HINTS & SOLUTIONS

EXERCISE - 1

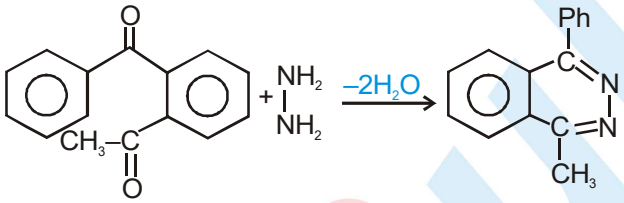
Single Choice

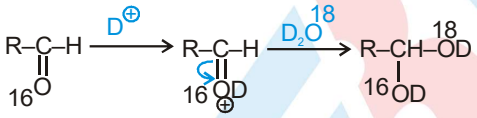
2. $CH_3-CH(Cl)_2 \xrightarrow{\text{alc. KOH}} CH_3-CH(OH)_2 \xrightarrow{-H_2O} CH_3CHO$

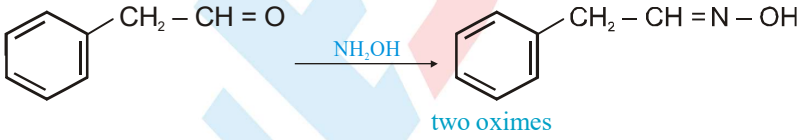
4. $(CH_3CH_2-C(=O)-O)_2Ca \xrightarrow{\Delta} CH_3-CH_2-C(=O)-CH_2-CH_3 + CaCO_3$

5. $H-C(=O)-O-Ca-O-C(=O)-CH_3 \xrightarrow{\Delta} H-C(=O)-CH_3 + CaCO_3$

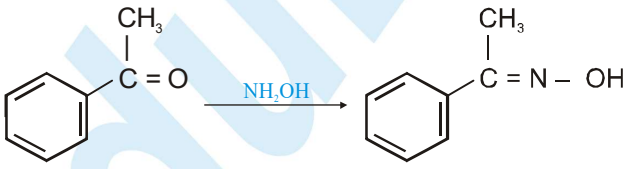
6. $2\,CH_3COOH \xrightarrow{MnO\,/\,300^oC} CH_3-C(=O)-CH_3 + CO_2 + H_2O$

7. 

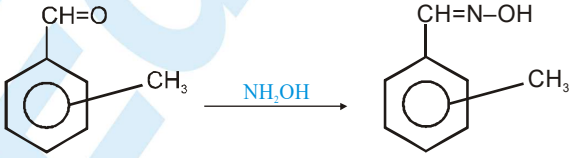
8. 

9. 

two oximes



two oximes



O/M/P

O/M/P
(six isomers)

10. $CF_3-\underset{\underset{O}{\|}}{C}-H > CCl_3-\underset{\underset{O}{\|}}{C}-H > CH_3-\underset{\underset{O}{\|}}{C}-H > CH_3-\underset{\underset{O}{\|}}{C}-CH_3$

11. –I and –M group increase electrophilicity on –CHO group so rate of addition reaction increase and also increases equilibrium constant.

12. $CH_3-\underset{\underset{O}{\|}}{C}-H + NaHSO_3 \longrightarrow CH_3-\underset{\underset{Na\,O^{\ominus}}{|}}{\overset{\overset{O}{\|}}{CH}}-\underset{\underset{O}{\|}}{S}-OH \xrightarrow[\text{exchange}]{H^+} CH_3-\underset{\underset{OH}{|}}{CH}-SO_3^{\ominus}Na$

13. It is protection of carbonyl compound.

14. As the positive charge decreases and steric hinderance increases on carbonyl group the rate of nucleophilic addition reaction decreases.

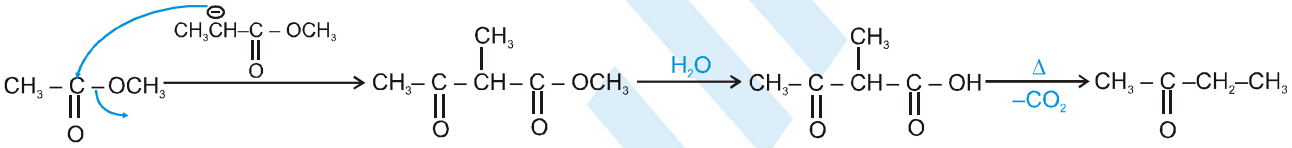
15. $CH_3-\underset{\underset{O}{\|}}{C}-H + HCN \longrightarrow CH_3-\underset{\underset{OH}{|}}{\overset{\overset{CN}{|}}{C}}-H \xrightarrow{H_2O} CH_3-\underset{\underset{OH}{|}}{CH}-COOH$

16. Perkin reaction

$$Ph-CH=CH-COOH \xrightarrow{HBr} Ph-\underset{\underset{Br}{|}}{CH}-CH_2-COOH$$

(A)

17.



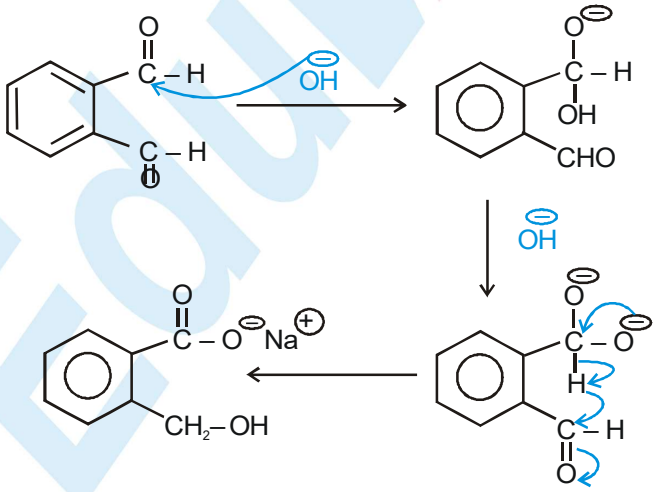
18. Compound which have α-hydrogen gives aldol condensation reaction.

20. $CH_3-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow{\ominus OH} C_6H_5-\underset{\underset{O}{\|}}{C}-H + \overset{\ominus}{C}H_2-\underset{\underset{O}{\|}}{C}-CH_3 \longrightarrow C_6H_5-\underset{\underset{OH}{|}}{CH}-CH_2-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow[-H_2O]{\Delta} C_6H_5-CH=CH-\underset{\underset{O}{\|}}{C}-CH_3$

21. $CH_3-\underset{\underset{O}{\|}}{C}-CH_2-CN$

22. Dioxide anion is a better hydride donor, and presence of $-OCH_3$ group further increases the electron density.

23.



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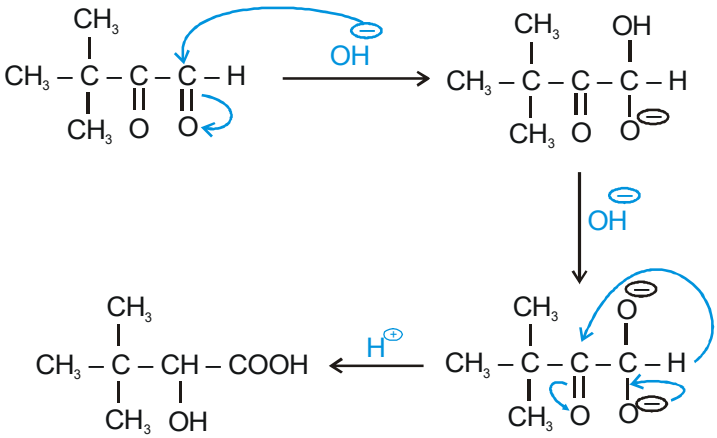
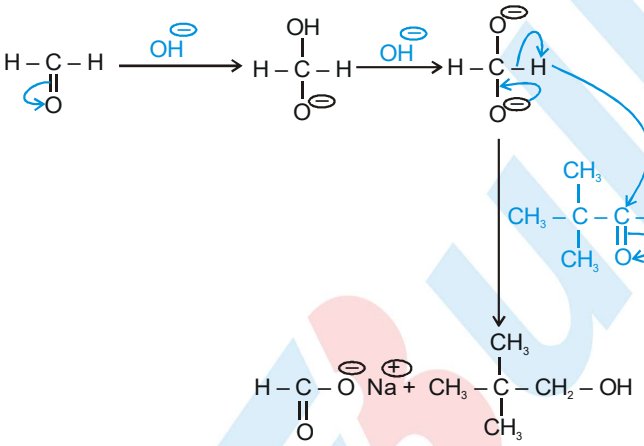


25. $CH_3 - CHO$ (α – Hydrogen is present).

26.



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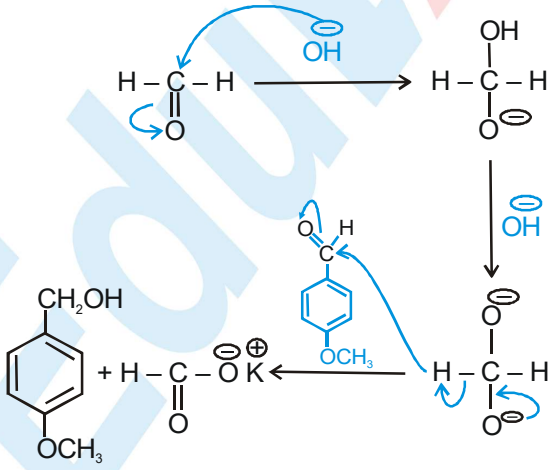

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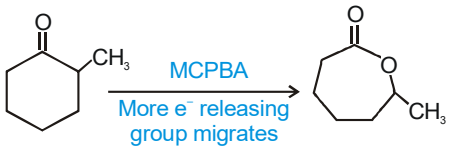

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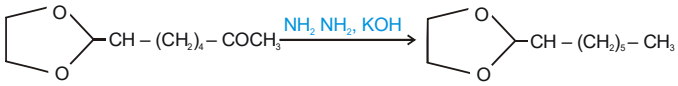
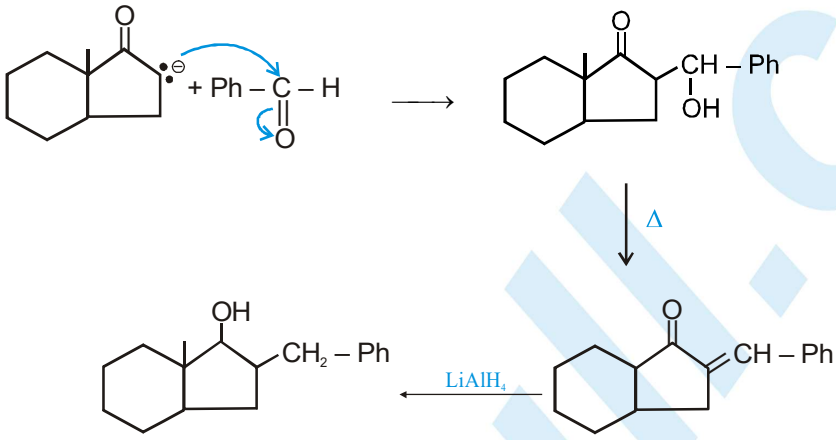


Acetal is hydrolysed in acidic Medium so clemmensen reduction is not used.

30. If base sensitive group is present on carbonyl compound then Clemmensen reduction is used.

31.



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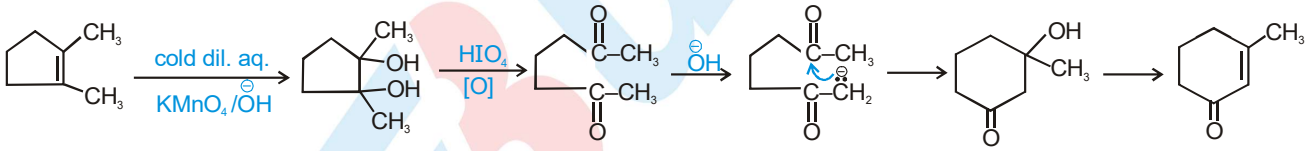

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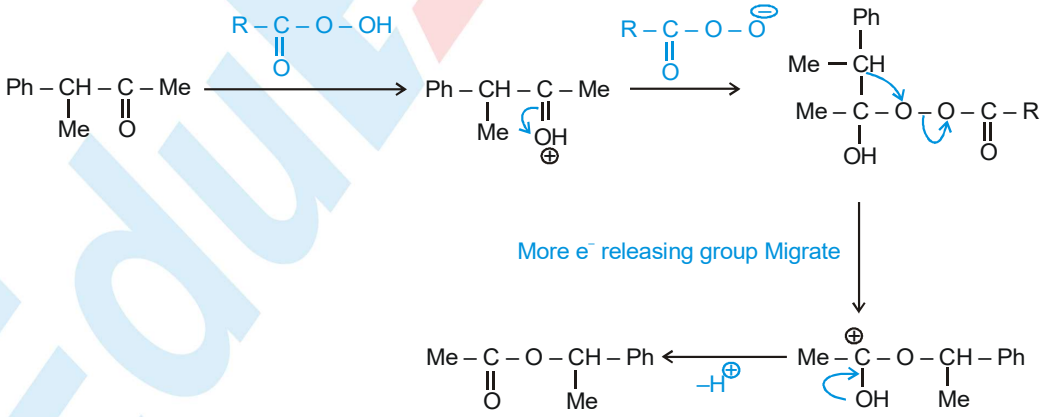
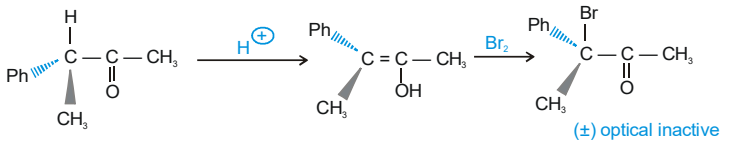


34. Those carbonyl compound in which α – hydrogen is present show deuterium exchange.

35. α – Hydrogen is absent so deuterium exchange is not observed in A and C.

36.



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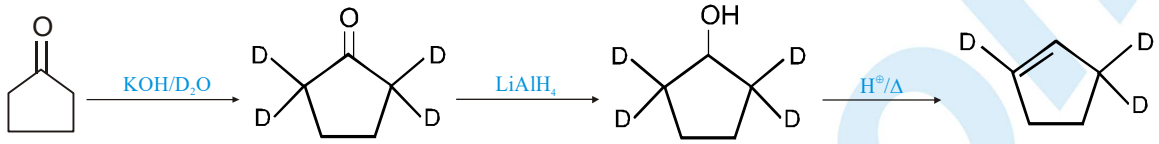

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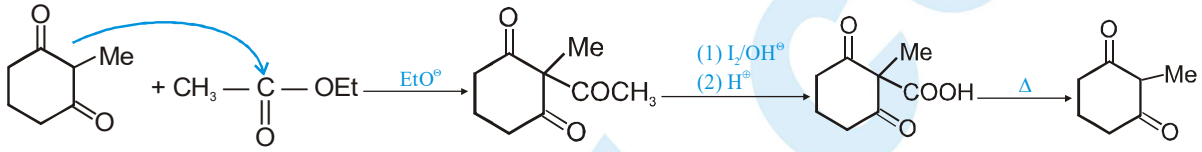

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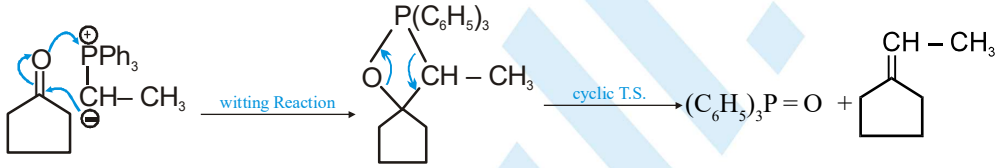

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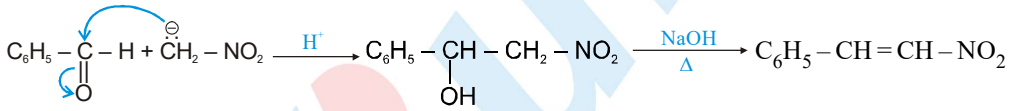

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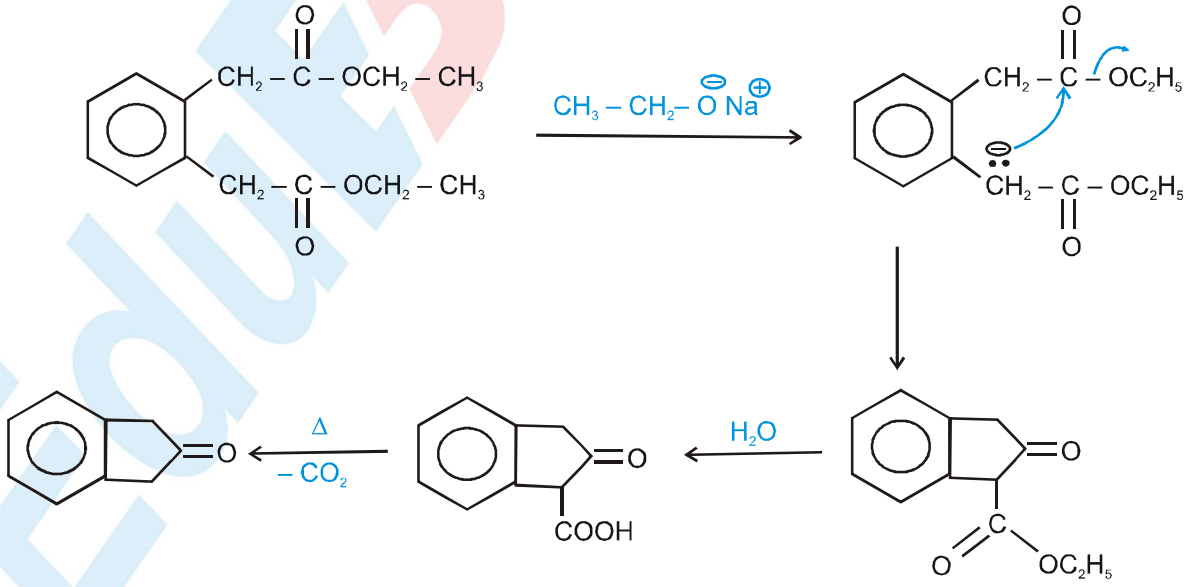

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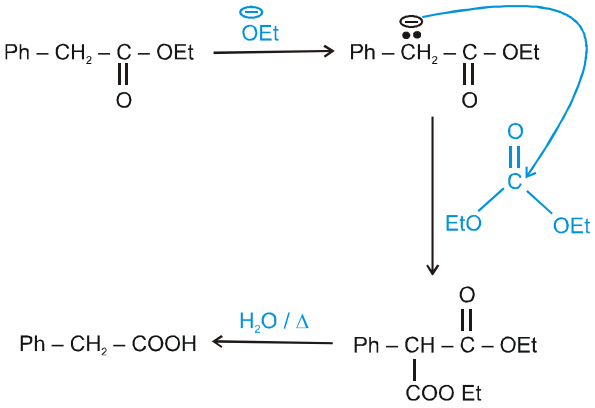

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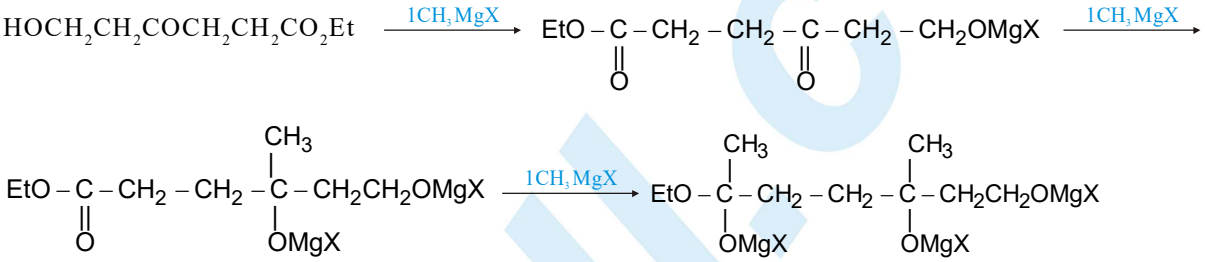

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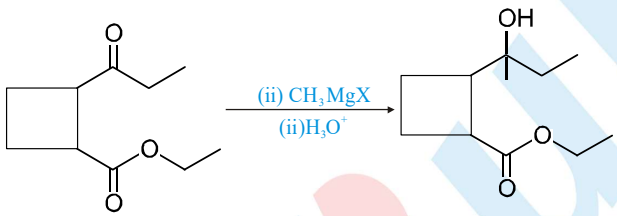
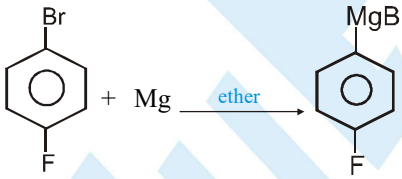


48. $(CH_3)_3\,CMgCl + D_2O \longrightarrow (CH_3)_3CD$

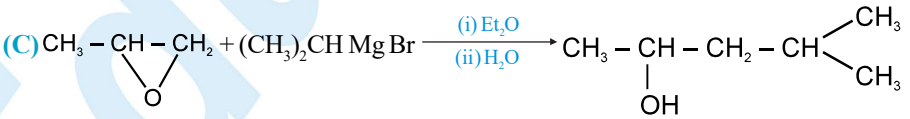
49. **(A)** $C_6H_5COOH + CH_3MgI \longrightarrow CH_4 + C_6H_5COOMgI$

50.



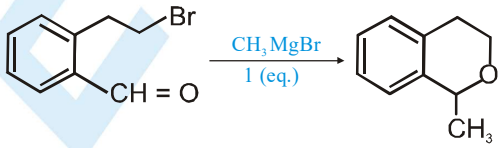
Flourine will not form G.R.

51. **(C)**



52. X : CH_3–$(CH_2)_3$–CH_2MgBr Y : CH_3–$(CH_2)_5$–CH_2OH Z : CH_3–$(CH_2)_5$–CH_2Br

53.



54. Active hydrogen containing functional group release CH_4 gas with CH_3MgBr. (i.e. OH, COOH, SO_3H)

55. $Ph-MgBr + (CH_3)_2CH-\overset{O}{\overset{\|}{C}}-Cl \longrightarrow (CH_3)_2CH-\overset{O}{\overset{\|}{C}}-Ph \xrightarrow{Zn-Hg/\ HCl} Ph-CH_2-\underset{CH_3}{\underset{|}{CH}}-CH_3$

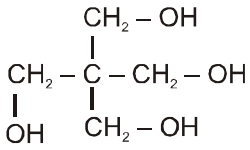
1 mole

56. $C_6H_5CH_2CO_2CH_3 \xrightarrow[2.\ H^+]{1.\ CH_3MgBr\ (excess)} C_6H_5-CH_2-\underset{OH}{\underset{|}{\overset{CH_3}{\overset{|}{C}}}}-CH_3$

(Major product)
t-alcohol

57. $C_5H_{12}O_4 \xrightarrow{CH_3MgBr} 4CH_4\uparrow$.

It means compound (X) contains 4 acidic hydrogen.



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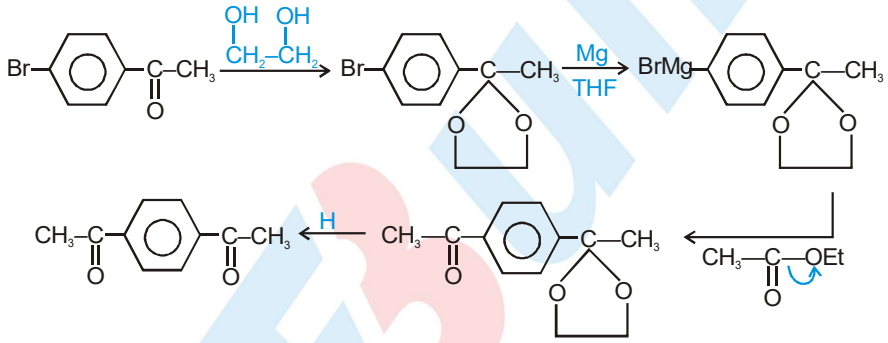
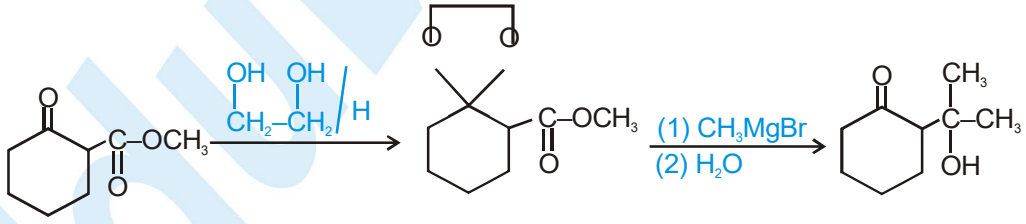


Grignard reagent is stable in THF. Grignard reagent reacts with epoxide hence **(B)** can't be the answer.

59.



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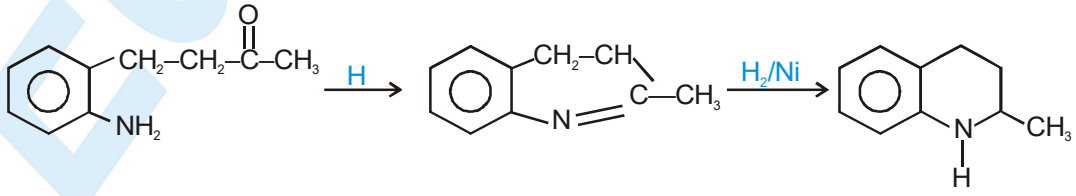

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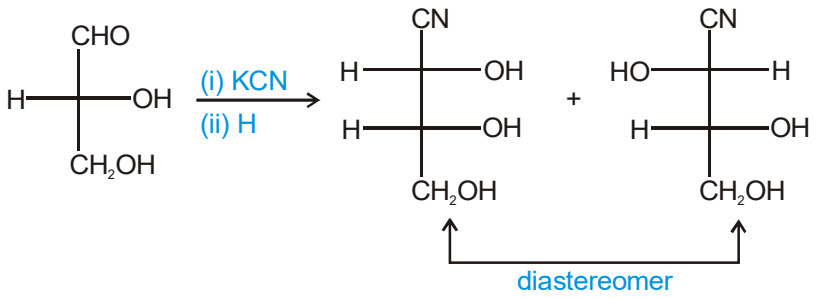

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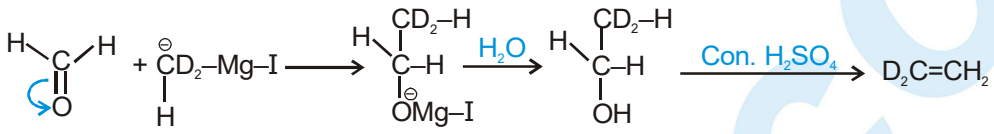

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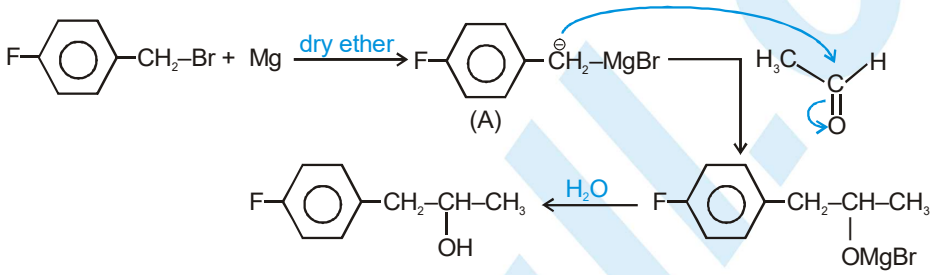

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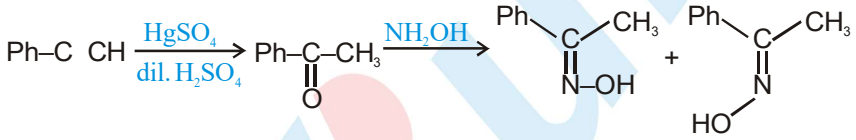

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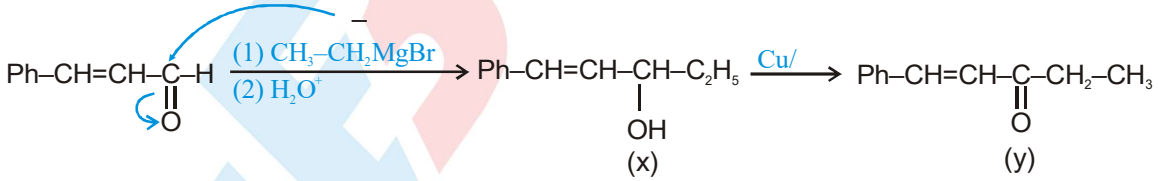

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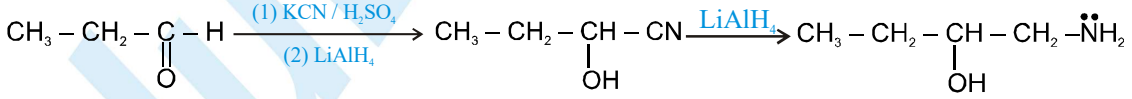

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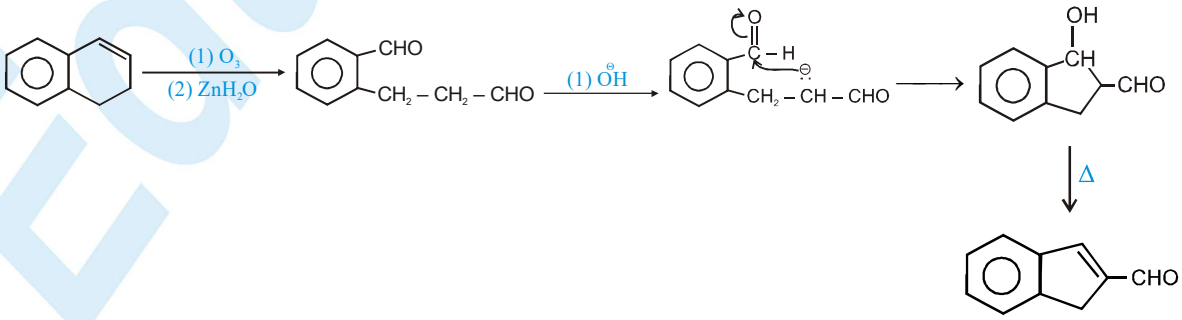

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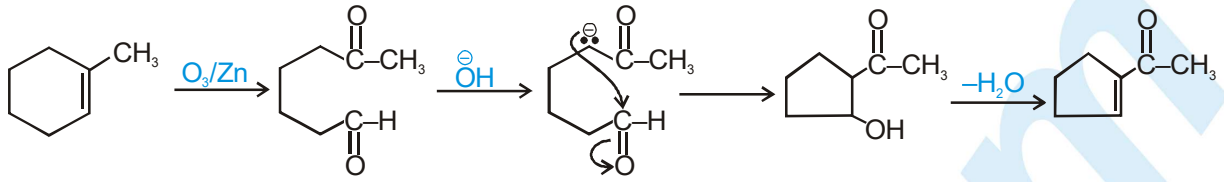

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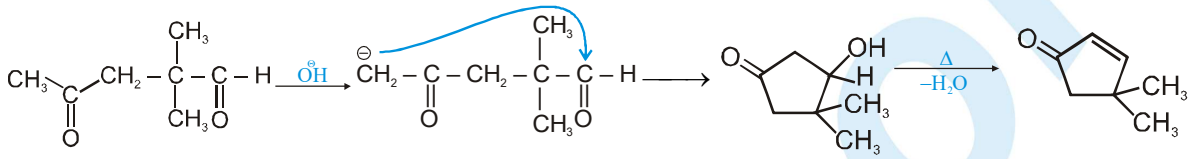
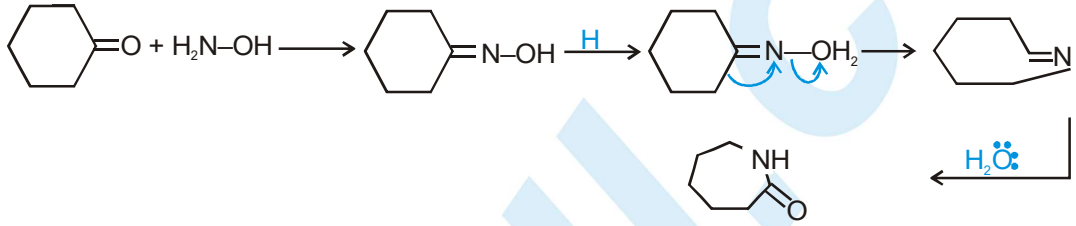


70. Beckmanns rearrangement



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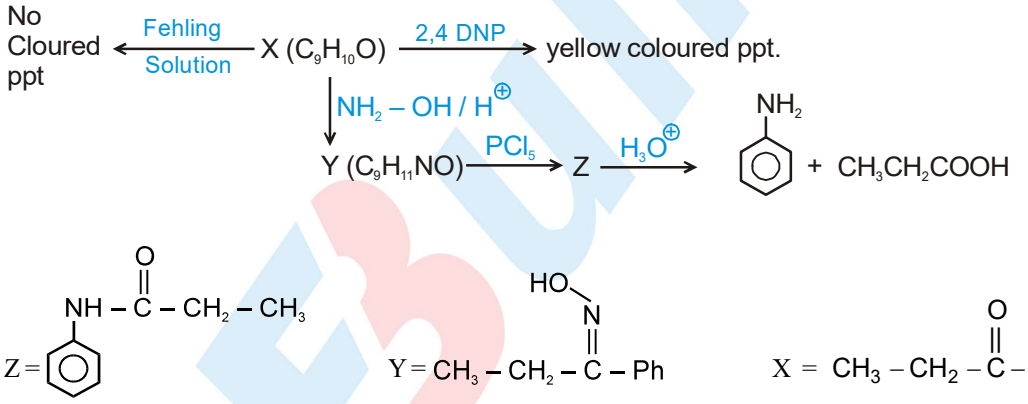

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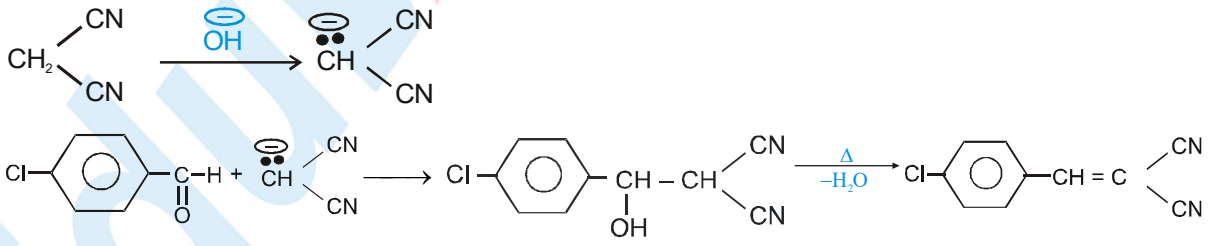

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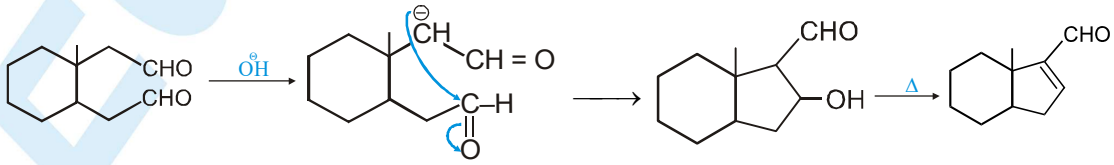

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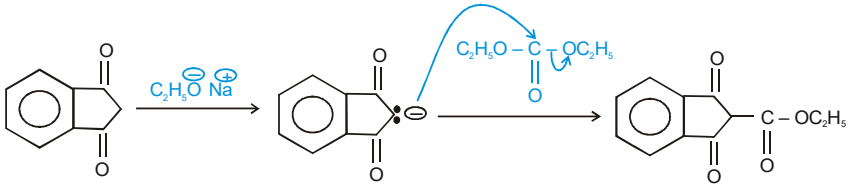

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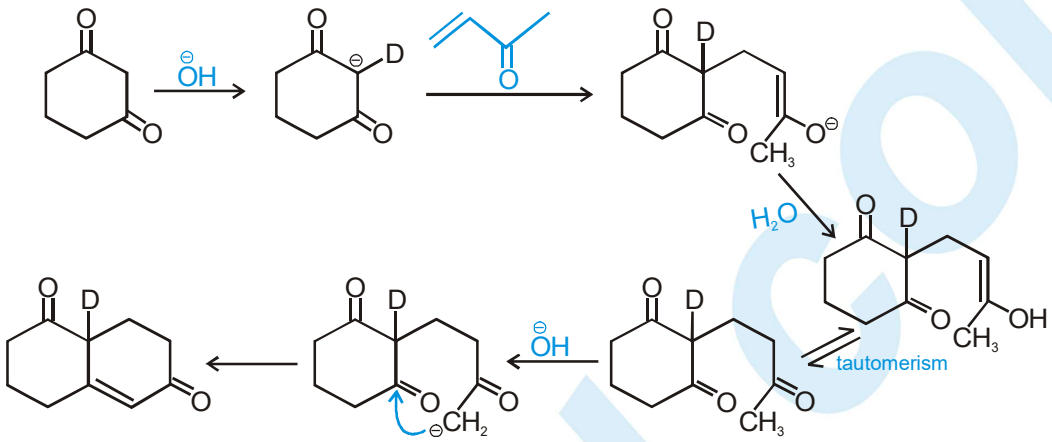

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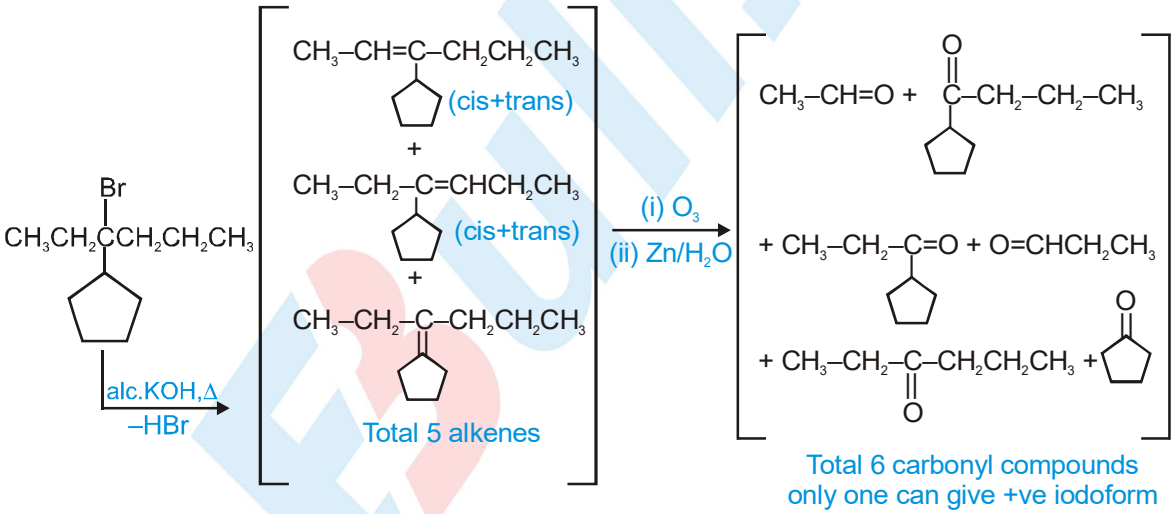
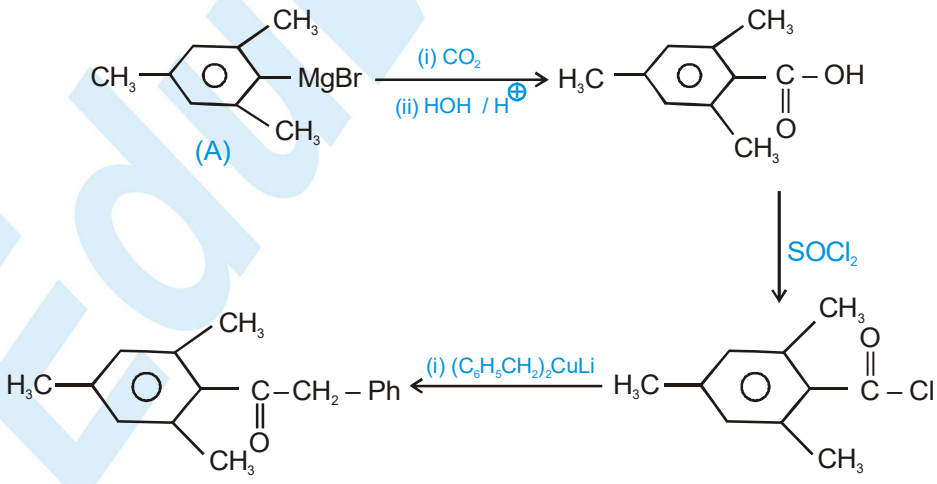

Total 5 alkenes
Total 6 carbonyl compounds
only one can give +ve iodoform

78.



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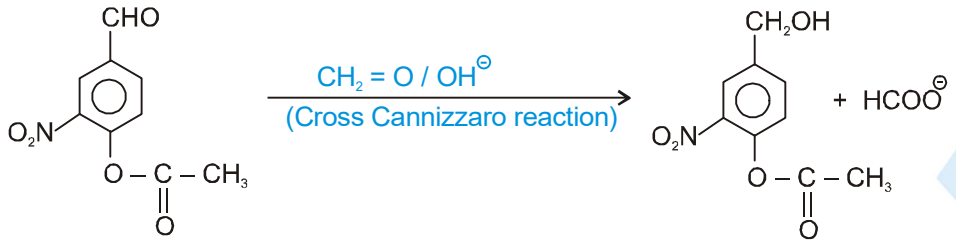
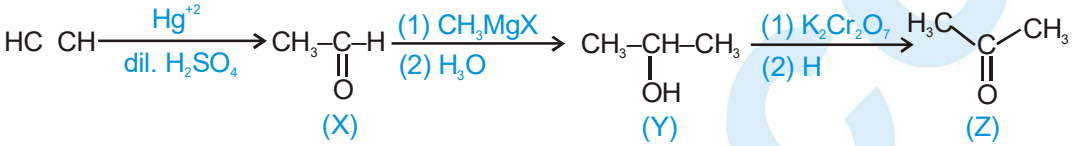


EXERCISE - 2

Part # I : Multiple Choice

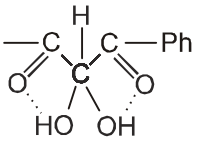
2.



3. $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-CH_3$ and $CH_3-\underset{\underset{CH_3}{|}}{CH}-\overset{\overset{O}{\|}}{C}-CH_3$ gives positive Iodoform test

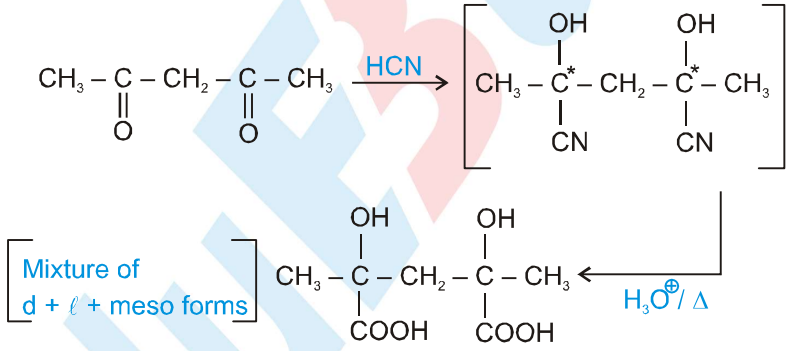
4. **(A)** Due to substrate (steric factor)

(B) H bonding in



(C) Cyanohydrin formation is usually reversible

5.



6.

(a) $Ph-CH_2-CH=O \xrightarrow{KCN/H_2O} Ph-CH_2-\underset{\underset{OH}{|}}{CH}-CN \xrightarrow{\ddot{N}H_3} Ph-CH_2-\underset{\underset{NH_2}{|}}{CH}-CN \xrightarrow{H_3O} Ph-CH_2-\underset{\underset{NH_2}{|}}{CH}-COOH$

(b) $Ph-CH_2-CH=O \xrightarrow{KCN/NH_4Cl} Ph-CH_2-\underset{\underset{OH}{|}}{CH}-CN \xrightarrow{\ddot{N}H_3} Ph-CH_2-\underset{\underset{NH_2}{|}}{CH}-CN \xrightarrow{H_3O} Ph-CH_2-\underset{\underset{NH_2}{|}}{CH}-COOH$

(c) $Ph-CH_2-CH=O \xrightarrow{HCN/NaOH} Ph-CH_2-\underset{\underset{OH}{|}}{CH}-CN \xrightarrow{SOCl_2} Ph-CH_2-\underset{\underset{Cl}{|}}{CH}-CN \xrightarrow[(2)\ H_3O]{(1)\ NH_3} Ph-CH_2-\underset{\underset{NH_2}{|}}{CH}-COOH$

7. **(A)** $(CH_3CH_2COO)_2Ca \xrightarrow{\Delta} CH_3-CH_2-\underset{\underset{O}{\|}}{C}-CH_2-CH_3$

(B) $CH_3-CH_2-C\equiv N \xrightarrow{CH_3-CH_2-MgBr} CH_3-CH_2-\underset{\underset{CH_2CH_3}{|}}{C}=N\,MgBr \xrightarrow{H_3O^+} CH_3-CH_2-\underset{\underset{CH_2CH_3}{|}}{C}=NH$

$CH_3-CH_2-\underset{\underset{O}{\|}}{C}-CH_2-CH_3 \xleftarrow{H_3O^+}$ (from the imine above)

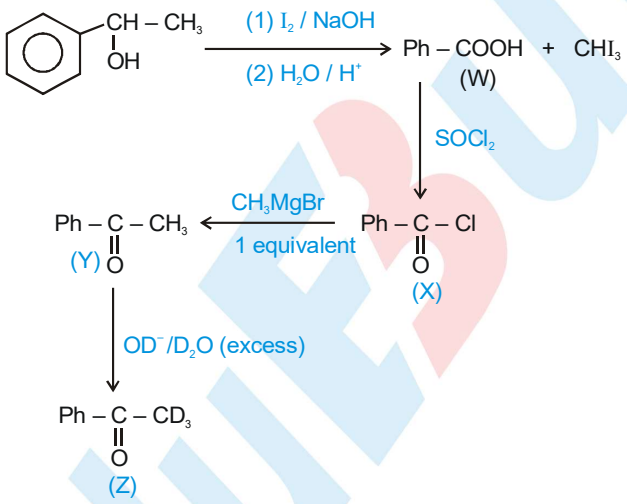
(C) $CH_3-\underset{\underset{O}{\|}}{C}-CH_2-CH_2-\underset{\underset{O}{\|}}{C}-OC_2H_5 \xrightarrow{H_3O/H^+} CH_3-\underset{\underset{O}{\|}}{C}-CH_2-CH_2-\underset{\underset{O}{\|}}{C}-OH$

$CH_3-\underset{\underset{O}{\|}}{C}-CH_2-CH_3 \xleftarrow{NaOH/CaO}$ (from the acid above)

(D) $CH_3-CH_2-\underset{\underset{O}{\|}}{C}-\underset{\underset{CH_3}{|}}{CH}-\underset{\underset{O}{\|}}{C}-OH \xrightarrow[CO_2]{\Delta} CH_3-CH_2-\underset{\underset{O}{\|}}{C}-CH_2-CH_3$

8. **(A)** Perkin reaction **(B)** Knoevenagel reaction **(D)** Reformatsky reaction

9.



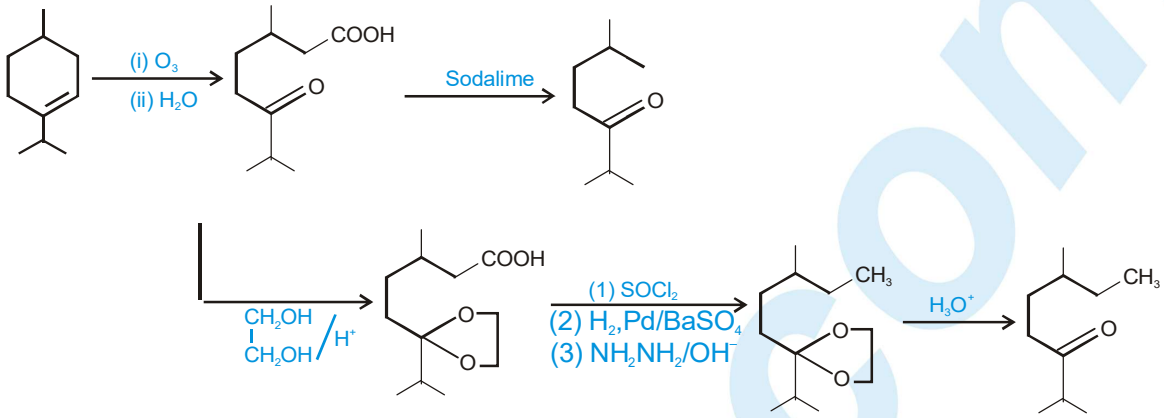
10. Wittig reaction.

(a) $C_6H_5-CH=O + Ph_3-P=CH-CH=CH_2 \longrightarrow C_6H_5-CH=CH-CH=CH_2$

(b) $C_6H_5-\underset{\underset{H}{|}}{C}=PPh_3 + O=\underset{\underset{CH=CH_2}{|}}{C}H \longrightarrow C_6H_5-\underset{\underset{H}{|}}{C}=\underset{\underset{CH=CH_2}{|}}{C}H$

11. Stability of hydrates of carbonyl compound depends on steric hindrance, presence of –I group on gemdiol. Intramolecular H-bonding and angle 'strain in carbonyl compound.

12.



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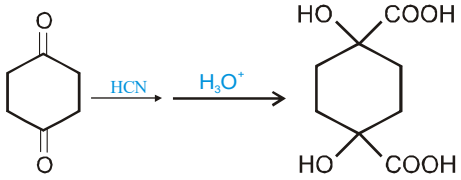

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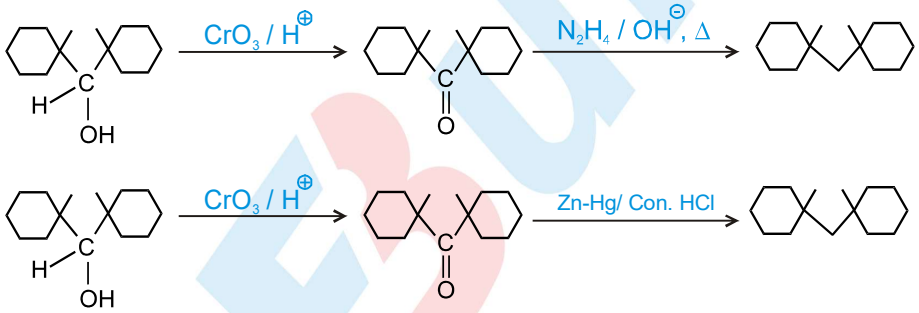


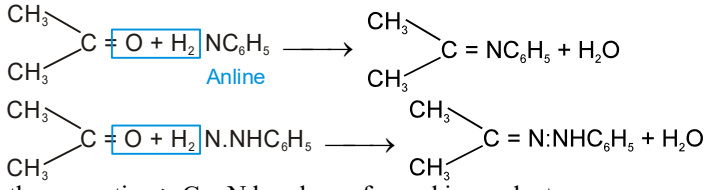
15.

(A) $CH_3 - CH_2 - \underset{\underset{O}{\|}}{C} - H + CH_3 - \overset{\ominus}{C}H - CHO \xrightarrow[-H_2O]{\overset{\ominus}{O}H} CH_3 - CH_2 - CH = \underset{\underset{CH_3}{|}}{C} - CHO$

(B) $PhCH + CH_3 - \overset{\ominus}{C}H - \underset{\underset{O}{\|}}{C} - Ph \xrightarrow[-H_2O]{\overset{\ominus}{O}H} Ph - CH = \underset{\underset{CH_3}{|}}{CH} - \underset{\underset{O}{\|}}{C} - Ph$

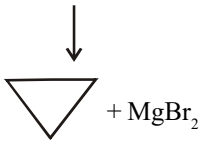
(C) $PhCH + \overset{\ominus}{C}H_2 - \underset{\underset{O}{\|}}{C} - CH_3 \xrightarrow[-H_2O]{\overset{\ominus}{O}H} Ph - CH = CH - \underset{\underset{O}{\|}}{C} - CH_3$

16. Carbonyl compound (acetone) forms condensation product with hydrazine, phenyl hydrazine aniline etc.



Hence in these reaction > C = N bonds are formed in products.

18. **(C)** $BrCH_2CH_2CH_2Br + Mg \xrightarrow{Et_2O} Br - CH_2 - CH_2 - CH_2\ MgBr$



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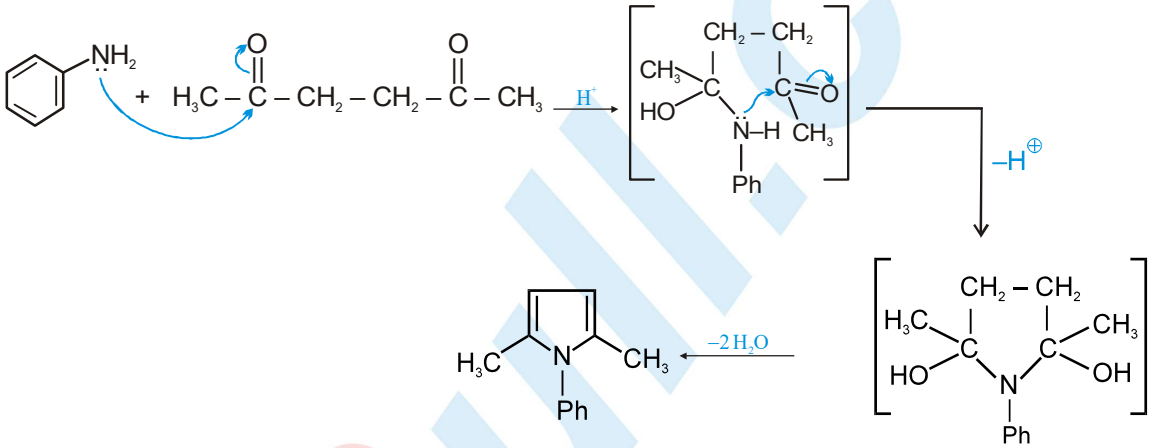

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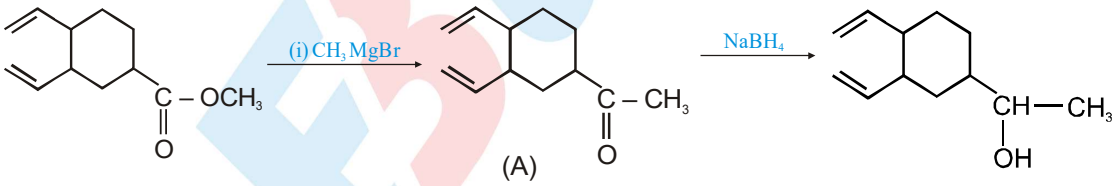


21. **(D)** $Cl - CH_2 - \underset{\underset{O}{\|}}{C} - OEt + 2CH_3MgI \xrightarrow{H_2O} Cl - CH_2 - \underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_3$

22. **(A)** $2CH_2 = CH - CH_2 - Cl \xrightarrow[ether]{Mg} 2\,CH_2 = CH - CH_2 - MgCl + H - \underset{\underset{O}{\|}}{C} - OC_2H_5$

$(CH_2 = CH - CH_2)_2\,CH - OH + CH_3 - CH_2 - OH$

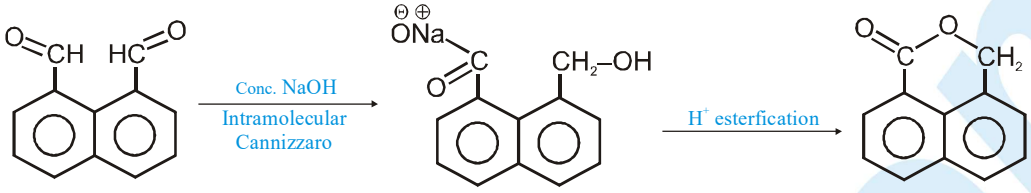
23. It is cannizzaro reaction.

24. In Wolf-Kishner reduction carbonyl compound is converted to hydrocarbon.

25. $C_6H_5 - \underset{\underset{O}{\|}}{C} - Cl \xrightarrow[\text{Rossenmund's reduction}]{H_2, Pd/BaSO_4} C_6H_5 - \underset{\underset{O}{\|}}{C} - H$

26. It is a protection of carbonyl group.

27.



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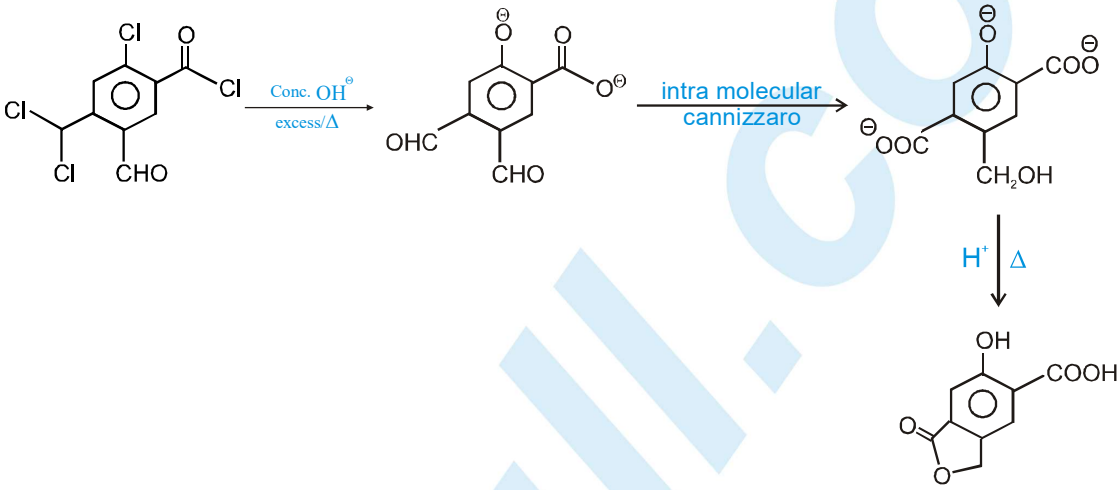
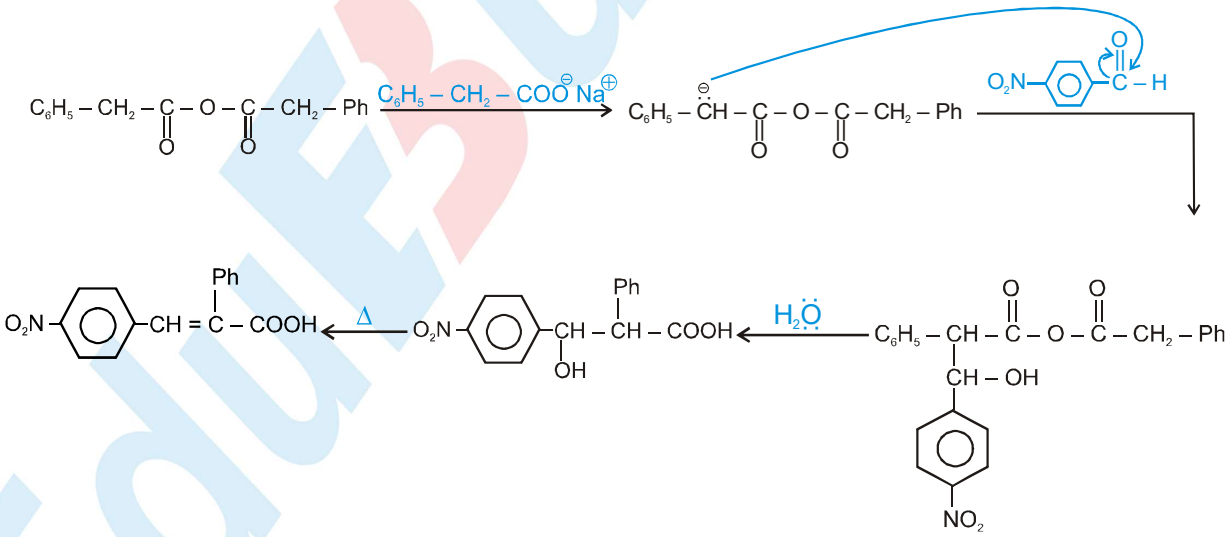


29. Rate of nucleophilic attack ∝ amount of +ve charge at carbonyl carbon.

31.



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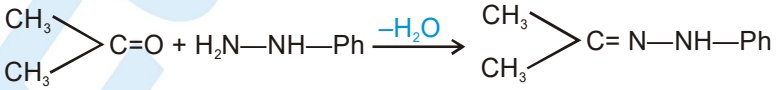

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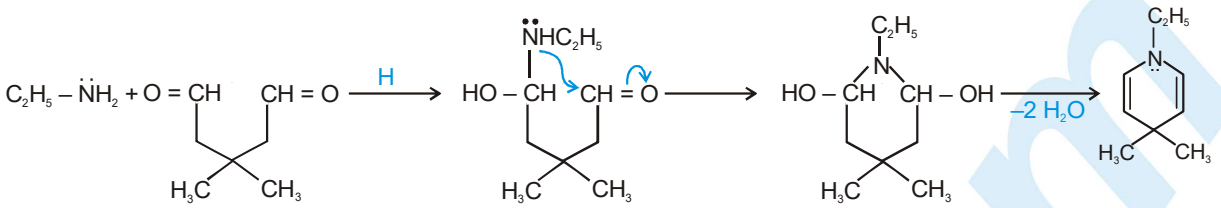

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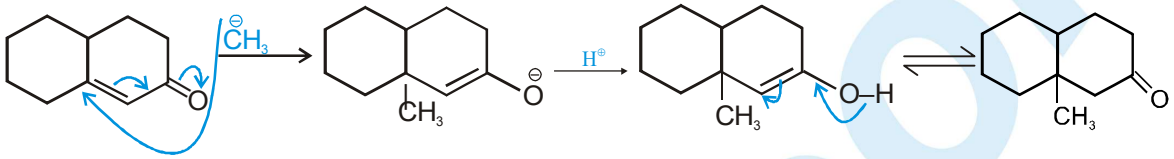

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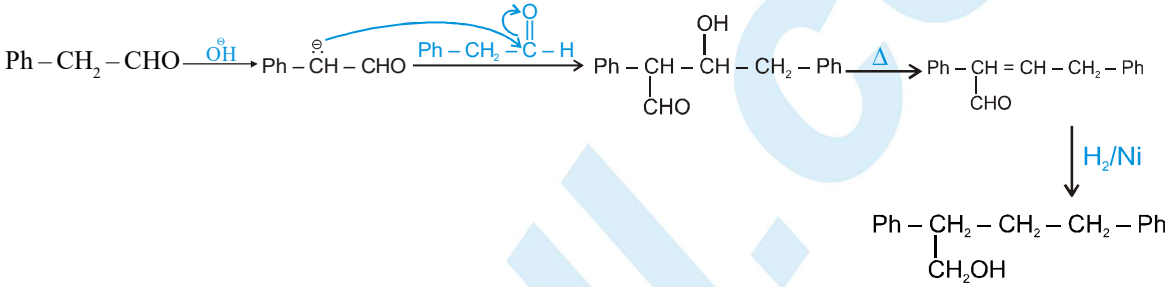

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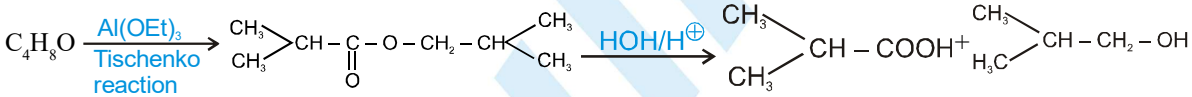

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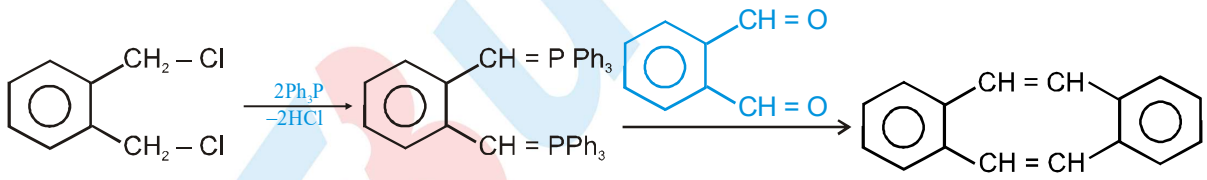
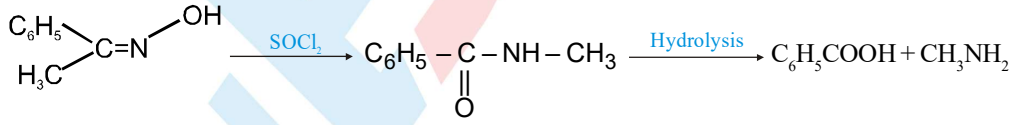


38. Beckamann rearrangement (anti group of –OH migrate)



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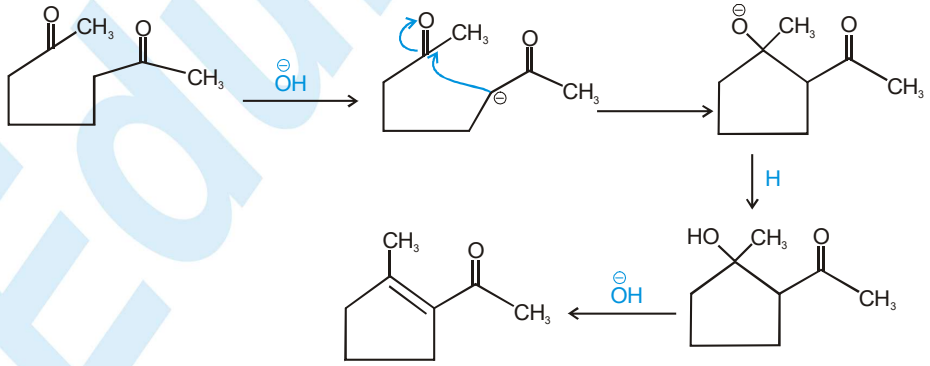

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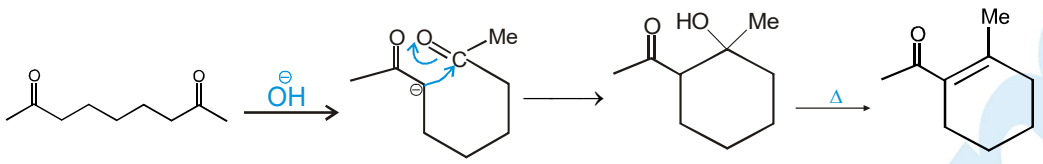
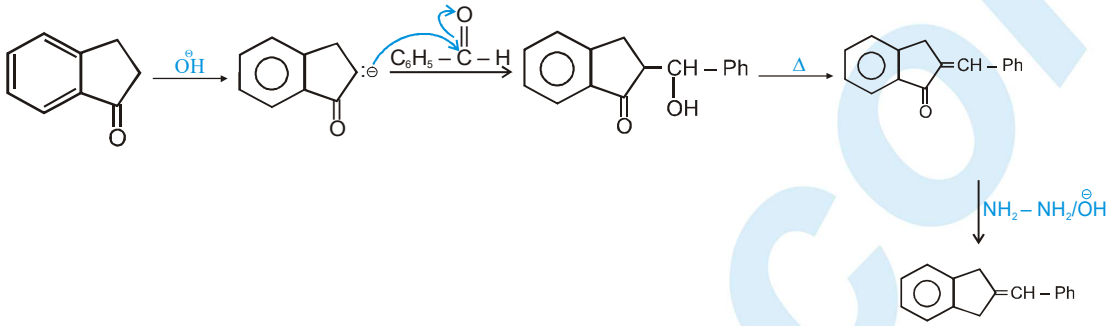
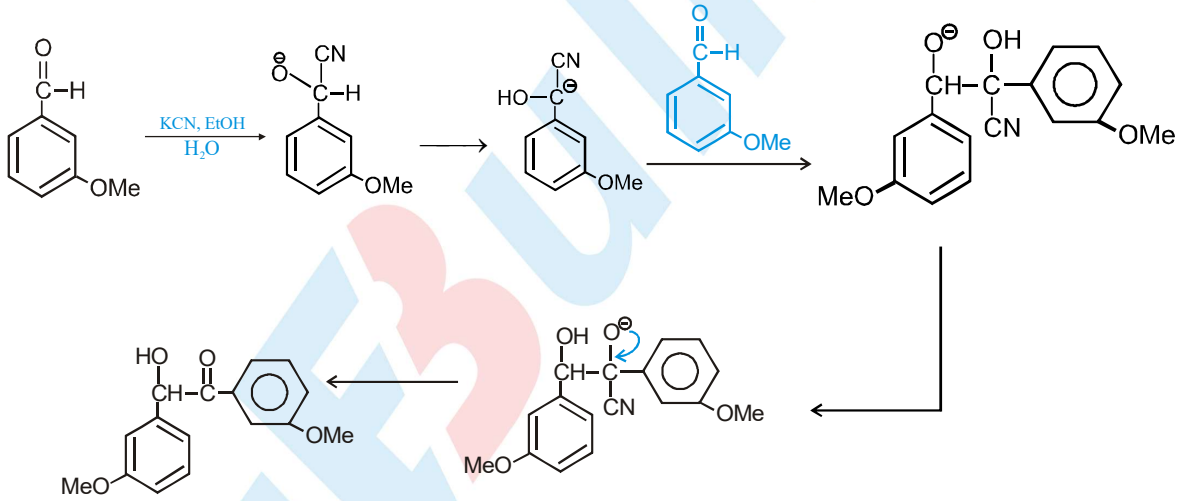


41.



42. –I and –M group increase electrophilicity on carbonyl group so rate of addition reaction increase and also increases equilibrium constant.

43. Benzoin condensation



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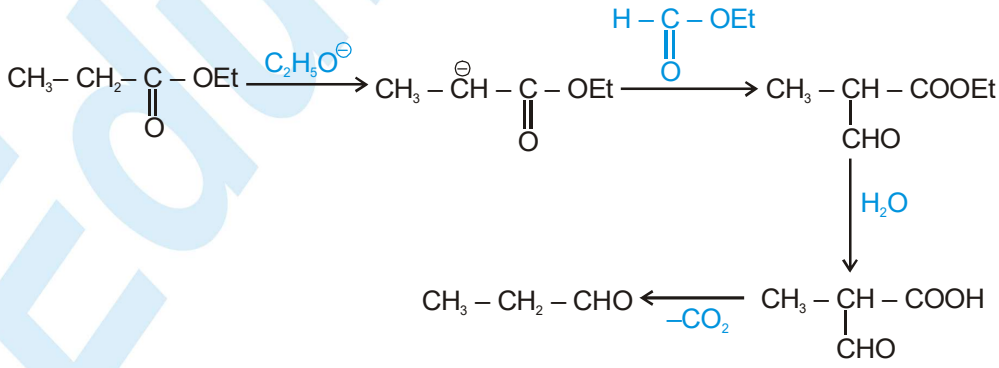

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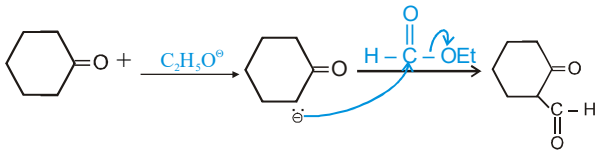
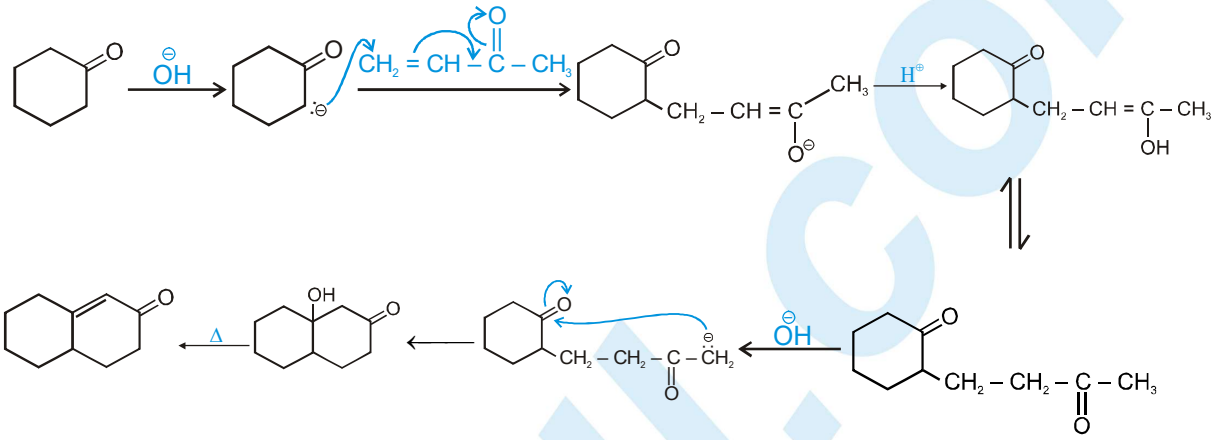


46. $K_2Cr_2O_7$ oxidised secondary alcohol which gives iodoform test.

47.



48. $C_6H_5CHO + HCHO + \underset{\text{(conc.)}}{NaOH} \longrightarrow C_6H_5CH_2OH + HCOONa$

It is crossed Cannizzaro's reaction.

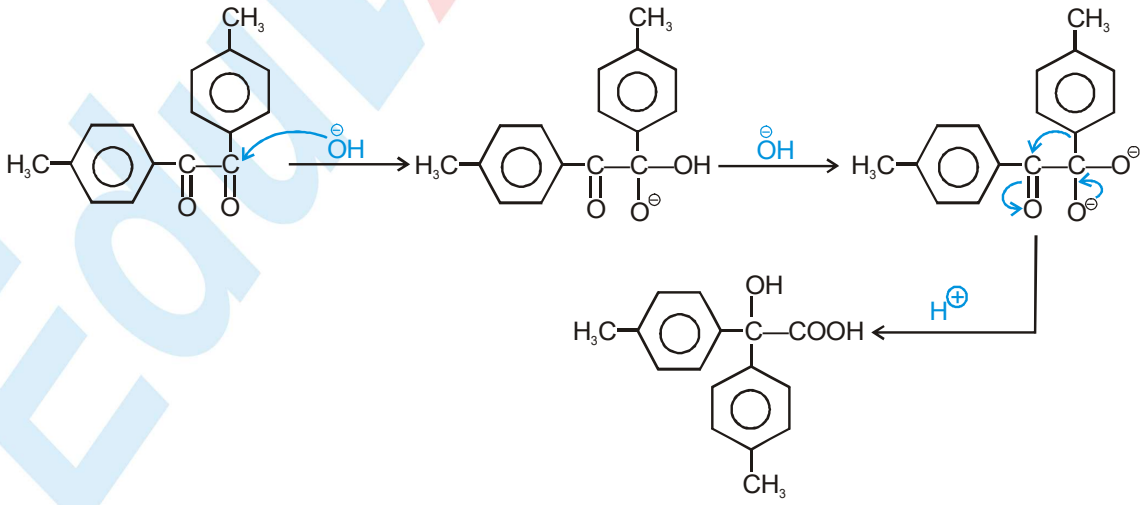
49. $CH_3-CH_2-CH_2OH \xrightarrow[\text{heat, } 300°C]{Cu} CH_3-CH_2-CHO \xrightarrow[\text{Fehling Solution}]{2CuO} Cu_2O\downarrow$

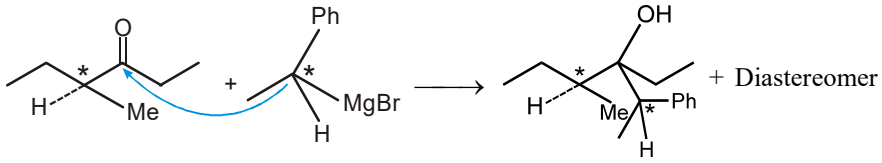
1 – Propanol — red ppt

$CH_3-CHOH-CH_3 \xrightarrow[\text{heat, } 300°C]{Cu} CH_3-CO-CH_3 \xrightarrow[\text{Fehling Solution}]{2CuO+CH_3CH_2COOH}$ No reaction

2 – Propanol

50. It is benzil-benzylic acid rearrangement



51. 

+ Diastereomer

52. Transfer of hydride ion

Part # II : Assertion & Reason

1. $NaHSO_3$ on addition of carbonyl compound forms a salt.

5. Base will decrease the rate of reaction.

7. Grignard reagent can not be prepared in all nonpolar solvent, it can prepare only in ether solvent.

8. G.R. can not prepared in aqueous solution due to acid base reaction.

10. In weakly acidic medium nucleophile is not affected.

12. Acetals are not hydrolysed in basic medium.

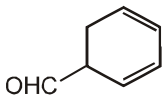
13. Hydrogen of nitromethane is more acidic as $\overset{\ominus}{C}H_2–NO_2$ is more stable.

EXERCISE - 3

Part # I : Matrix Match Type

1.

(A) $Ph–CH_2–\overset{O}{\overset{\|}{C}}–CH=CH_2$
- 1, 4-addition.
- Shows tautomerism as it has two α-H.
- Gives +ve 2, 4-DNP test as the carbonyl group is present.

(B) 

- Gives 1, 4-addition.
- Shows tautomerism as it has two α-H.
- Gives +ve tollen's test as it has aldehyde groups.
- +ve 2, 4-dNP test.

(C) $CH_3–CH=CH–CH=CH_2$
- It is a conjugated diene and gives 1, 4-addition.

(D) $CH_3–\overset{O}{\overset{\|}{C}}–CH_2–\overset{O}{\overset{\|}{C}}–H$
- Shows tautomerism as it has active methylene group (α-H).
- +ve tollen's test since –CHO group is present.
- +ve 2, 4-DNP test.

3.

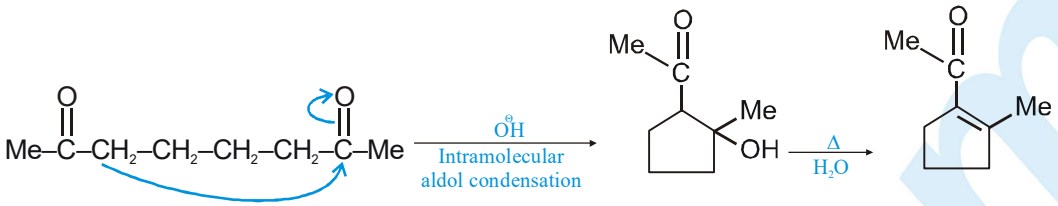
(A) $RMgI + CH_3–C\equiv N \longrightarrow CH_3–\overset{R}{\overset{|}{C}}=NMgI \xrightarrow{H_3O^+} CH_3–\overset{O}{\overset{\|}{C}}–R$ (Alkanone)

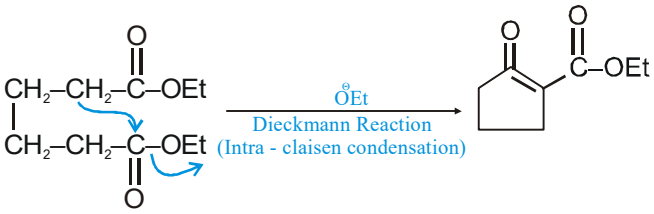
(B) $RMgI + S=C=S \longrightarrow R–\overset{S}{\overset{\|}{C}}–S–MgI \xrightarrow{H_3O^+} R–\overset{S}{\overset{\|}{C}}–SH$ (Dithionic acid)

(C) $RMgI + CH_3CH_2O–\overset{O}{\overset{\|}{C}}–Cl \longrightarrow CH_3–CH_2–O–\overset{R}{\overset{|}{C}}(OMgI)–Cl \longrightarrow CH_3–CH_2–O–\overset{R}{\overset{|}{\underset{O}{\overset{\|}{C}}}} + MgICl$

(Ester)

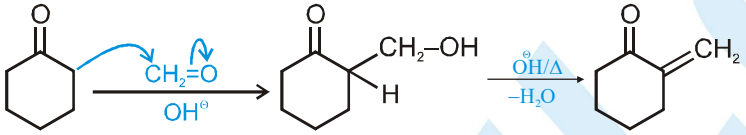
(D) $RMgI + \underset{O}{CH_2–CH_2} \longrightarrow R–CH_2–CH_2–OMgI \xrightarrow{H_3O^+} R–CH_2–CH_2–OH$ (Alcohol)

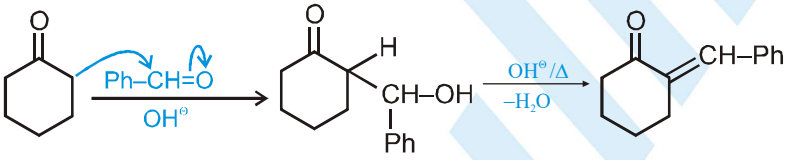
4. **(A)** 

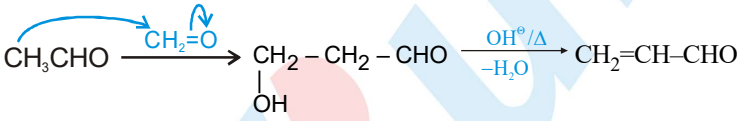
(B) 

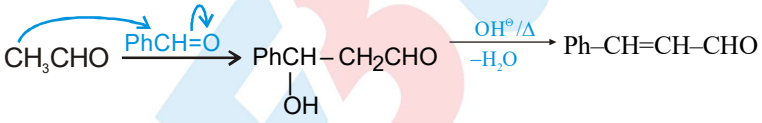
(C) Perkin's condensation reaction.

(D) Benzil-Benzilic acid rearrangement.

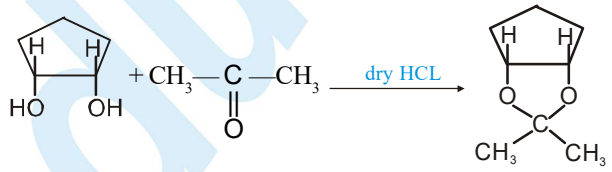
5. **(A)** 

(B) 

(C) 

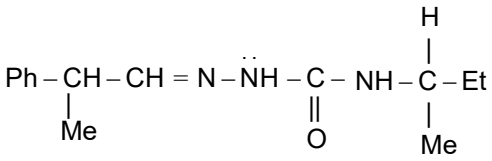
(D) 

EXERCISE - 4
Subjective Type

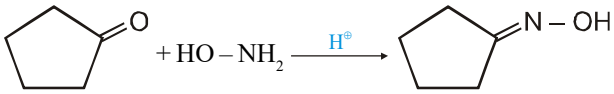
2. **(a)** 

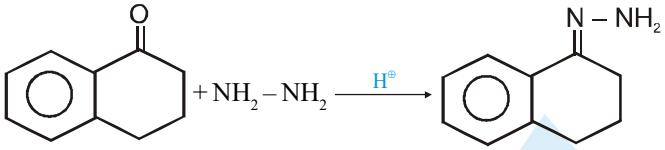
K
A cyclic ketal

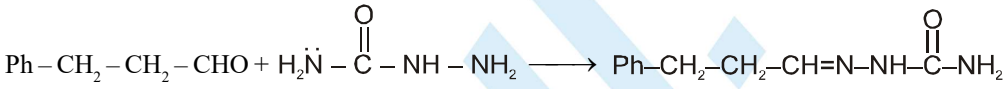
(b) The – OH groups in the trans isomer are too far apart to form cyclic structure.

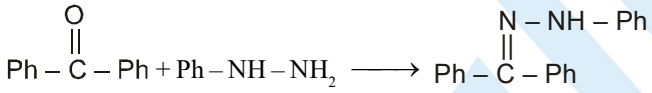
3. **(a)** 

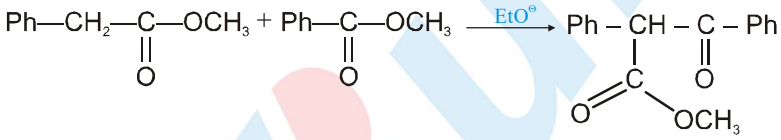
(R, syn)
(R, anti)
(S, syn)
(S, anti)

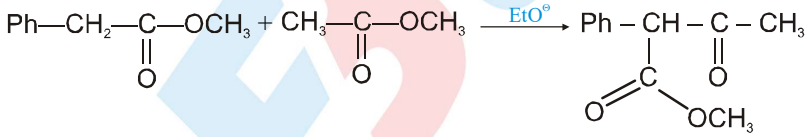
4. **(a)** 

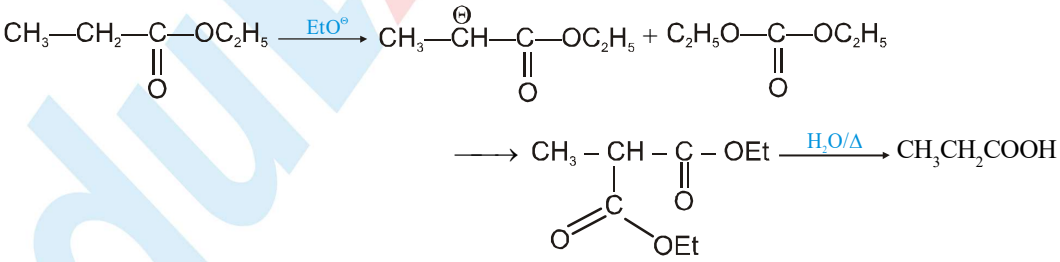
(b) 

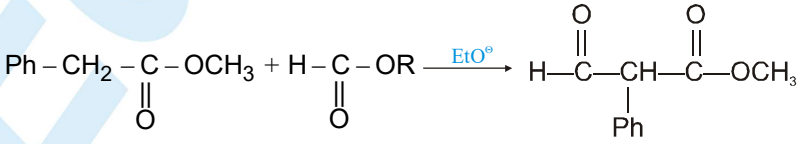
(c) 

(d) 

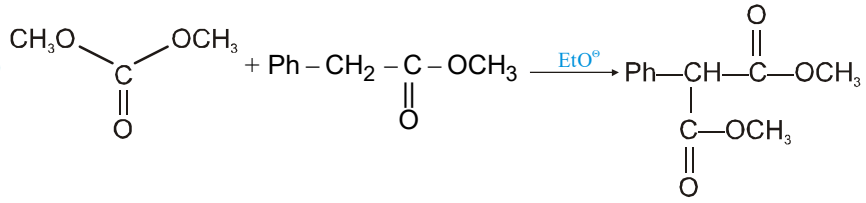
7. **(a)** 

(b) 

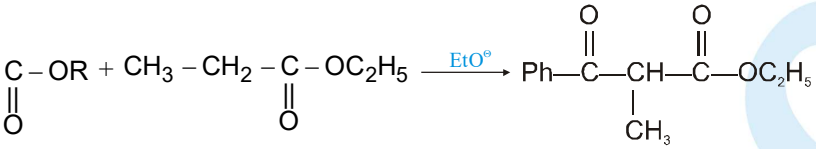
(c) 

8. **(a)** 

(b)



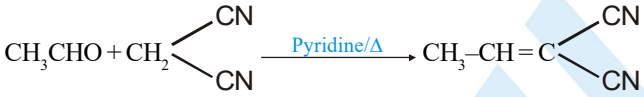
(c)



9. **(a)**

excess

(b)



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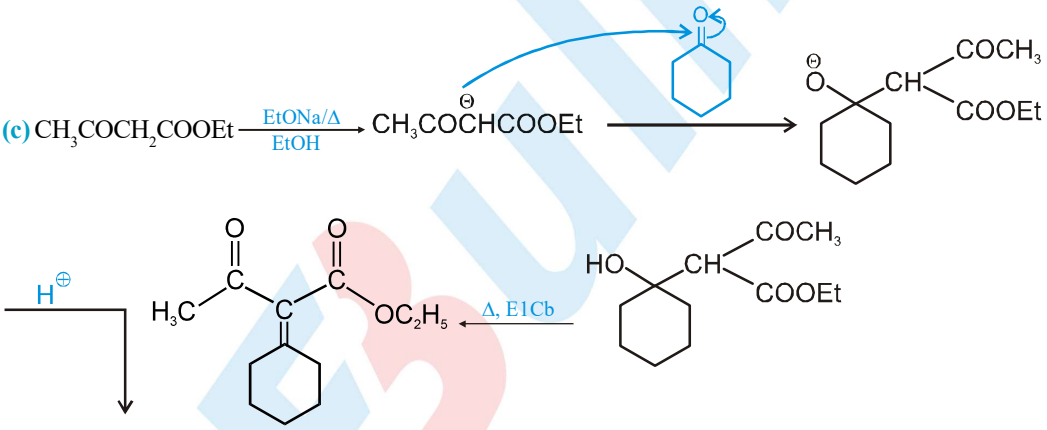

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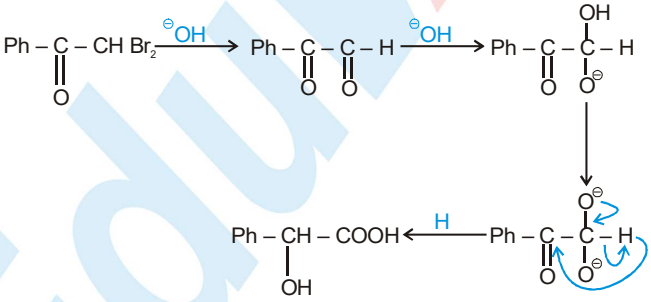

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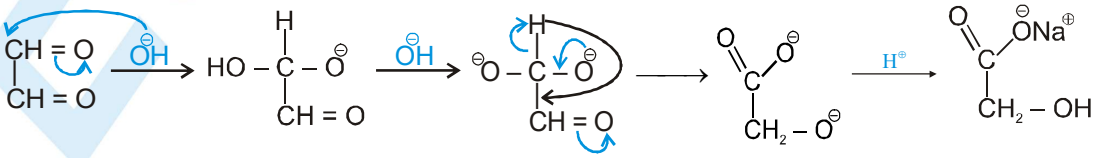

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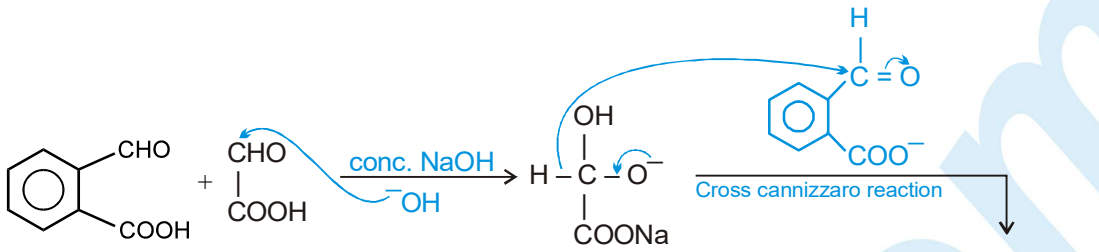
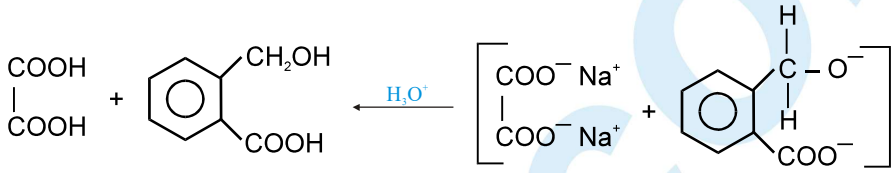
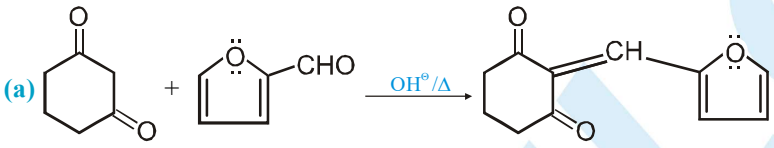
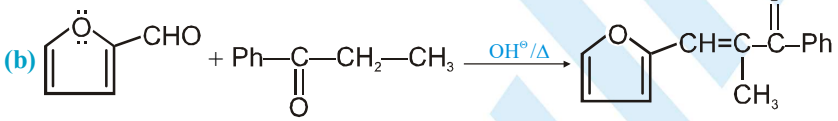




13. **(a)**



(b)



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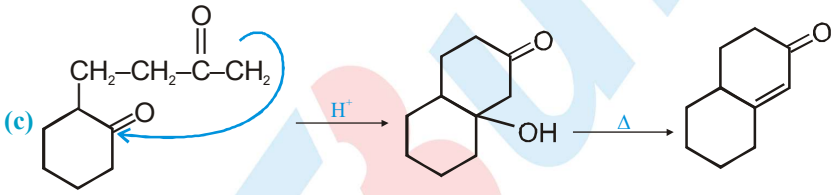
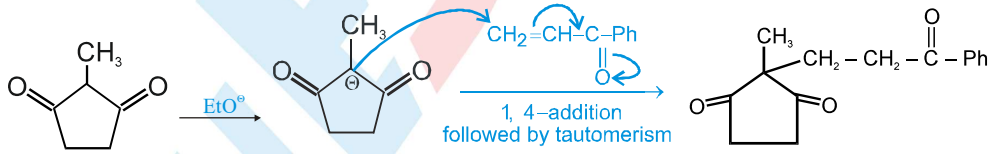


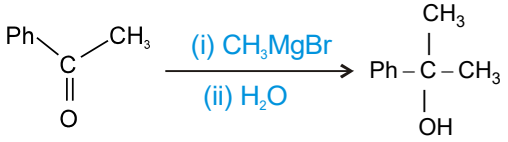
14.

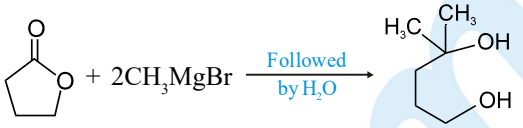


16. $CH_3(CH_2)_8CH_2Br \xrightarrow[H_3O^{\oplus}]{Mg} CH_3(CH_2)_8CH_3 \xrightarrow{Cl_2}$ 5 monochloro product.

(X) (Y)

17. **(a)** $Ph{-}C{\equiv}CH + CH_3MgBr \longrightarrow CH_4 + Ph{-}C{\equiv}CMgBr \xrightarrow[(ii)\ H_2O]{(i)\ CH_3-\overset{\overset{O}{\|}}{C}-CH_3} Ph-C\equiv C-\underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$

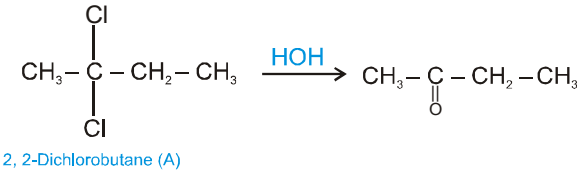
(b) 

(c) 

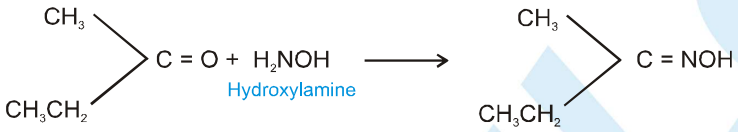
18. **(i)** **(B)** reacts with hydroxyl amine and thus **(B)** has carbonyl group, i.e., $>C=O$ group ketonic or aldehyde (—CH = O) group.

(ii) **(B)** gives negative test with Tollen's reagent and thus **(B)** is ketone.

(iii) **(B)** is obtained by hydrolysis of **(A)** and thus both CI atoms should be on same carbon atoms, i.e., **(A)** must be gem dihalide as well as not on terminals. Thus, only possibility of **(A)** is $CH_3CCl_2CH_2CH_3$.

(i) 

2, 2-Dichlorobutane (A)

(ii) 

(iii) 

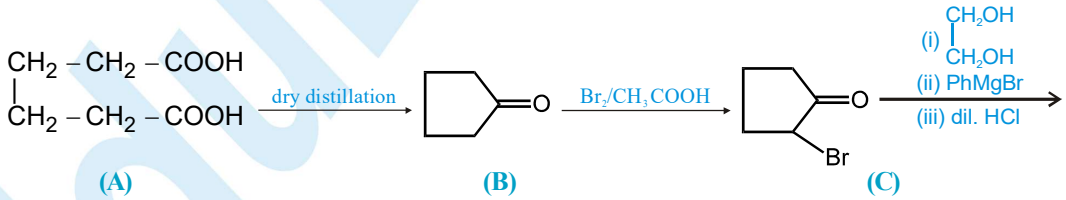
20. $ROH + CH_3MgX \rightarrow CH_4 + ROMgX$

Let molecular mass of alcohol is M

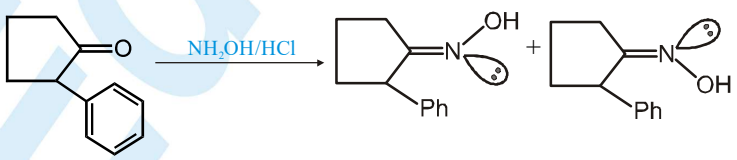
$$\frac{56}{22400} = \frac{0.22}{M}$$

$$M = \frac{22400 \times 0.22}{56} = 88 \text{ gm}$$

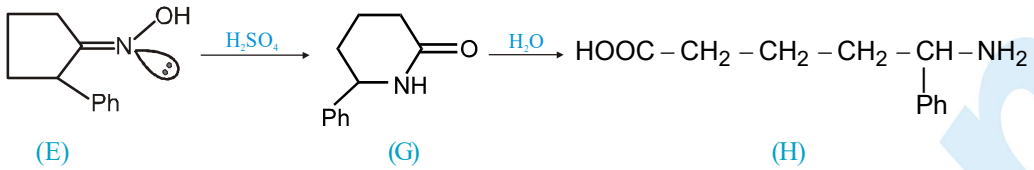
General formula of alcohol is $C_nH_{2n+1}OH$ which correspond to the molecular mass 88. Hence value of n = 5. So molecular formula of alcohol is $C_5H_{11}OH$.

21. 

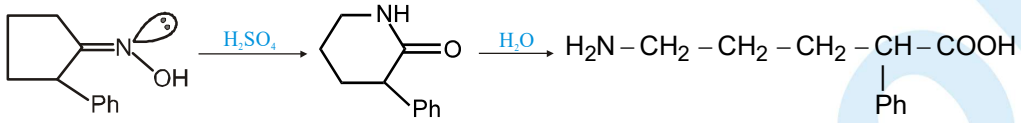
(A) **(B)** **(C)**



(D) (E) (F)

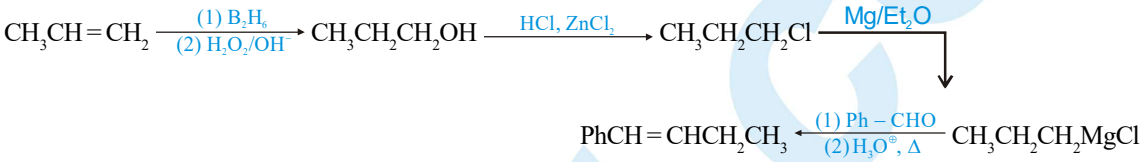

OH
N
Ph
H_2SO_4
O
NH
Ph
H_2O
HOOC – CH_2 – CH_2 – CH_2 – CH – NH_2
Ph

(E) (G) (H)

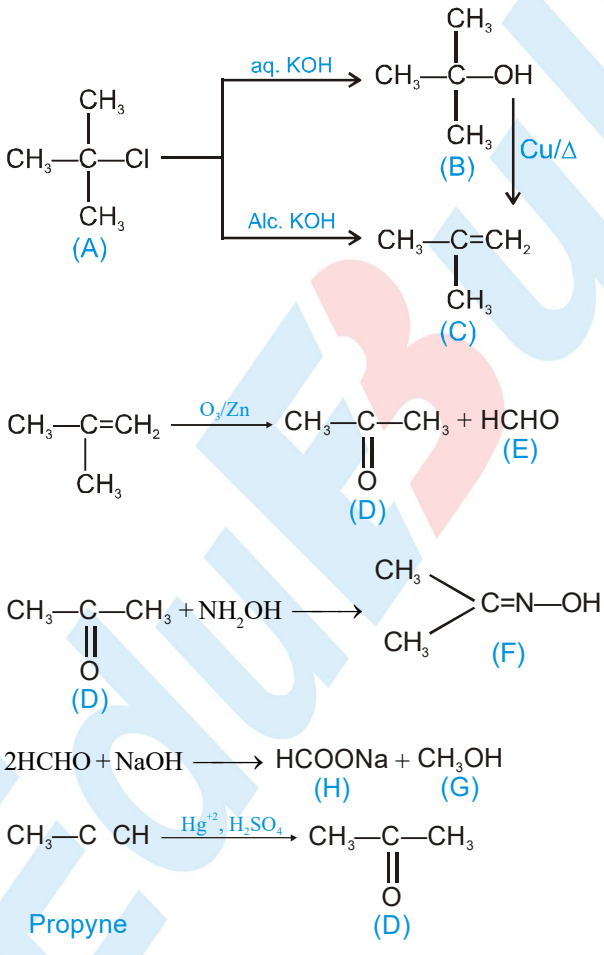

N
OH
Ph
H_2SO_4
NH
O
Ph
H_2O
H_2N – CH_2 – CH_2 – CH_2 – CH – COOH
Ph

(F) (I) (J)

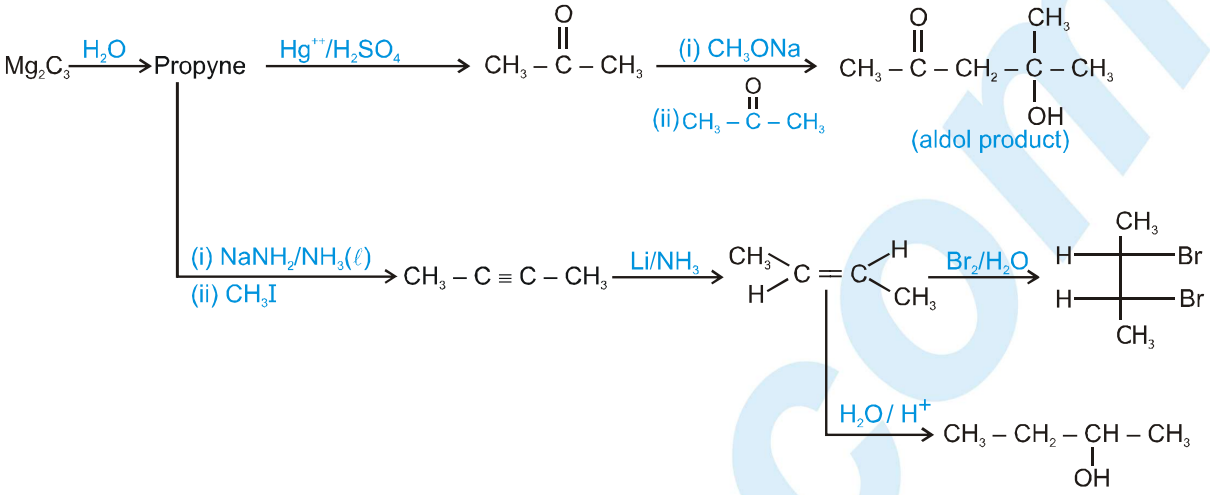
22.


$CH_3CH=CH_2$
(1) B_2H_6
(2) H_2O_2/OH^-
$CH_3CH_2CH_2OH$
HCl, $ZnCl_2$
$CH_3CH_2CH_2Cl$
Mg/Et_2O
$CH_3CH_2CH_2MgCl$
(1) Ph – CHO
(2) $H_3O^{\oplus}$, Δ
$PhCH=CHCH_2CH_3$

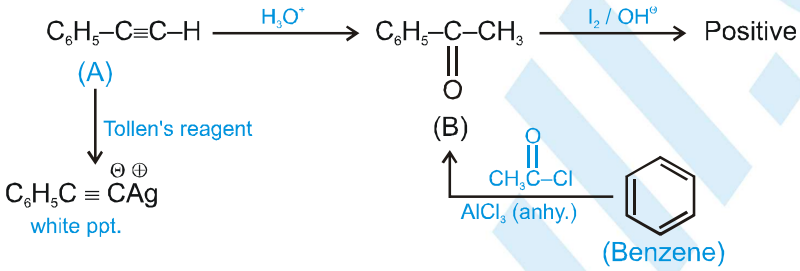
23.


CH_3—C—Cl
CH_3
CH_3
(A)
aq. KOH
CH_3—C—OH
CH_3
CH_3
(B)
Cu/Δ
Alc. KOH
CH_3—C=CH_2
CH_3
(C)
CH_3—C=CH_2
CH_3
O_3/Zn
CH_3—C—CH_3 + HCHO
O
(D)
(E)
CH_3—C—CH_3 + NH_2OH
O
(D)
CH_3
C=N—OH
CH_3
(F)
2HCHO + NaOH
HCOONa + CH_3OH
(H)
(G)
CH_3—C CH
Hg^{+2}, H_2SO_4
CH_3—C—CH_3
O
Propyne
(D)

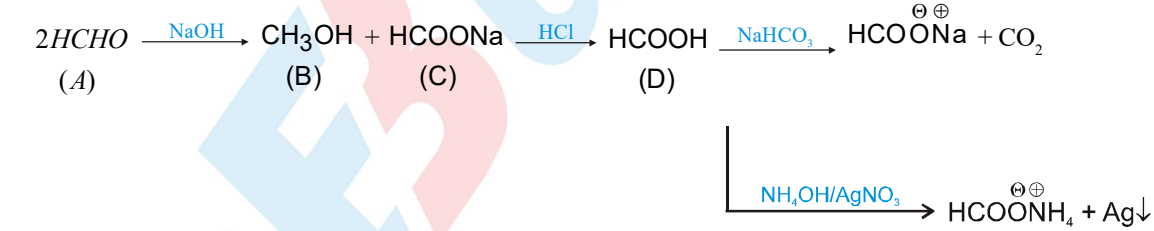
24.



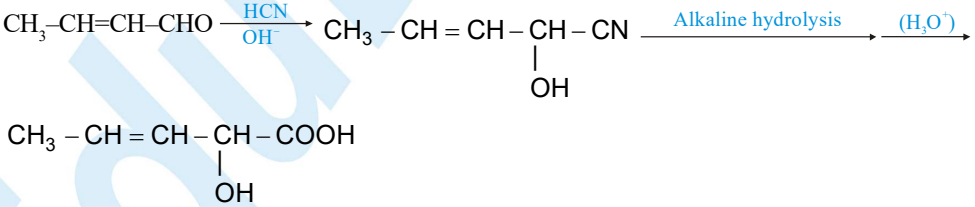
25.



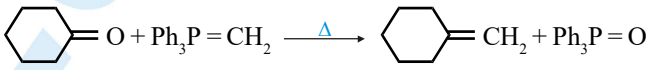
27. Empirical formula of **(A)** $\Rightarrow CH_2O$
Molecular formula of **(A)** $\Rightarrow HCHO$



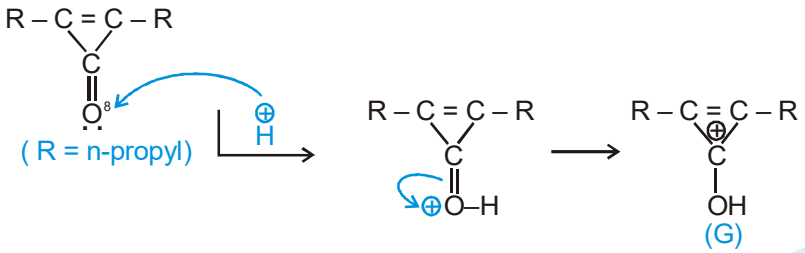
28.



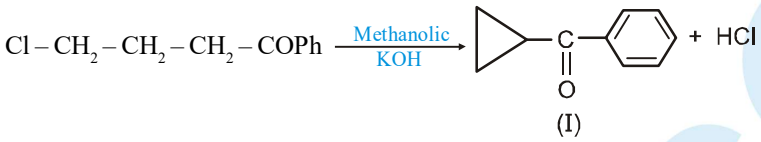
30. **(a)** It is Wittig reaction.



(b)

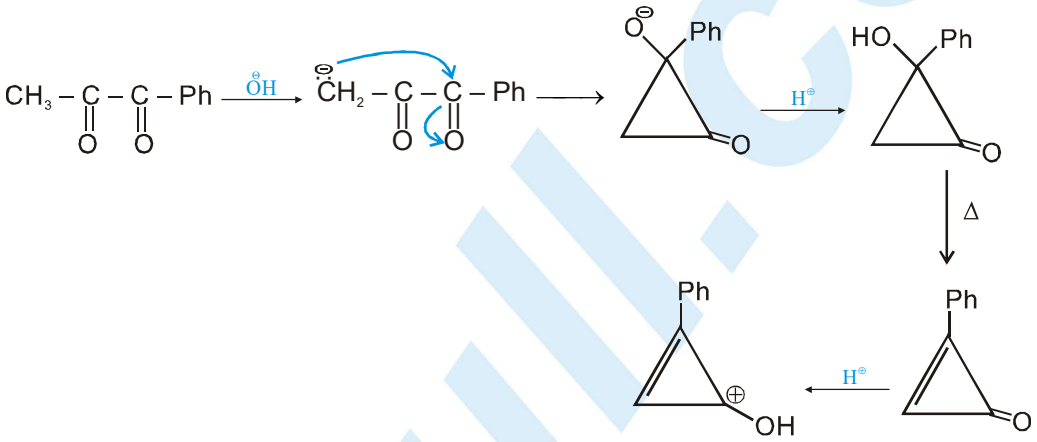


(c)

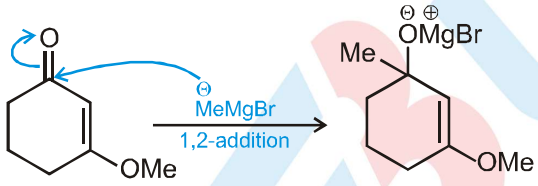


(I)

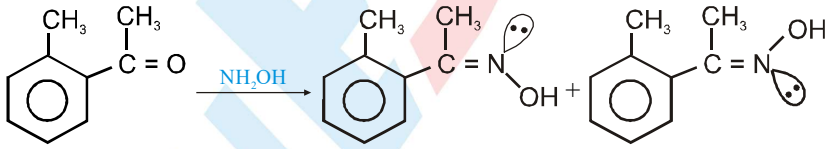
(d)



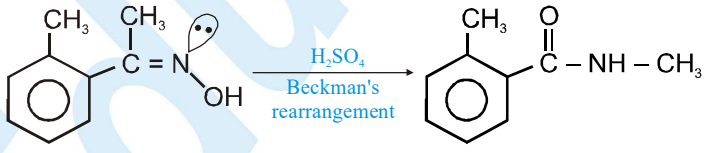
32.



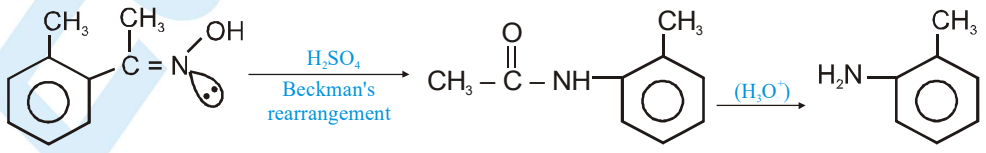
33.



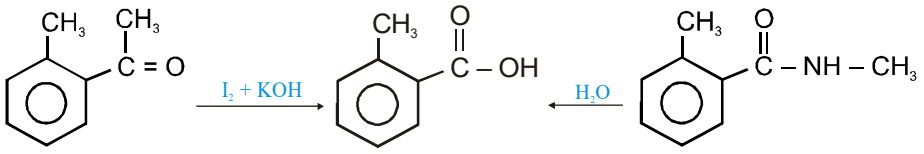
(A) **(C)** **(B)**



(C) **(D)**

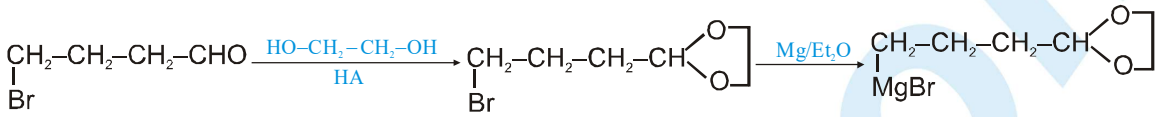


(B) (E) o-methylaniline

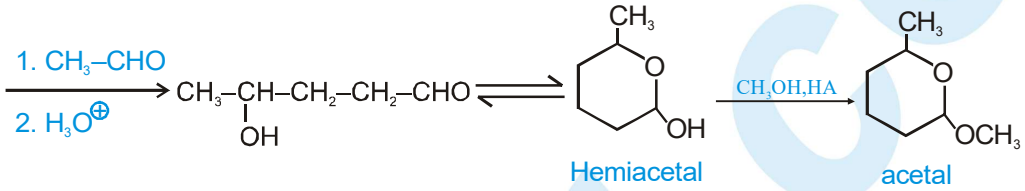


(A) (F) (D)

34.



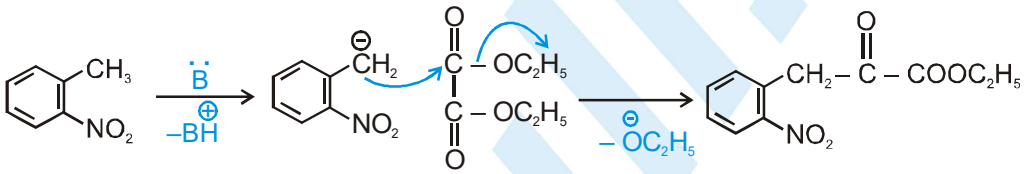
(A) (B)



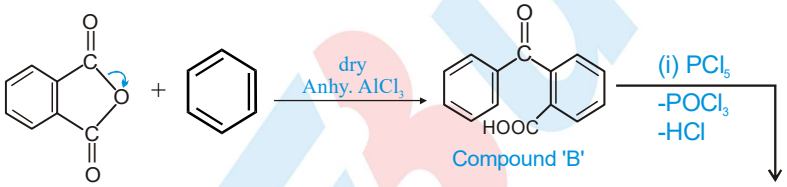
Hemiacetal acetal

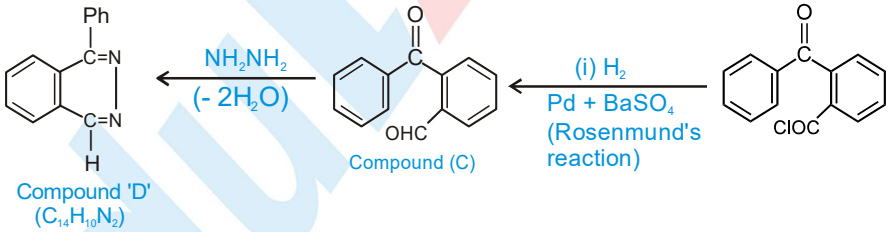
(C) (D)

39.



42.



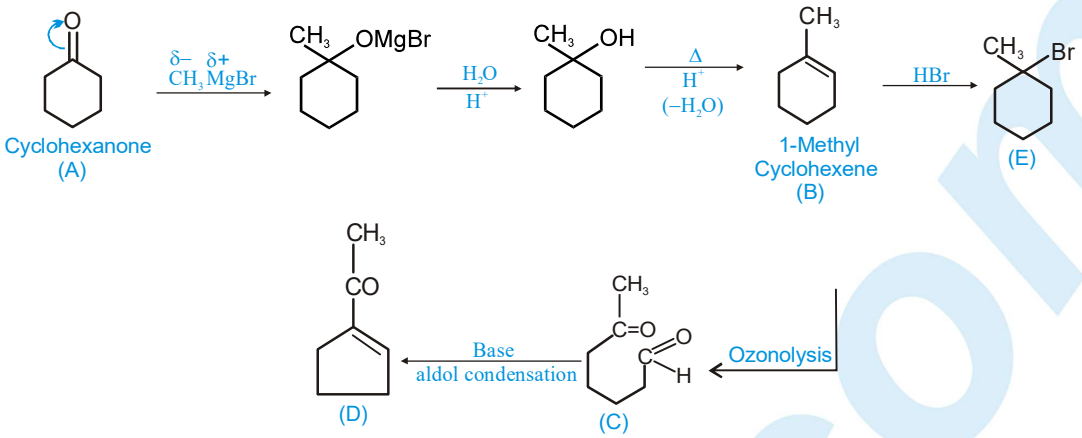


43. Compound 'A' ($C_6H_{10}O$) $\xrightarrow[2.\,H_3O^+]{1.\,CH_3MgBr}$ Compound 'B' $\xrightarrow{\text{Ozonolysis}}$ Compound 'C' $\xrightarrow{\text{Base}}$ Compound 'D'

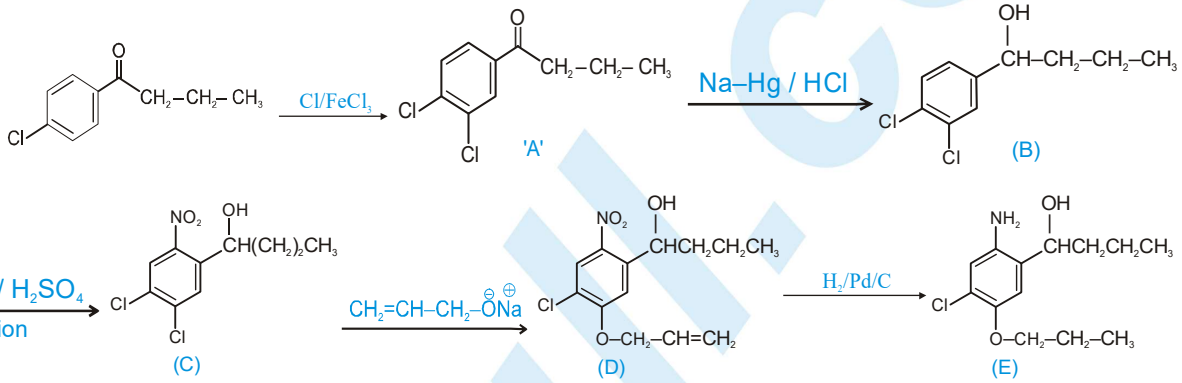
(1- acetyl cyclopentene)

Compound 'B' $\xrightarrow{HBr}$ Compound 'E'

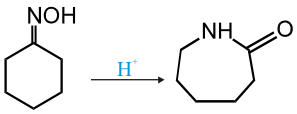
Compound 'A' is cyclic carbonyl compound which gives following reaction according to given problem.



44.

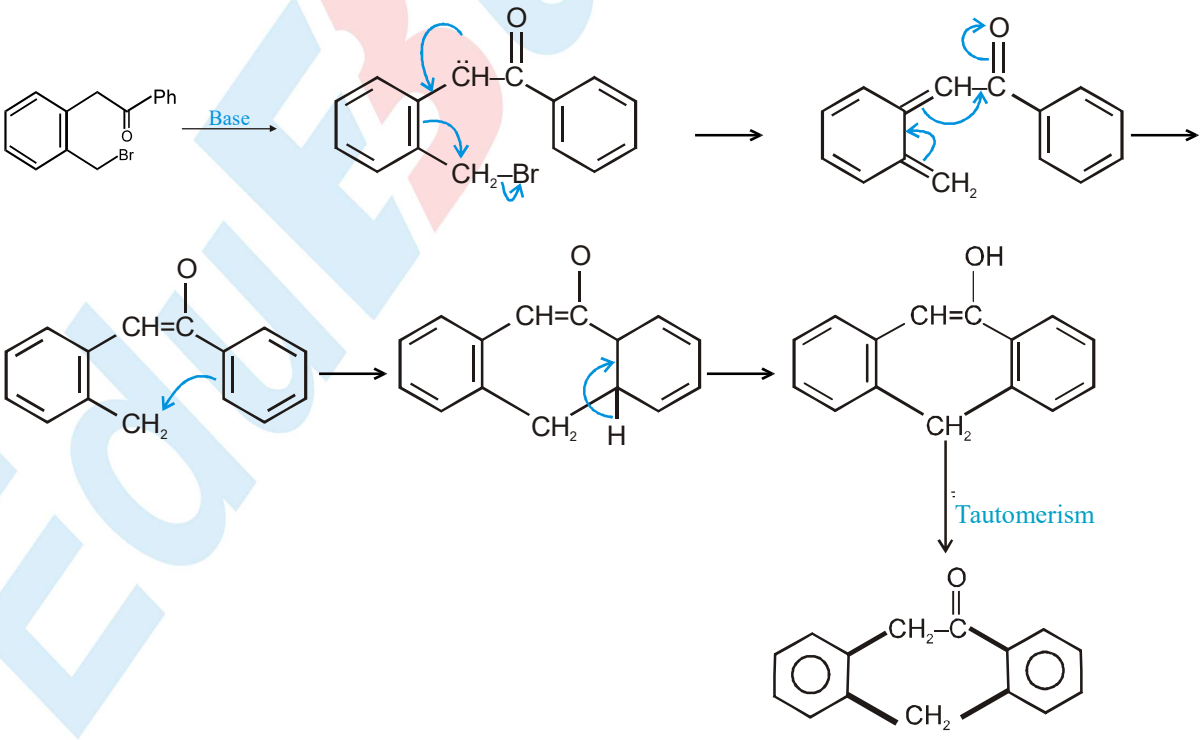


46.



(Beckmann's rearrangement)

47.



EXERCISE - 5

Part # I : AIEEE/JEE-MAIN

1. $CH_3-\underset{\underset{\text{2 – butanone}}{}}{\overset{\overset{O}{\|}}{C}}-C_2H_5 \xrightarrow[HCl]{Zn-Hg} CH_3CH_2CH_2CH_3$ Butane

It refers to as clemmensen's reduction

2. Benzaldehyde undergoes disproportionation with 50% NaOH to given benzyl alcohol and sodium benzoate

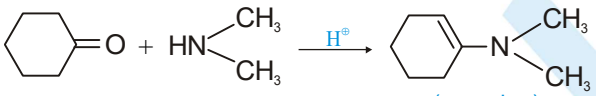
$C_6H_6CHO \xrightarrow{50\%\ NaOH} C_6H_5CH_2OH + C_6H_5COONa$

This is Cannizzaro's reaction.

3. $CH_3-\overset{\overset{O}{\|}}{C}-Br + CH_3MgI \longrightarrow CH_3-\underset{OMgI}{\overset{CH_3}{C}}-Br \xrightarrow{CH_3MgI} CH_3-\underset{OMgI}{\overset{CH_3}{C}}-CH_3 \xrightarrow{NH_4Cl} CH_3-\underset{OH}{\overset{CH_3}{C}}-CH_3$

2-Methyl-2-propanol

4. $H_3C-\underset{OH}{CH}-CH=CH-CH_3 \xrightarrow{PCC} H_3C-\overset{\overset{O}{\|}}{C}-CH=CH-CH_3$

5. 

(enamine)

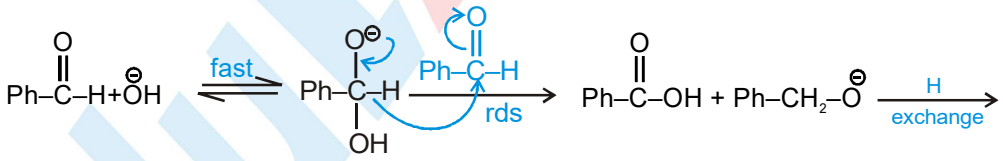
6. As increase steric hinderance around carbonyl group then rate of nucleophilic addition reaction decreases.

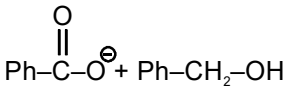
7. $CH_3CH_2OH \xrightarrow[I_2]{P} CH_3CH_2I \xrightarrow{Mg} CH_3CH_2MgI \xrightarrow{HCHO} H-\underset{CH_2CH_3}{\overset{H}{C}}-OMgI \xrightarrow{H_2O} H-\underset{CH_2CH_3}{\overset{H}{C}}-OH$

n-propyl alcohol (D)

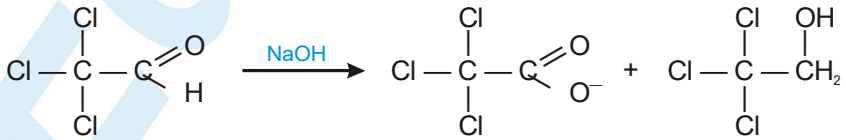
8. $CH_3-CH=CH-CH_3 \xrightarrow{O_3/Zn} CH_3-CHO$

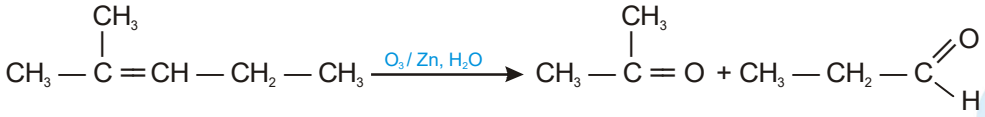
9. $CH_3MgX + CH_3-C\equiv CH \longrightarrow CH_4 + CH_3-C\equiv C-MgX$

10. 



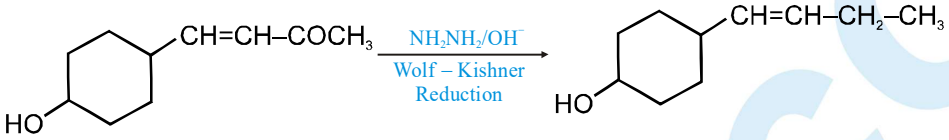
11. The cannizzaro product of given reaction yields 2, 2, 2-trichloroethanol.



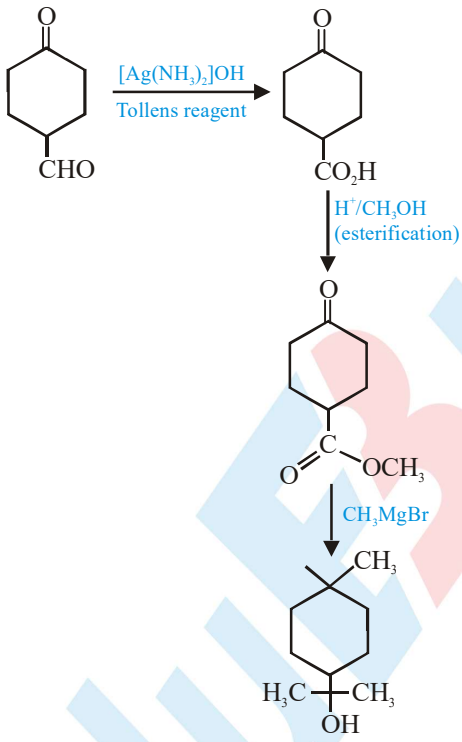
12. 

(2-Methyl-2-pentene) (A) Acetone Propionaldehyde

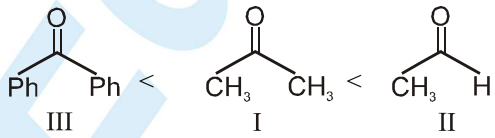
13. $CH_3-\underset{\displaystyle CH_3}{\overset{|}{CH}}-CH_2-OH$ isobutyl alcohol does'nt give positive iodoform test.

14. 

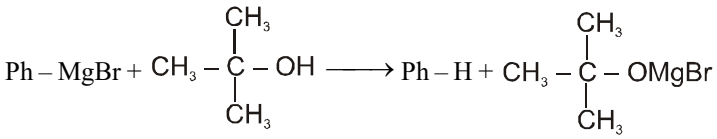
–OH group and alkene are acid-sensitive groups so clemmensen reduction can not be used.

15. 

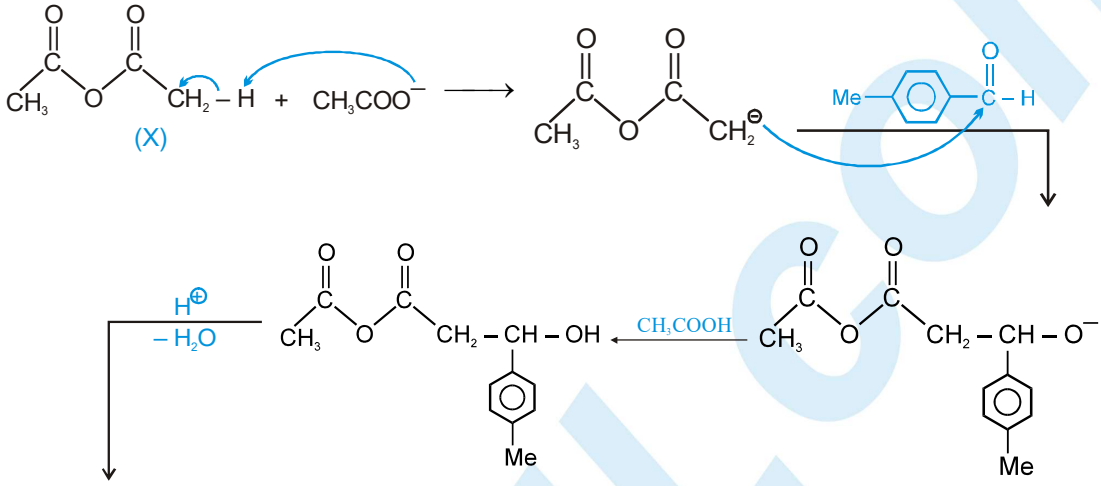
Part # II : IIT-JEE ADVANCED

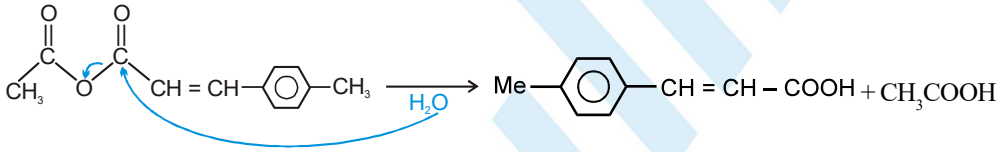
1. 

2.

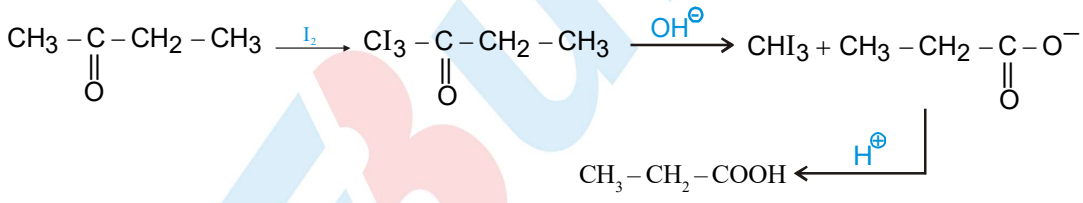


3. This is Perkin reaction

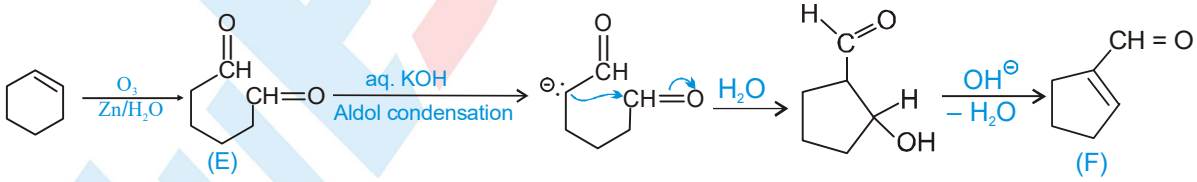




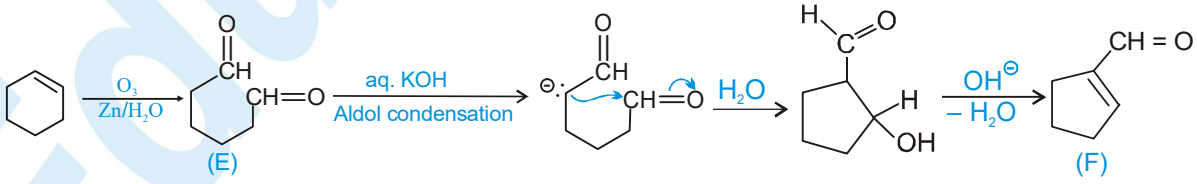
4.



5.



Sol.



Ozonolysis product of cyclohexene will give hexanedial and this undergoes intramolecular aldol condensation in presence of alkali to give cyclic α,β-unsaturated aldehyde.

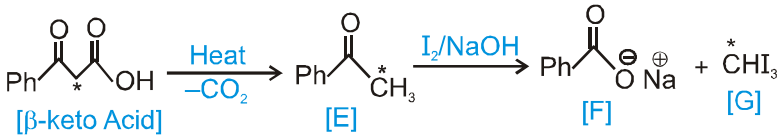
6. **(p)** 2, 4-DNP (2, 4-dinitrophenyl hydrazine) is used to distinguish carbonyl compounds as it gives solid orange precipitate of 2,4-dinitrophenyl hydrazone.

(q) Tollen's reagent (ammonical silver nitrate solution) gives white precipitate with alkyne and silver mirror test with aldehyde.

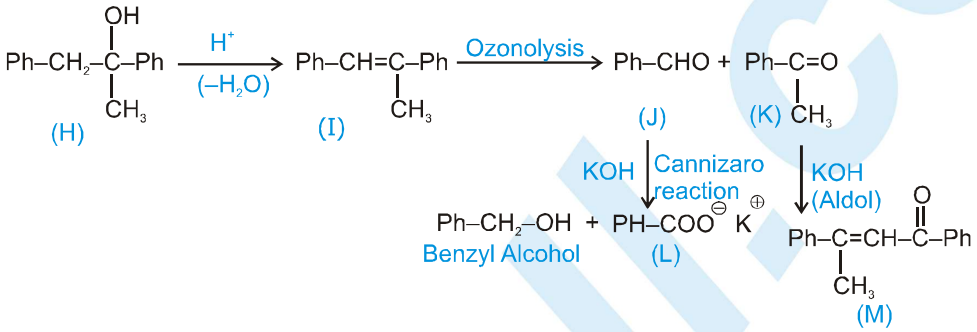
(r) (i) $\overset{\ominus}{C}N$ will gives AgCN with $AgNO_3$ (ii) is nucleophile (iii) forms cyanohydrin

(s) (i) $\overset{\ominus}{I}$ will give AgI with $AgNO_3$ (ii) is nucleophile

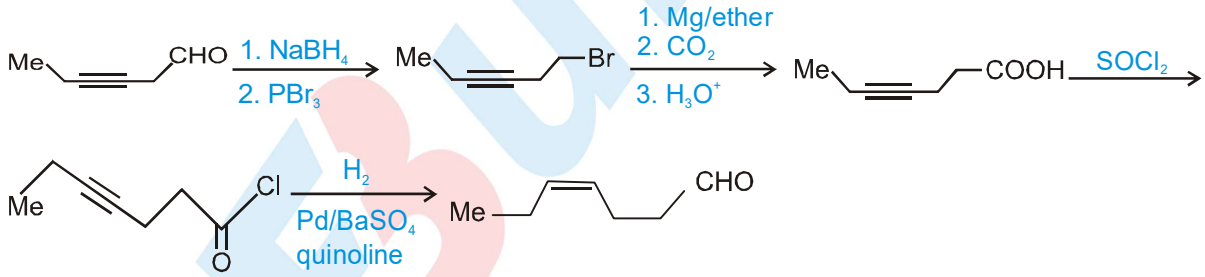
7.



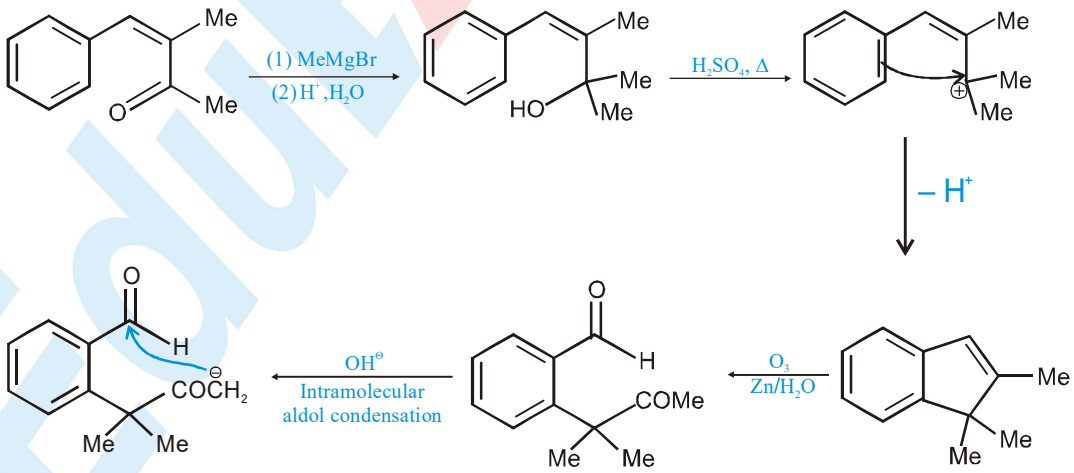
(8-10)

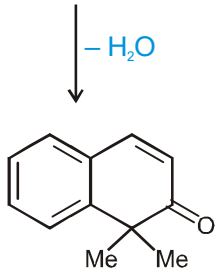


(11-13)

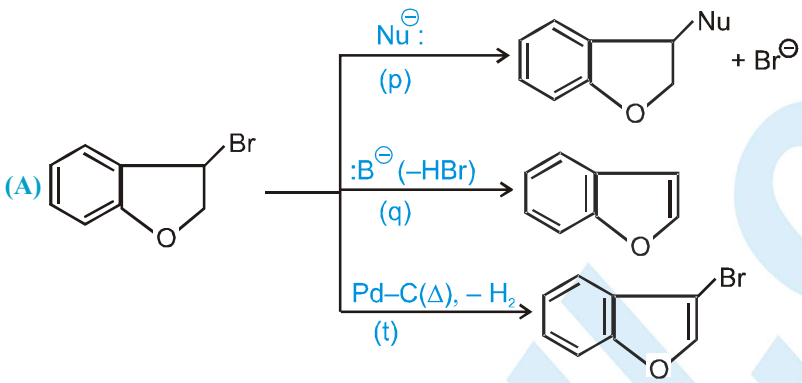


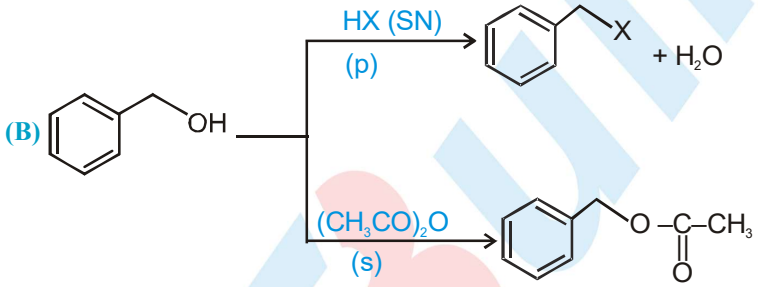
(14-16)

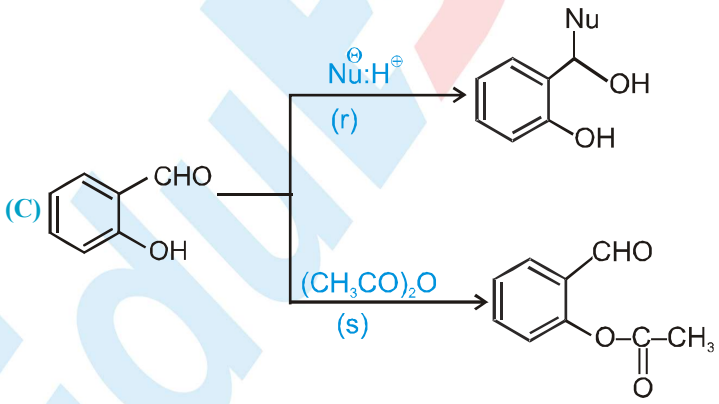


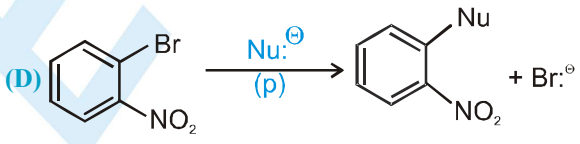

– H2O
Me
Me
O

17.

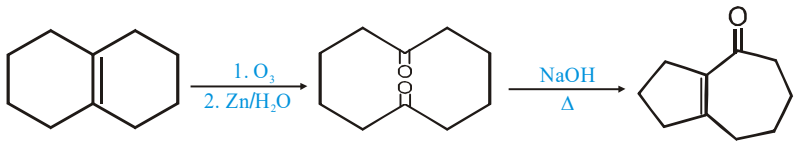

(A)
Br
O
Nu⊖:
(p)
Nu
+ Br⊖
:B⊖ (–HBr)
(q)
Pd–C(Δ), – H2
(t)
Br


(B)
OH
HX (SN)
(p)
X
+ H2O
(CH3CO)2O
(s)
O –C–CH3
O

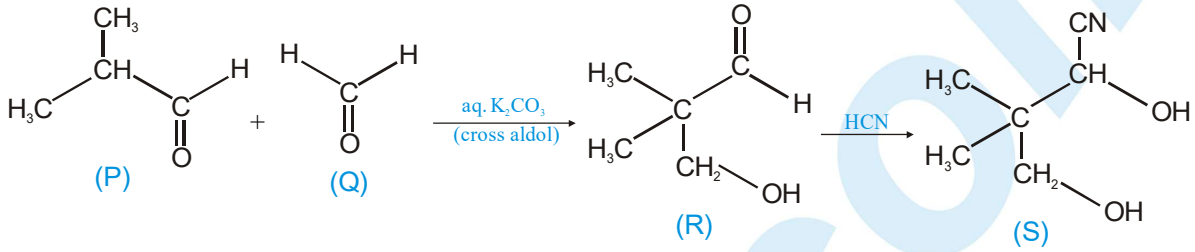

(C)
CHO
OH
Nu⊖:H⊕
(r)
Nu
OH
OH
(CH3CO)2O
(s)
CHO
O–C–CH3
O

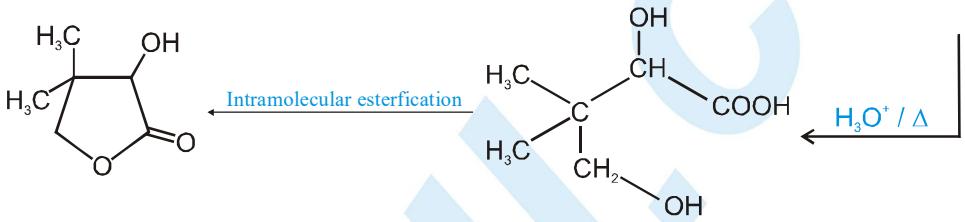

(D)
Br
NO2
Nu:⊖
(p)
Nu
NO2
+ Br:⊖

18.

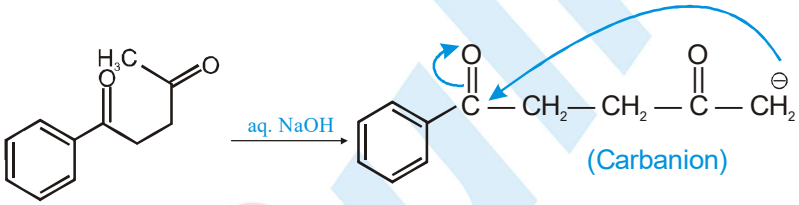

1. O_3
2. Zn/H_2O
NaOH
Δ

(19-21)

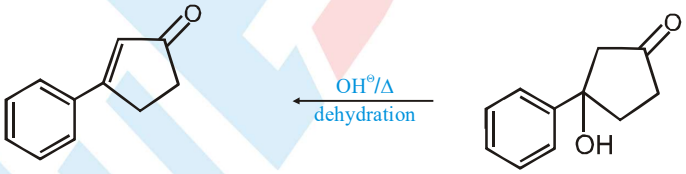

(P)
(Q)
aq. K_2CO_3
(cross aldol)
(R)
HCN
(S)


Intramolecular esterfication
H_3O^+ / Δ

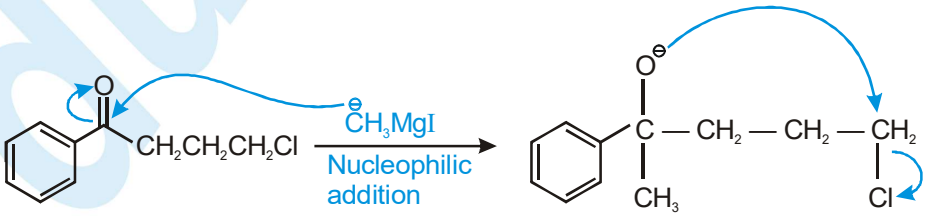
22. **(A)**

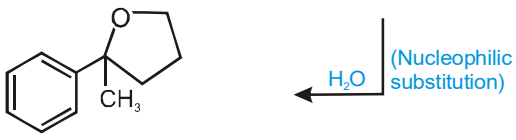

aq. NaOH
(Carbanion)


H_2O
(Nucleophilic addition)

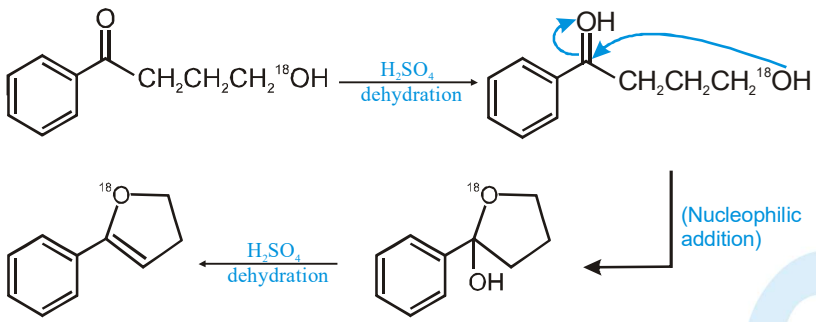

$OH^{\ominus}/\Delta$
dehydration

(B)

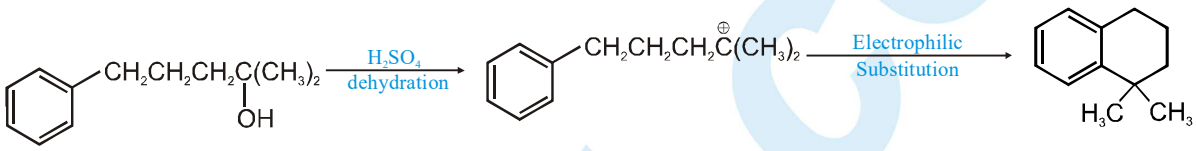

CH_3MgI
Nucleophilic addition


H_2O
(Nucleophilic substitution)

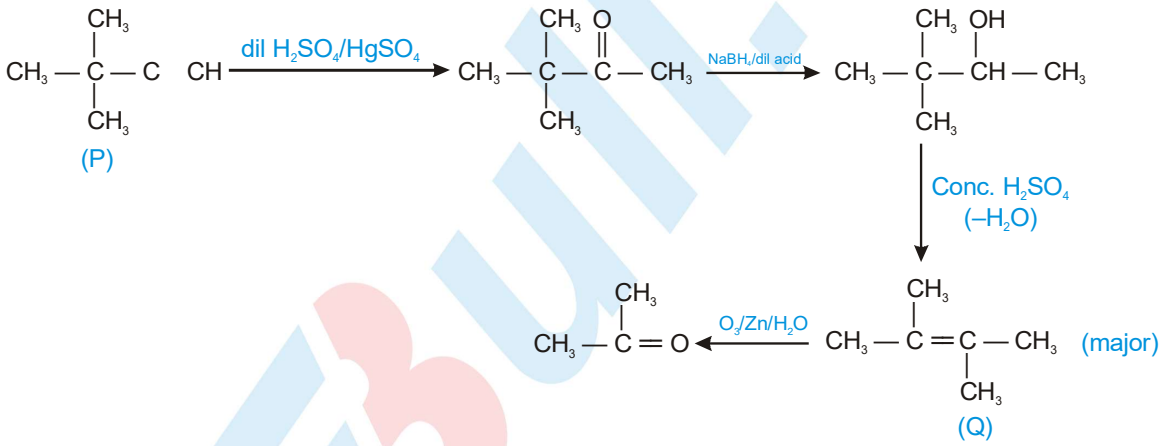
(C)


O
CH2CH2CH2 18OH
H2SO4
dehydration
OH
CH2CH2CH2 18OH
18O
H2SO4
dehydration
18O
OH
(Nucleophilic
addition)

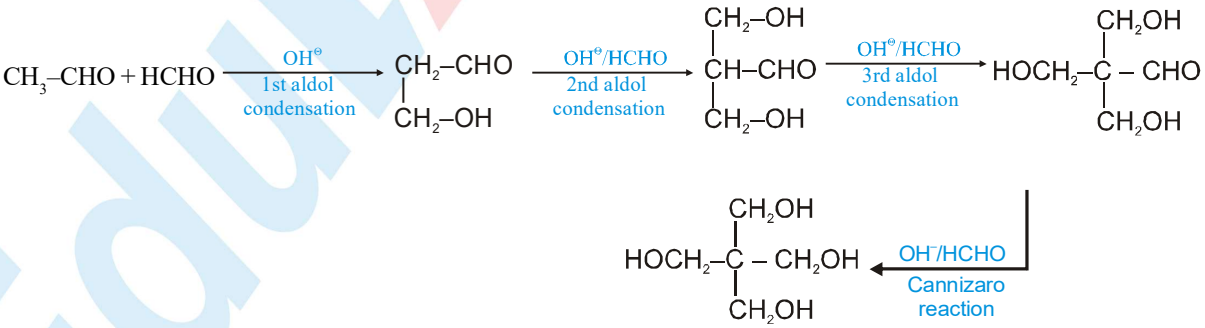
(D)


CH2CH2CH2C(CH3)2
OH
H2SO4
dehydration
CH2CH2CH2C(CH3)2
Electrophilic
Substitution
H3C
CH3

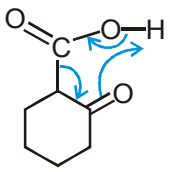
(23-24)


CH3
CH3 — C — C
CH3
(P)
CH
dil H2SO4/HgSO4
CH3 O
CH3 — C — C — CH3
CH3
NaBH4/dil acid
CH3 OH
CH3 — C — CH — CH3
CH3
Conc. H2SO4
(–H2O)
CH3
CH3 — C = O
O3/Zn/H2O
CH3
CH3 — C = C — CH3
CH3
(major)
(Q)

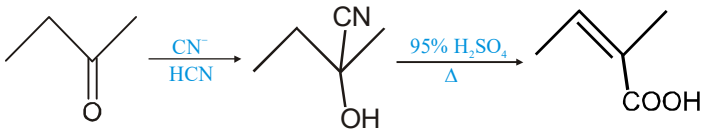
25.


CH3–CHO + HCHO
OH⊖
1st aldol
condensation
CH2–CHO
CH2–OH
OH⊖/HCHO
2nd aldol
condensation
CH2–OH
CH–CHO
CH2–OH
OH⊖/HCHO
3rd aldol
condensation
CH2OH
HOCH2–C – CHO
CH2OH
CH2OH
HOCH2–C – CH2OH
CH2OH
OH⁻/HCHO
Cannizaro
reaction

26. In decarboxylation, β-carbon acquires δ– charge. Whenever δ– charge is stabilized, decarboxylation becomes simple. In **(B)**, it is stabilized by –m & –I of C = O, which is best amongst the options offered,

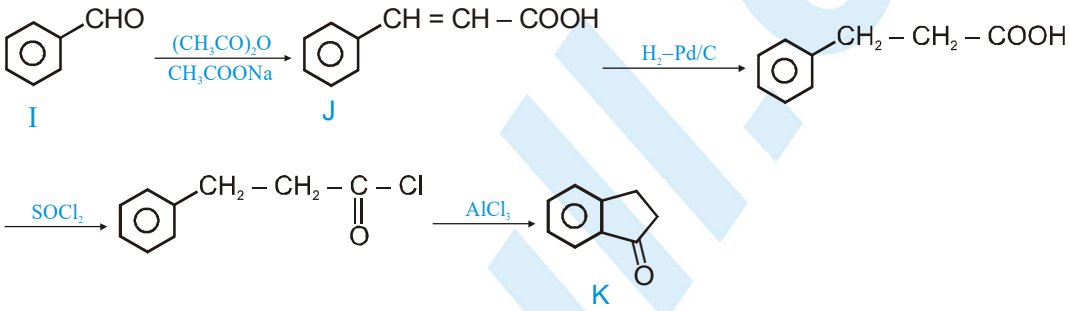


27.



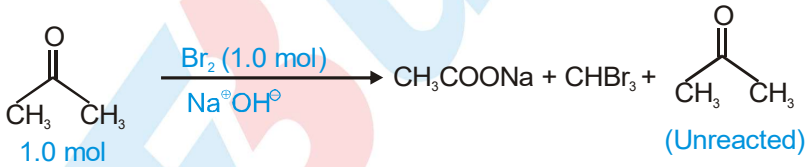
(G)

(28-29)



I J K

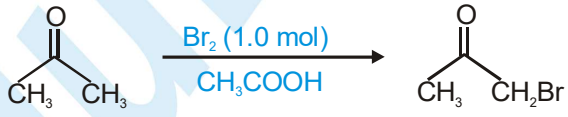
30. **Reaction I :**



1.0 mol (Unreacted)

(In basic medium complete haloform reaction takes place since the rate of reaction increases with each α-halogenation)

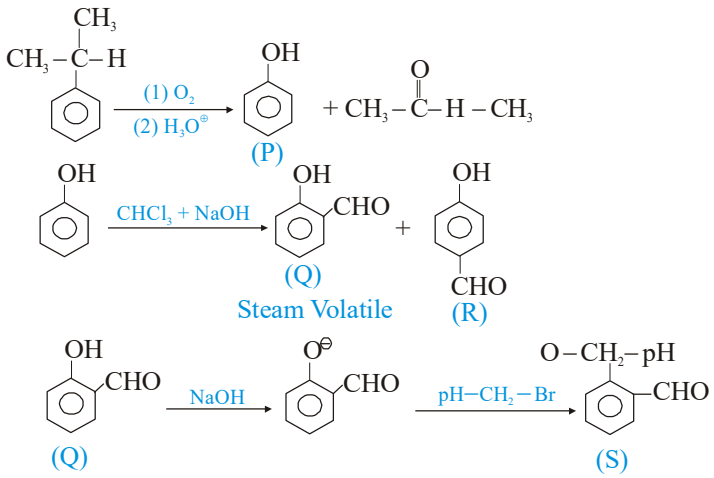
Reaction II :



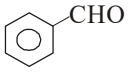
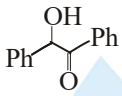
1.0 mol

(In acidic medium monohalogenation takes place with 1-mol of halogen)

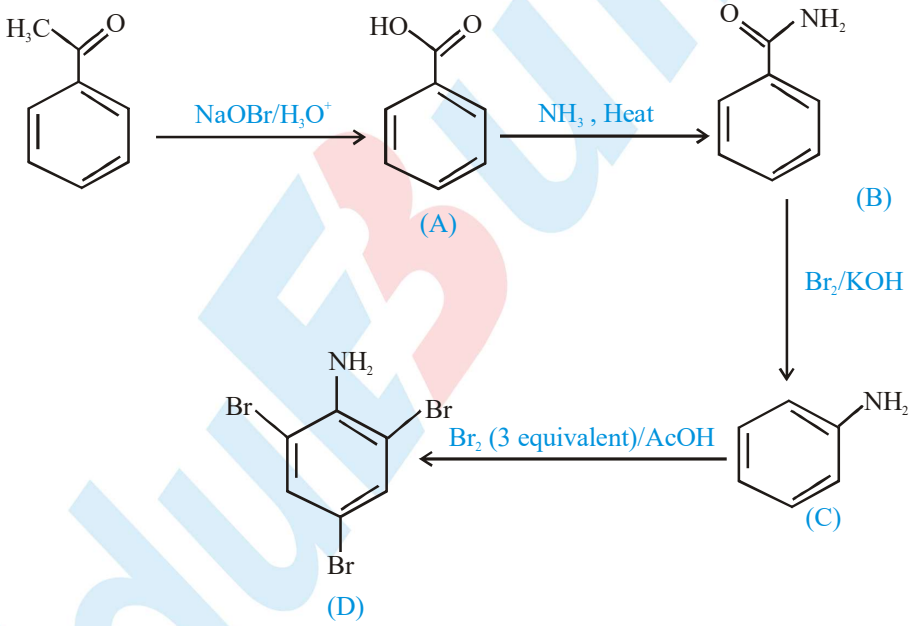
31. **B, C**



32. **A, B, C**

$CH_2 = CH - CHO$,  and  gives positive test with Tollen's reagent.

33.

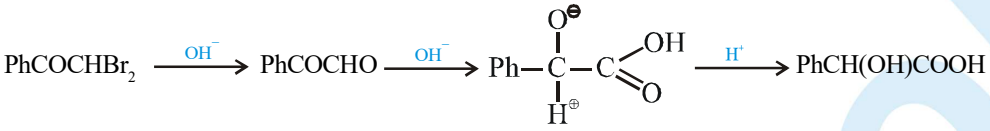


Moles of D formed = $10 \times 0.6 \times 0.5 \times 0.5 \times 1 = 1.5$

Mass of D formed = $1.5 \times 330 = 495$ gram

MOCK TEST

1. **(B)**

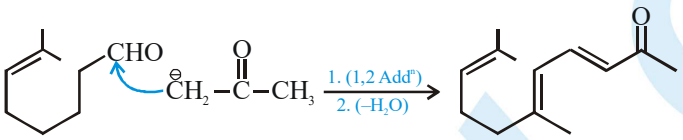


2. **(D)**

3. **(B)** Benzoin condensation

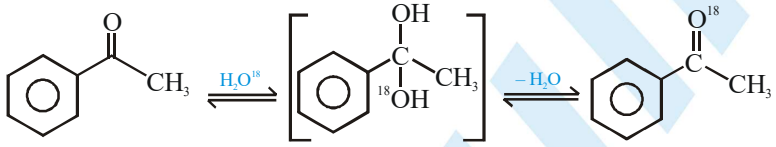
4. **(C)** Intramolecular adlol condensation take place.

5. **(C)**



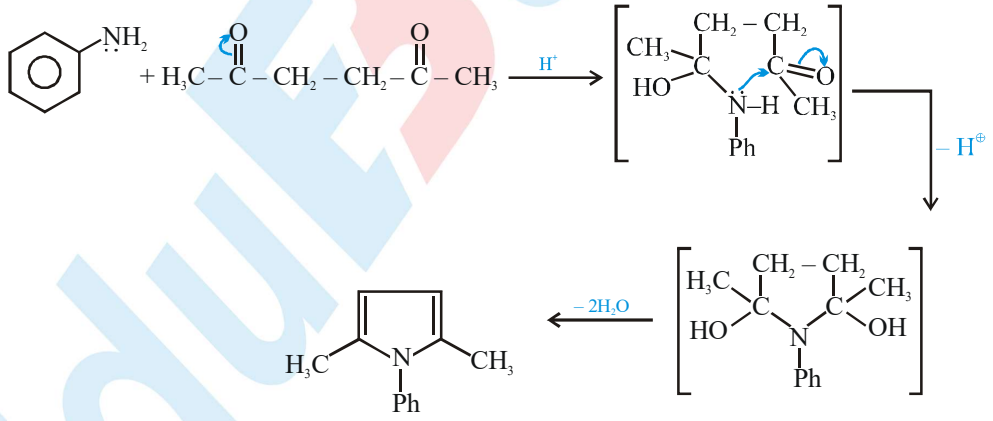
6. **(D)** :NH_2NH_2 is most nucleophilic as compared others.

7. **(D)**

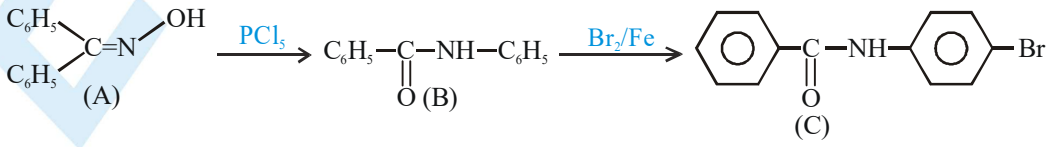


In water, carbonyl compounds form hydrates.

8. **(B)**

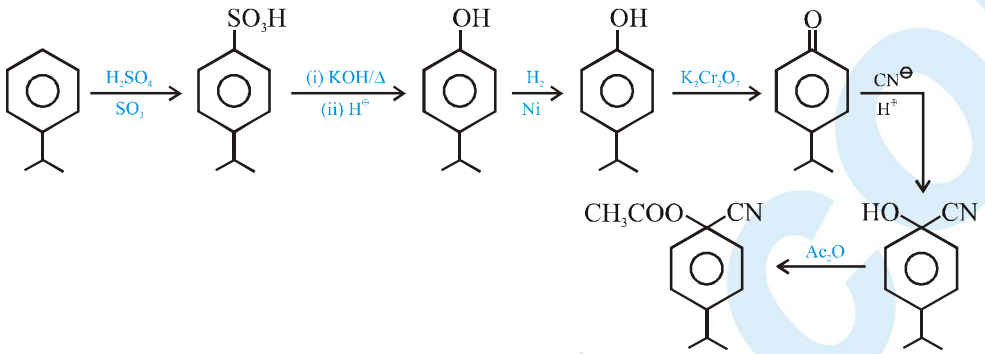


9. **(C)**

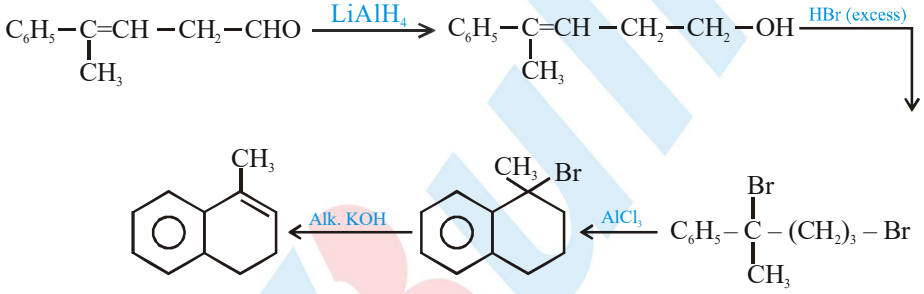


10. **(C)** I is conjugated system.

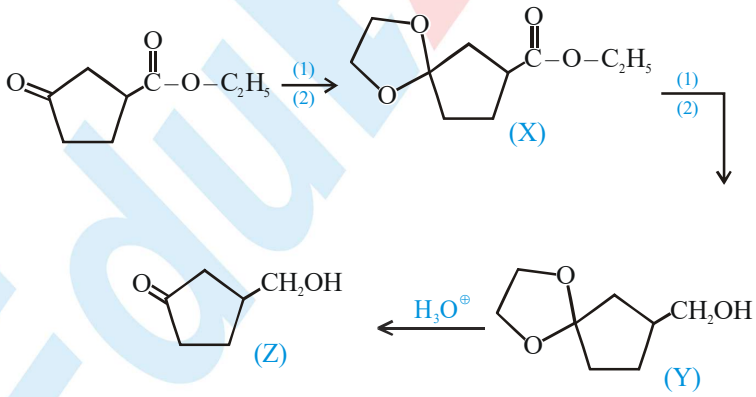
11. **(D)**



12. **(C)**

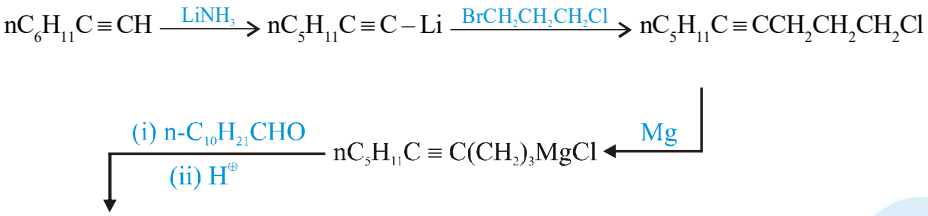


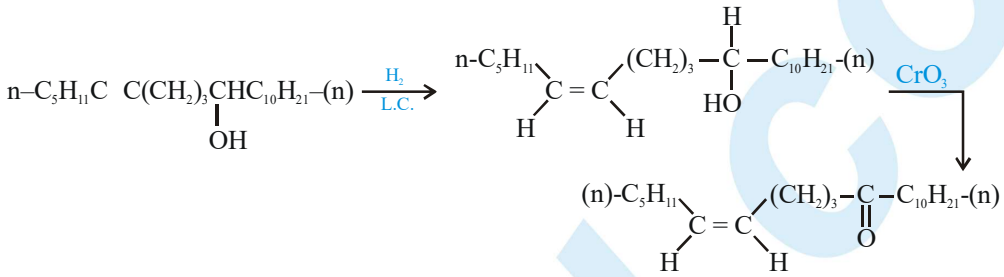
13. **(C)**



14. **(C)** Ag_2O oxidises the aldehyde selectively to the carboxylic acid.

15. **(A)**



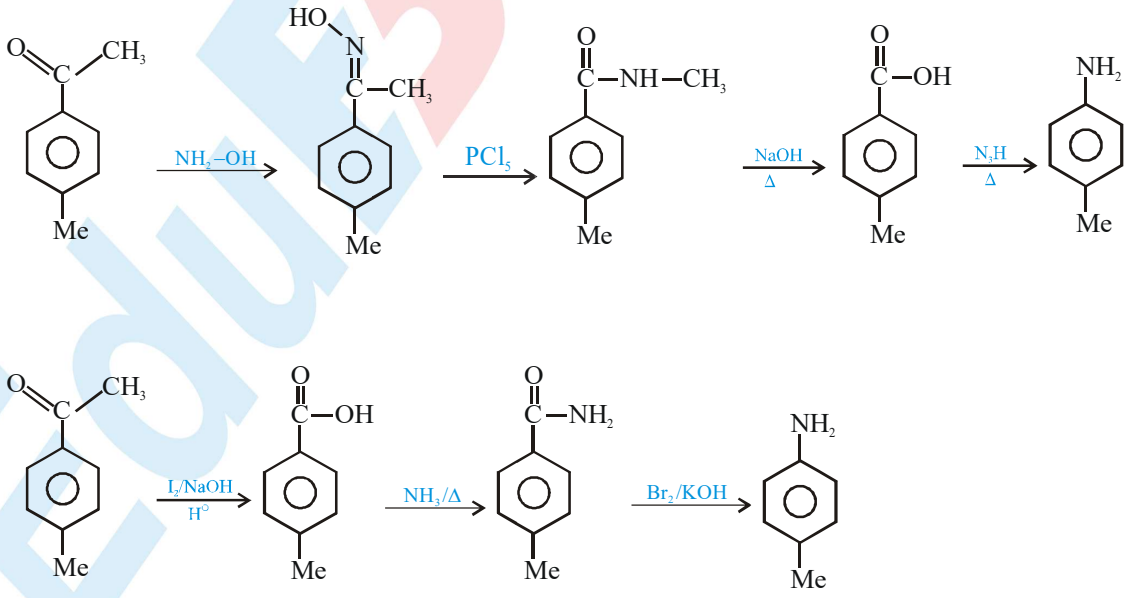


17. **(A, B, C)** Bakemann's rearrangement.

18. **(A, B, D)**

It is a Cannizaro reaction.

19. **(B, C)**



20. **(A, B, C, D)**

21. **(B, D)**

22. **(C)**

23. **(A)**

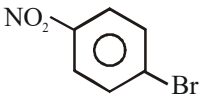
24. **(A)**

25. **(A)**

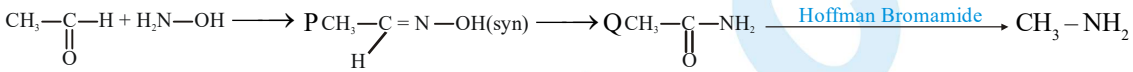
26. **(A)**

27. **(A)**

28. **(A)**


is anti to – OH therefore it will migrate.

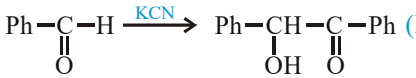
29. **(B)**



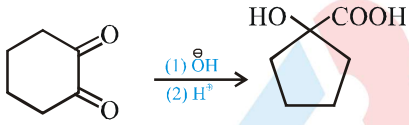
30. **(B, D)**

Shift is retentive therefore initial configuration will be maintained. Initially it is "S" and afterwards it will be "R" due to change in Priority of atoms not connected on dextro laevo can be made.

32. **(A) → p, q, s** **(B) → r, s** **(C) → q** **(D) → r, s**



(Benzoin condensation)



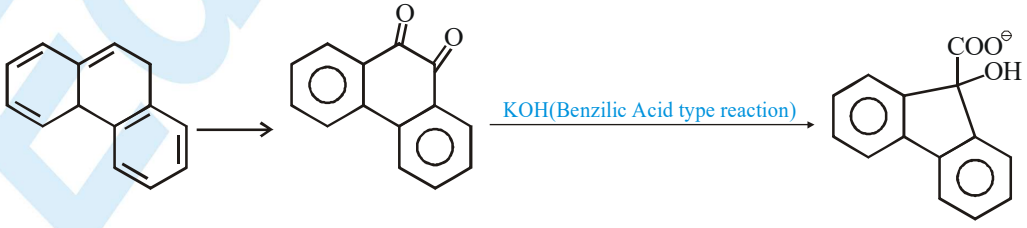
(Benzil benzylic acid rearrangement)

(Cannizzaro reaction)

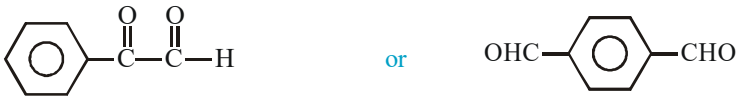
33. **a → s, b → r, c → q, d → p**

34.

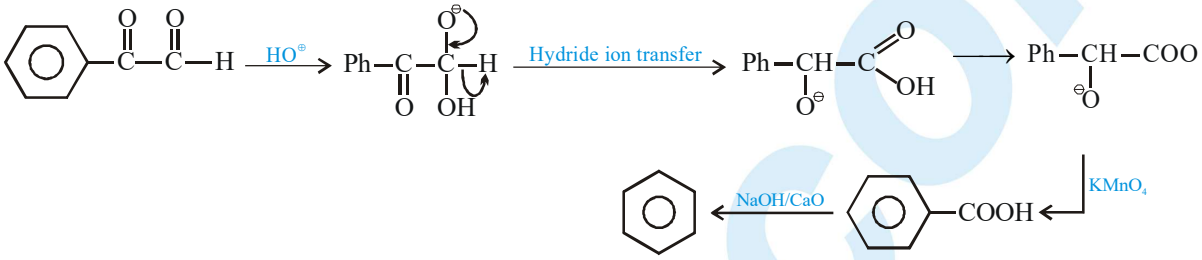
X	Y	Z
7	3	2



35. **72**



Internal Cannizaro



36. **Tischenko reaction**

(X) Mol.wt. = 106