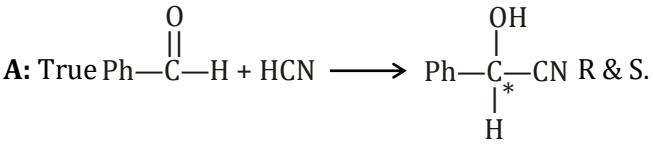
(B) Can't give tollen's test.

17. **Ans. (D)**

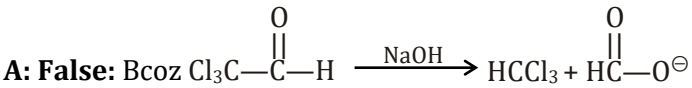


(B) (C) Can't take part in Aldol condensation.

18. **Ans. (C)**



19. **Ans. (D)**



20. **Ans. (6)**

(a), (b), (d), (e), (h), (i) gives positive haloform test.