

# Chapter 26

## Aldehydes, Ketones and Carboxylic Acids

1. A liquid was mixed with ethanol and a drop of concentrated  $\text{H}_2\text{SO}_4$  was added. A compound with a fruity smell was formed. The liquid was

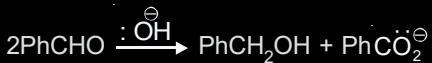
[AIEEE-2009]

- (1)  $\text{HCHO}$       (2)  $\text{CH}_3\text{COCH}_3$   
(3)  $\text{CH}_3\text{COOH}$       (4)  $\text{CH}_3\text{OH}$

2. Which of the following on heating with aqueous KOH, produces acetaldehyde? [AIEEE-2009]

- (1)  $\text{CH}_3\text{CH}_2\text{Cl}$       (2)  $\text{CH}_2\text{ClCH}_2\text{Cl}$   
(3)  $\text{CH}_3\text{CHCl}_2$       (4)  $\text{CH}_3\text{COCl}$

3. In Cannizzaro reaction given below



the slowest step is

[AIEEE-2009]

- (1) The transfer of hydride to the carbonyl group  
(2) The abstraction of proton from the carboxylic group  
(3) The deprotonation of  $\text{PhCH}_2\text{OH}$   
(4) The attack of  $\text{:OH}$  at the carboxyl group

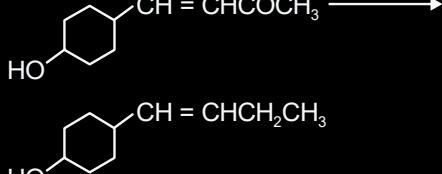
4. Ozonolysis of an organic compound 'A' produces acetone and propionaldehyde in equimolar mixture. Identify 'A' from the following compounds

[AIEEE-2011]

- (1) 2 - Methyl - 2 - pentene  
(2) 2 - Methyl - 1 - pentene  
(3) 1 - Pentene  
(4) 2 - Pentene

5. In the given transformation, which of the following is the most appropriate reagent? [AIEEE-2012]

Reagent



- (1)  $\text{Zn} - \text{Hg/HCl}$       (2)  $\text{Na, Liq. NH}_3$   
(3)  $\text{NaBH}_4$       (4)  $\text{NH}_2\text{NH}_2, \text{OH}^-$

6. Iodoform can be prepared from all except

[AIEEE-2012]

- (1) Isopropyl alcohol  
(2) 3 - Methyl - 2 - butanone  
(3) Isobutyl alcohol  
(4) Ethyl methyl ketone

7. The most suitable reagent for the conversion of  $\text{R} - \text{CH}_2 - \text{OH} \rightarrow \text{R} - \text{CHO}$  is [JEE (Main)-2014]

- (1)  $\text{KMnO}_4$   
(2)  $\text{K}_2\text{Cr}_2\text{O}_7$   
(3)  $\text{CrO}_3$   
(4) PCC (Pyridinium Chlorochromate)

8. In the reaction,



the product C is

[JEE (Main)-2014]

- (1) Acetaldehyde      (2) Acetylene  
(3) Ethylene      (4) Acetyl chloride

9. In the following sequence of reactions :

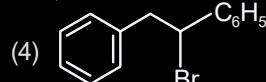
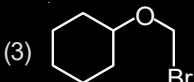
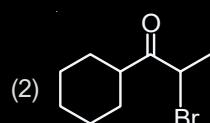
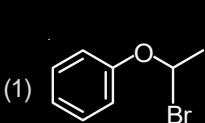


the product C is

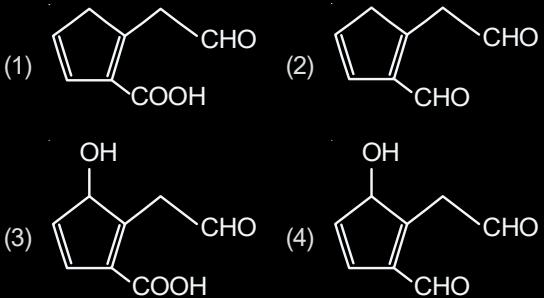
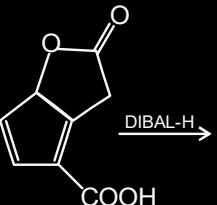
[JEE (Main)-2015]

- (1)  $\text{C}_6\text{H}_5\text{COOH}$       (2)  $\text{C}_6\text{H}_5\text{CH}_3$   
(3)  $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$       (4)  $\text{C}_6\text{H}_5\text{CHO}$

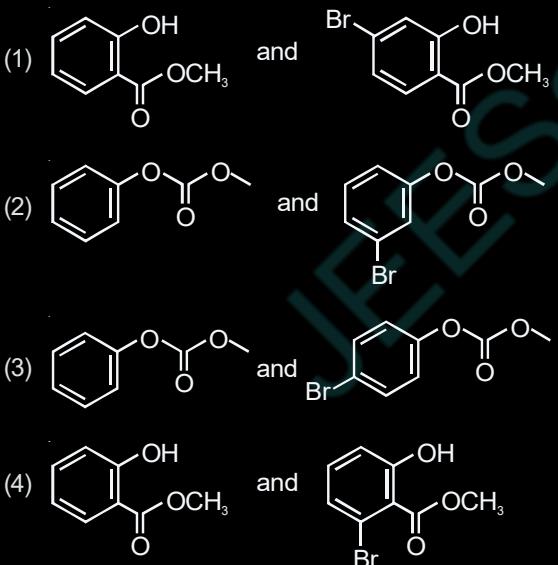
10. Which of the following, upon treatment with *tert*-BuONa followed by addition of bromine water, fails to decolorize the colour of bromine? [JEE (Main)-2017]



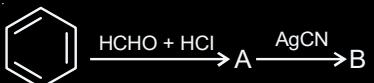
11. The major product obtained in the following reaction is  
[JEE (Main)-2017]



12. Phenol reacts with methyl chloroformate in the presence of NaOH to form product A. A reacts with Br<sub>2</sub> to form product B. A and B are respectively  
[JEE (Main)-2018]



13. The compounds A and B in the following reaction are, respectively  
[JEE (Main)-2019]



- (1) A = Benzyl alcohol, B = Benzyl isocyanide  
 (2) A = Benzyl chloride, B = Benzyl cyanide  
 (3) A = Benzyl chloride, B = Benzyl isocyanide  
 (4) A = Benzyl alcohol, B = Benzyl cyanide

14. The major product of following reaction is



- (1) RCH<sub>2</sub>NH<sub>2</sub>  
 (2) RCHO  
 (3) RCONH<sub>2</sub>  
 (4) RCOOH

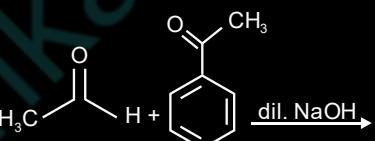
15. The correct match between Item I and Item II is

Item I	Item II
(A) Benzaldehyde	(P) Mobile phase
(B) Alumina	(Q) Adsorbent
(C) Acetonitrile	(R) Adsorbate

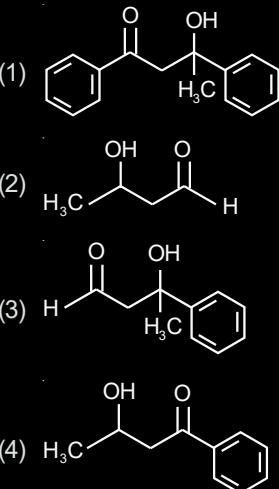
[JEE (Main)-2019]

- (1) (A) → (Q), (B) → (R), (C) → (P)  
 (2) (A) → (Q), (B) → (P), (C) → (R)  
 (3) (A) → (P), (B) → (R), (C) → (Q)  
 (4) (A) → (R), (B) → (Q), (C) → (P)

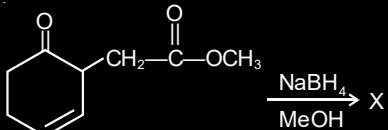
16. The major product formed in the following reaction is



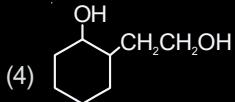
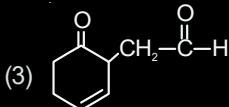
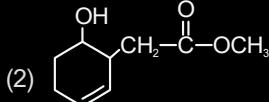
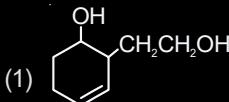
[JEE (Main)-2019]



17. The major product 'X' formed in the following reaction is

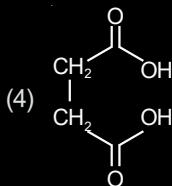
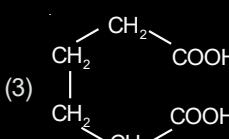
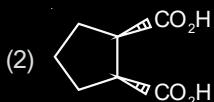
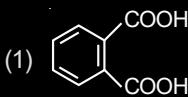


[JEE (Main)-2019]

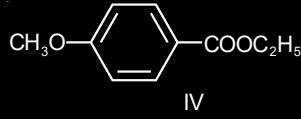
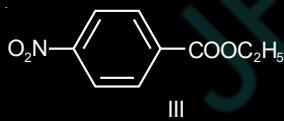
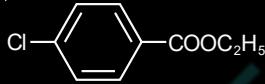
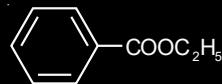


18. Which dicarboxylic acid in presence of a dehydrating agent is least reactive to give an anhydride?

[JEE (Main)-2019]



19. The decreasing order of ease of alkaline hydrolysis for the following esters is

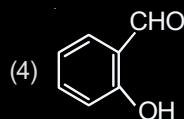
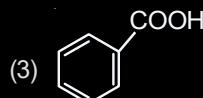
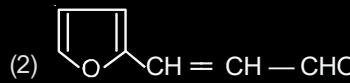
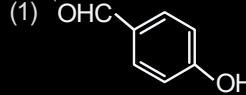


[JEE (Main)-2019]

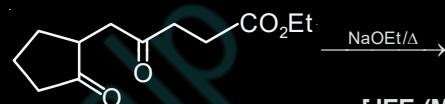
- (1) III > II > IV > I      (2) IV > II > III > I  
 (3) II > III > I > IV      (4) III > II > I > IV

20. An aromatic compound 'A' having molecular formula  $C_7H_6O_2$  on treating with aqueous ammonia and heating forms compound 'B'. The compound 'B' on reaction with molecular bromine and potassium hydroxide provides compound 'C' having molecular formula  $C_6H_7N$ . The structure 'A' is

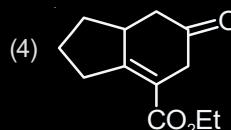
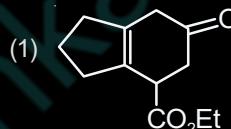
[JEE (Main)-2019]



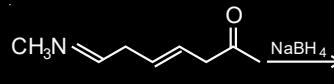
21. The major product obtained in the following reaction is



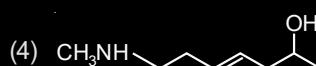
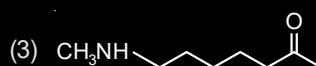
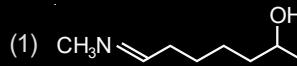
[JEE (Main)-2019]



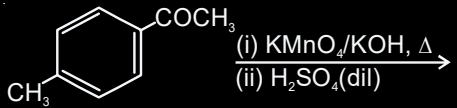
22. The major product of the following reaction is



[JEE (Main)-2019]



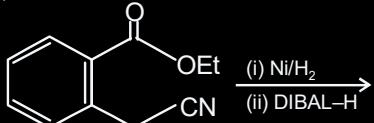
23. The major product of the following reaction is



[JEE (Main)-2019]

- (1)
- (2)
- (3)
- (4)

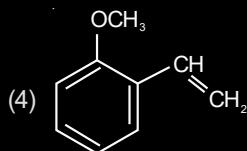
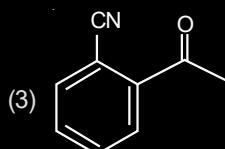
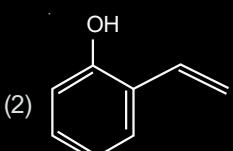
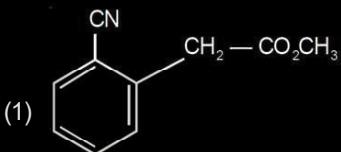
24. The major product of the following reaction is:



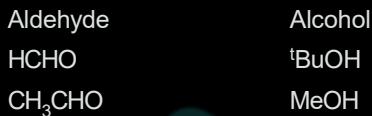
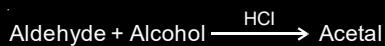
[JEE (Main)-2019]

- (1)
- (2)
- (3)
- (4)

25. Which of the following compounds reacts with ethylmagnesium bromide and also decolorizes bromine water solution? [JEE (Main)-2019]



26. In the following reaction

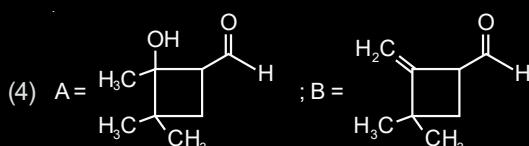
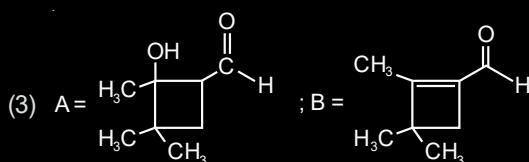
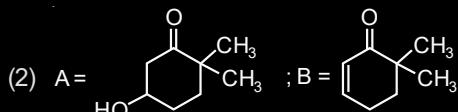
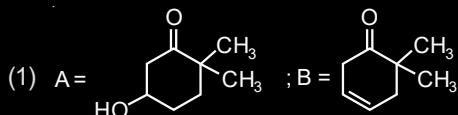
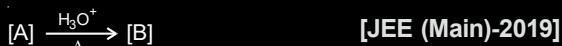
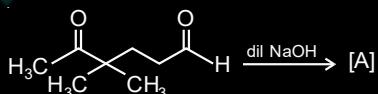


The best combination is

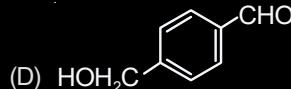
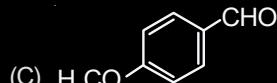
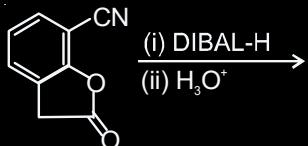
[JEE (Main)-2019]

- (1) HCHO and MeOH  
(2) HCHO and tBuOH  
(3) CH<sub>3</sub>CHO and tBuOH  
(4) CH<sub>3</sub>CHO and MeOH

27. In the following reactions, products A and B are

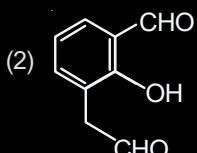
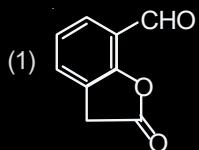


28. The major product of the following reaction



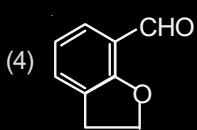
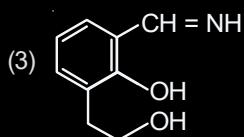
[JEE (Main)-2019]

[JEE (Main)-2019]

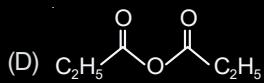
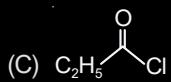
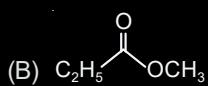
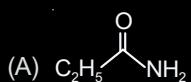


- (1) (B), (C) (2) (B), (D)

- (3) (B), (C), (D) (4) (C), (D)



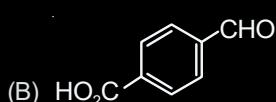
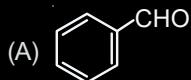
29. The increasing order of the reactivity of the following with  $\text{LiAlH}_4$  is



[JEE (Main)-2019]

- (1) (A) < (B) < (C) < (D)  
(2) (B) < (A) < (D) < (C)  
(3) (A) < (B) < (D) < (C)  
(4) (B) < (A) < (C) < (D)

30. The aldehydes which will not form Grignard product with one equivalent Grignard reagent are



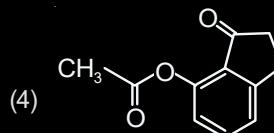
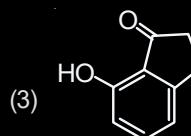
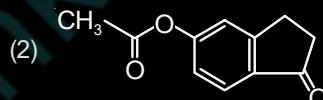
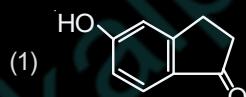
- (1) (B), (C) (2) (B), (D)

- (3) (B), (C), (D) (4) (C), (D)

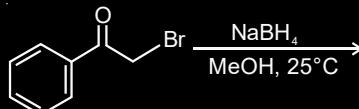
31. The major product of the following reaction is



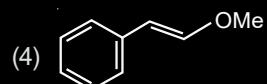
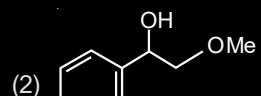
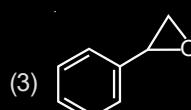
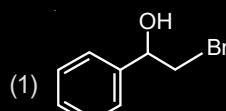
[JEE (Main)-2019]



32. The major product of the following reaction is



[JEE (Main)-2019]



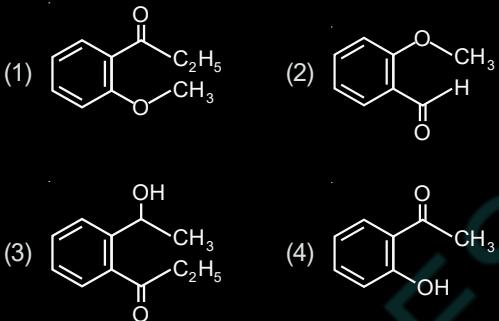
33. An organic compound 'X' showing the following solubility profile is

water	insoluble
5% HCl	insoluble
10% NaOH	soluble
10% NaHCO <sub>3</sub>	insoluble

[JEE (Main)-2019]

- (1) Benzamide      (2) Oleic acid  
 (3) o-Toluidine    (4) m-Cresol
34. An organic compound neither reacts with neutral ferric chloride solution nor with Fehling solution. It however, reacts with Grignard reagent and gives positive iodoform test. The compound is

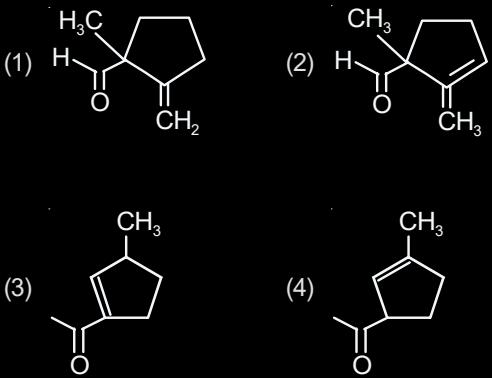
[JEE (Main)-2019]



35. The major product obtained in the following reaction is



[JEE (Main)-2019]



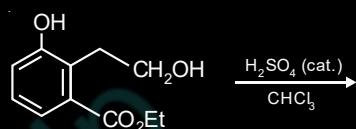
36. The major product of the following reaction is



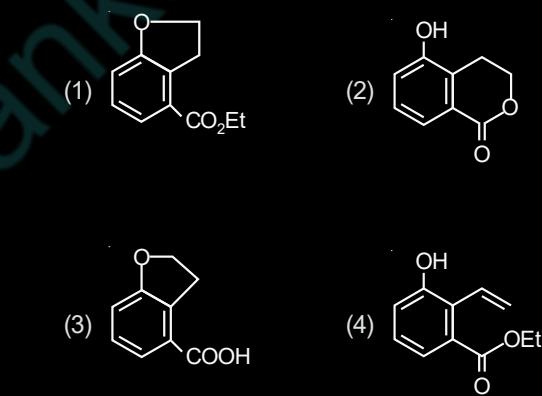
[JEE (Main)-2019]

- (1) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH  
 (2) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CHO  
 (3) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>CH<sub>3</sub>  
 (4) CH<sub>3</sub>CH = CHCH<sub>2</sub>OH

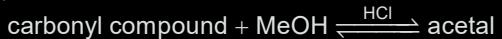
37. The major product of the following reaction is



[JEE (Main)-2019]



38. In the following reaction

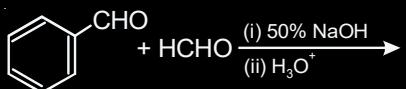


Rate of the reaction is the highest for

[JEE (Main)-2019]

- (1) Acetone as substrate and methanol in excess  
 (2) Propanal as substrate and methanol in stoichiometric amount  
 (3) Propanal as substrate and methanol in excess  
 (4) Acetone as substrate and methanol in stoichiometric amount

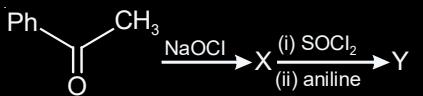
39. Major products of the following reaction are :



[JEE (Main)-2019]

- (1) HCOOH and
- (2) and
- (3) CH<sub>3</sub>OH and
- (4) CH<sub>3</sub>OH and HCO<sub>2</sub>H

40. The major product 'Y' in the following reaction is:



[JEE (Main)-2019]

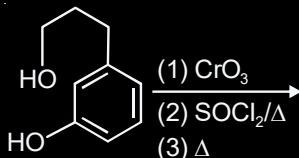
- (1)
- (2)
- (3)
- (4)

41. Compound A (C<sub>9</sub>H<sub>10</sub>O) shows positive iodoform test. Oxidation of A with KMnO<sub>4</sub>/KOH gives acid B (C<sub>8</sub>H<sub>6</sub>O<sub>4</sub>). Anhydride of B is used for the preparation of phenolphthalein. Compound A is:

[JEE (Main)-2019]

- (1)
- (2)
- (3)
- (4)

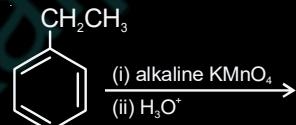
42. The major product of the following reaction is



[JEE (Main)-2019]

- (1)
- (2)
- (3)
- (4)

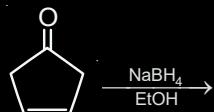
43. The major product of the following reaction is



[JEE (Main)-2019]

- (1)
- (2)
- (3)
- (4)

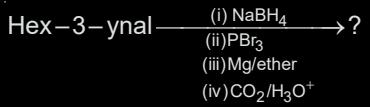
44. The major product of the following reaction is



[JEE (Main)-2019]

- (1)
- (2)
- (3)
- (4)

45. What is the product of following reaction?



[JEE (Main)-2020]

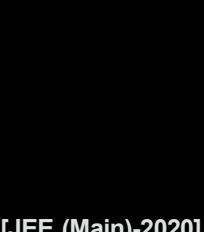
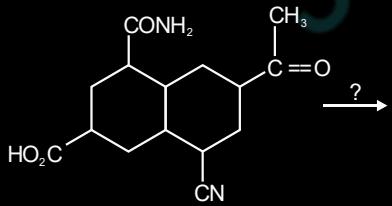
- (1)
- (2)
- (3)
- (4)

46. A solution of m-chloroaniline, m-chlorophenol and m-chlorobenzoic acid in ethyl acetate was extracted initially with a saturated solution of  $\text{NaHCO}_3$  to give fraction A. The left over organic phase was extracted with dilute  $\text{NaOH}$  solution to give fraction B. The final organic layer was labelled as fraction C. Fractions A, B and C, contain respectively :

[JEE (Main)-2020]

- (1) m-chloroaniline, m-chlorobenzoic acid and m-chlorophenol
- (2) m-chlorophenol, m-chlorobenzoic acid and m-chloroaniline
- (3) m-chlorobenzoic acid, m-chlorophenol and m-chloroaniline
- (4) m-chlorobenzoic acid, m-chloroaniline and m-chlorophenol

47. The most suitable reagent for the given conversion is



[JEE (Main)-2020]

- (1)  $\text{LiAlH}_4$
- (2)  $\text{NaBH}_4$
- (3)  $\text{H}_2/\text{Pd}$
- (4)  $\text{B}_2\text{H}_6$

48. An unsaturated hydrocarbon X absorbs two hydrogen molecules on catalytic hydrogenation, and also gives following reaction



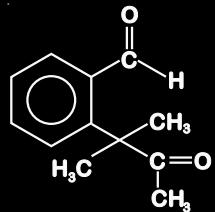
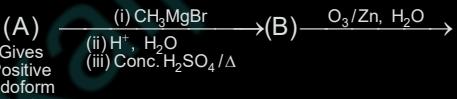
B(3-oxo-hexanedicarboxylic acid)

X will be

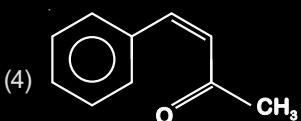
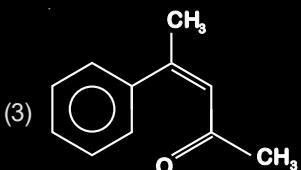
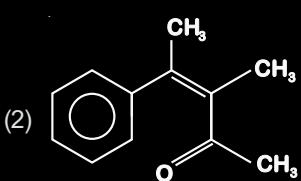
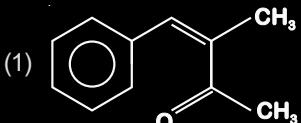
[JEE (Main)-2020]

- (1)
- (2)
- (3)
- (4)

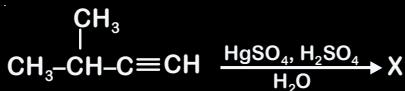
49. Identify (A) in the following reaction sequence.



[JEE (Main)-2020]

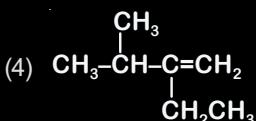
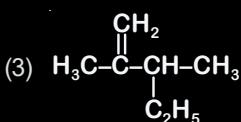
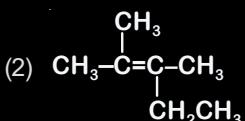
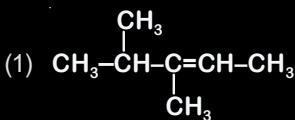


50. The major product (*Y*) in the following reaction is



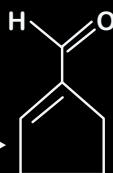
- (i)  $\text{C}_2\text{H}_5\text{MgBr}, \text{H}_2\text{O}$   $\rightarrow \text{Y}$   
 (ii) Conc.  $\text{H}_2\text{SO}_4/\Delta$

[JEE (Main)-2020]

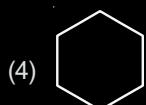
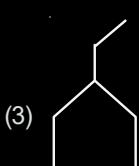
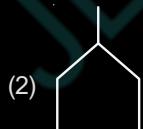
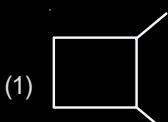


51. In the following reaction A is

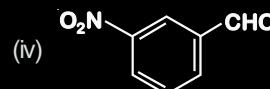
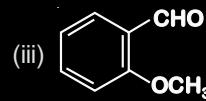
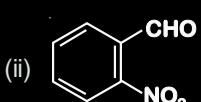
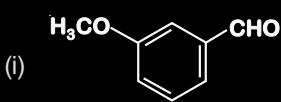
- (i)  $\text{Br}_2, h\nu$   
 (ii)  $\text{KOH}$  (alc.)  
 (iii)  $\text{O}_3$   
 (iv)  $(\text{CH}_3)_2\text{S}$   
 (v)  $\text{NaOH}$  (aq) +  $\Delta$



[JEE (Main)-2020]



52. The increasing order of the following compounds towards HCN addition is



[JEE (Main)-2020]

- (1) (iii) < (iv) < (ii) < (i)

- (2) (iii) < (i) < (iv) < (ii)

- (3) (iii) < (iv) < (i) < (ii)

- (4) (i) < (iii) < (iv) < (ii)

53. The increasing order of the reactivity of the following compounds in nucleophilic addition reaction is

Propanal, Benzaldehyde, Propanone, Butanone

[JEE (Main)-2020]

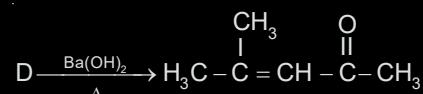
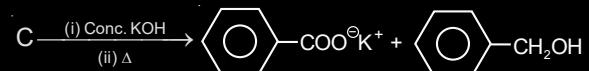
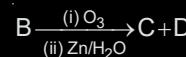
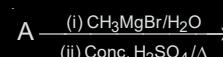
- (1) Propanal < Propanone < Butanone < Benzaldehyde

- (2) Benzaldehyde < Propanal < Propanone < Butanone

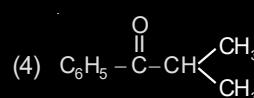
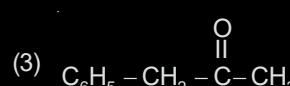
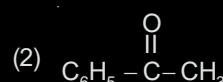
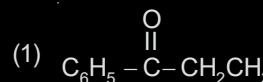
- (3) Benzaldehyde < Butanone < Propanone < Propanal

- (4) Butanone < Propanone < Benzaldehyde < Propanal

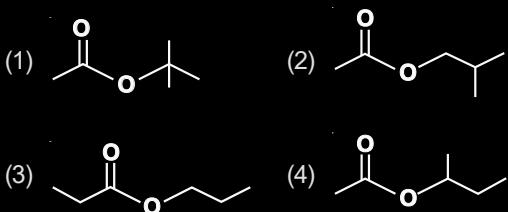
54. The compound A in the following reactions is



[JEE (Main)-2020]

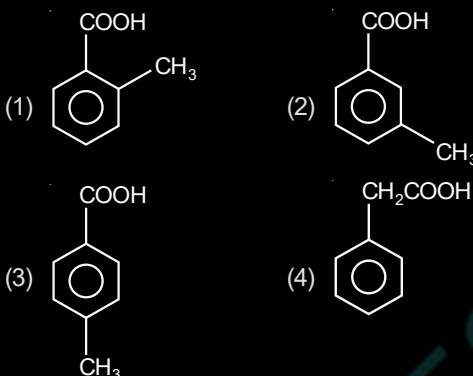


55. An organic compound (A) (molecular formula  $C_6H_{12}O_2$ ) was hydrolysed with dil.  $H_2SO_4$  to give a carboxylic acid (B) and an alcohol (C). 'C' gives white turbidity immediately when treated with anhydrous  $ZnCl_2$  and conc. HCl. The organic compound (A) is  
**[JEE (Main)-2020]**

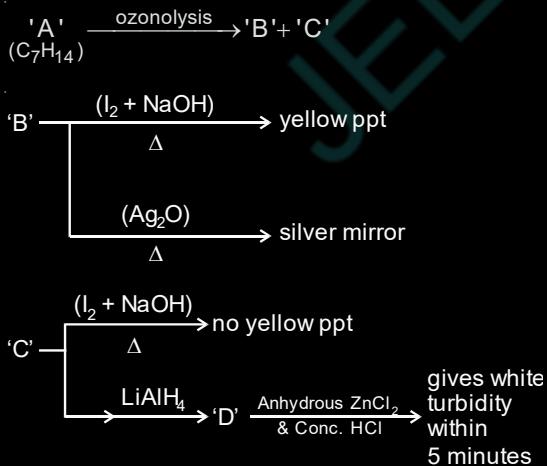


56. [P] on treatment with  $Br_2/FeBr_3$  in  $CCl_4$  produced a single isomer  $C_8H_7O_2Br$  while heating [P] with sodalime gave toluene. The compound [P] is

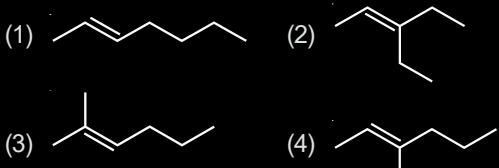
**[JEE (Main)-2020]**



57. Consider the following reactions



'A' is  
**[JEE (Main)-2020]**



58. The correct match between Item-I (starting material) and Item-II (reagent) for the preparation of benzaldehyde is

Item-I	Item-II
(I) Benzene	(P) $HCl$ and $SnCl_2$ , $H_3O^+$
(II) Benzonitrile	(Q) $H_2$ , $Pd-BaSO_4$ , S and quinoline
(III) Benzoyl Chloride	(R) $CO$ , $HCl$ and $AlCl_3$

**[JEE (Main)-2020]**

- (1) (I) - (R), (II) - (P) and (III) - (Q)  
(2) (I) - (P), (II) - (Q) and (III) - (R)  
(3) (I) - (Q), (II) - (R) and (III) - (P)  
(4) (I) - (R), (II) - (Q) and (III) - (P)

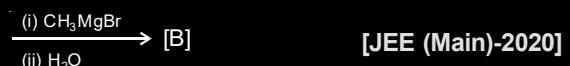
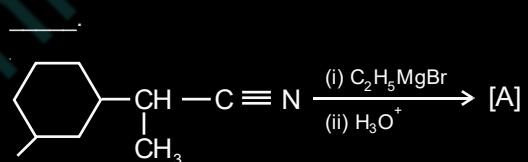
59. Consider the following reactions  
**[JEE (Main)-2020]**



The mass percentage of carbon in A is \_\_\_\_\_.

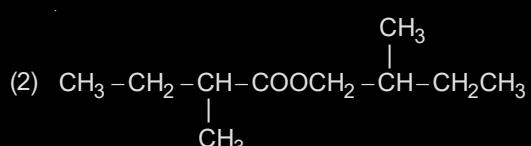
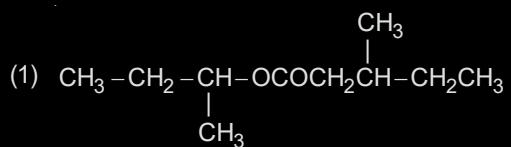
**[JEE (Main)-2020]**

60. The number of chiral centres present in [B] is



**[JEE (Main)-2020]**

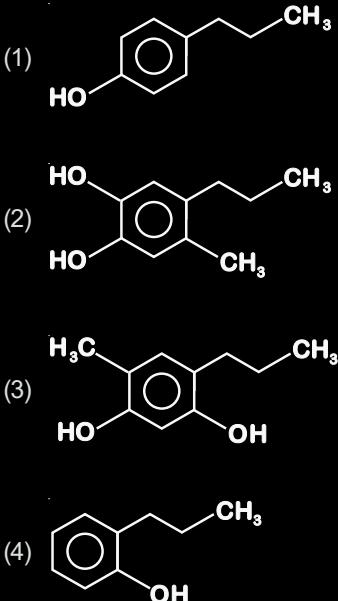
61. An organic compound [A], molecular formula  $C_{10}H_{20}O_2$  was hydrolyzed with dilute sulphuric acid to give a carboxylic acid [B] and an alcohol [C]. Oxidation of [C] with  $CrO_3 - H_2SO_4$  produced [B]. Which of the following structures are not possible for [A]?  
**[JEE (Main)-2020]**



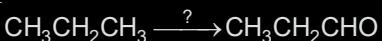
- (3)  $(CH_3)_3C - COOCH_2C(CH_3)_3$   
(4)  $CH_3(CH_2)_2CH_2COOCH_2(CH_2)_2CH_2CH_3$

62. Which of the following compound gives pink colour on reaction with phthalic anhydride in conc.  $\text{H}_2\text{SO}_4$  followed by treatment with NaOH?

[JEE (Main)-2021]

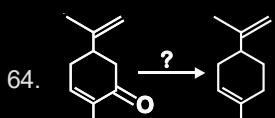


63. Which of the following reagent is used for the following reaction?



[JEE (Main)-2021]

- (1) Copper at high temperature and pressure  
 (2) Manganese acetate  
 (3) Molybdenum oxide  
 (4) Potassium permanganate



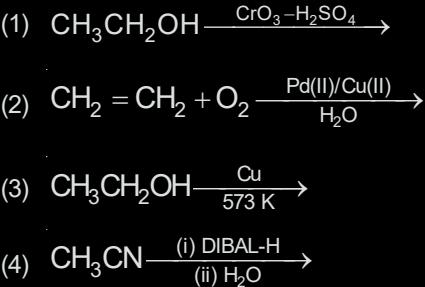
Which of the following reagent is suitable for the preparation of the product in the above reaction?

[JEE (Main)-2021]

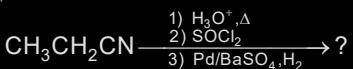
- (1) Red P +  $\text{Cl}_2$   
 (2) Ni/ $\text{H}_2$   
 (3)  $\text{NaBH}_4$   
 (4)  $\text{NH}_2\text{-NH}_2/\text{C}_2\text{H}_5\text{ONa}^{\ominus\oplus}$

65. Which one of the following reactions will not form acetaldehyde?

[JEE (Main)-2021]



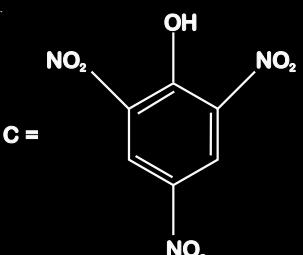
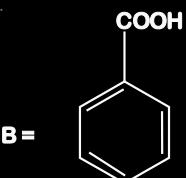
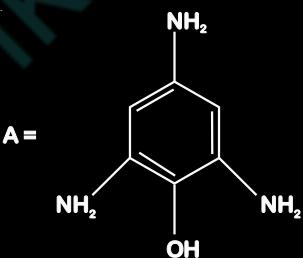
66. The major product of the following chemical reaction is:



[JEE (Main)-2021]

- (1)  $\text{CH}_3\text{CH}_2\text{CH}_3$       (2)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$   
 (3)  $\text{CH}_3\text{CH}_2\text{CHO}$       (4)  $(\text{CH}_3\text{CH}_2\text{CO})_2\text{O}$

67. Compound(s) which will liberate carbon dioxide with sodium bicarbonate solution is/are :



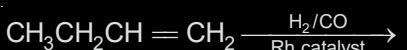
[JEE (Main)-2021]

- (1) B only      (2) C only  
 (3) A and B only      (4) B and C only

68. The correct sequence of reagents used in the preparation of 4-bromo-2-nitroethyl benzene from benzene is: [JEE (Main)-2021]

- (1)  $\text{CH}_3\text{COCl}/\text{AlCl}_3$ ,  $\text{Zn-Hg}/\text{HCl}$ ,  $\text{Br}_2/\text{AlBr}_3$ ,  $\text{HNO}_3/\text{H}_2\text{SO}_4$
- (2)  $\text{HNO}_3/\text{H}_2\text{SO}_4$ ,  $\text{Br}_2/\text{AlCl}_3$ ,  $\text{CH}_3\text{COCl}/\text{AlCl}_3$ ,  $\text{Zn-Hg}/\text{HCl}$
- (3)  $\text{CH}_3\text{COCl}/\text{AlCl}_3$ ,  $\text{Br}_2/\text{AlBr}_3$ ,  $\text{HNO}_3/\text{H}_2\text{SO}_4$ ,  $\text{Zn}/\text{HCl}$
- (4)  $\text{Br}_2/\text{AlBr}_3$ ,  $\text{CH}_3\text{COCl}/\text{AlCl}_3$ ,  $\text{HNO}_3/\text{H}_2\text{SO}_4$ ,  $\text{Zn}/\text{HCl}$

69. The major product of the following reaction is :



[JEE (Main)-2021]

- (1)  $\begin{array}{c} \text{CH}_3\text{CH}_2\text{C}=\text{CH}_2 \\ | \\ \text{CHO} \end{array}$
- (2)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$
- (3)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$
- (4)  $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}-\text{CHO}$

70. The number of compound/s given below which contain/s  $-\text{COOH}$  group is \_\_\_\_\_. (Integer answer)

[JEE (Main)-2021]

- (A) Sulphanilic acid
- (B) Picric acid
- (C) Aspirin
- (D) Ascorbic Acid



B reacts with Hydroxyl amine but does not give Tollen's test. Identify A and B.

[JEE (Main)-2021]

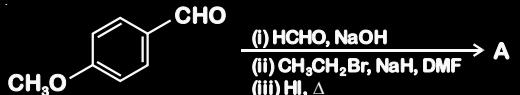
- (1) 2,2-Dichlorobutane and Butanal
- (2) 1,1-Dichlorobutane and Butanal
- (3) 1,1-Dichlorobutane and 2-Butanone
- (4) 2,2-Dichlorobutane and Butan-2-one

72. 2,4-DNP test can be used to identify

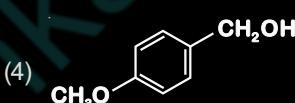
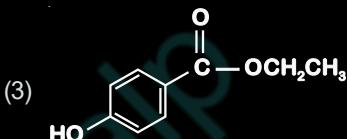
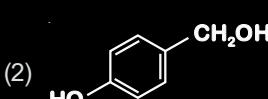
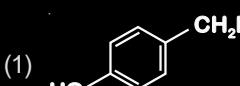
[JEE (Main)-2021]

- (1) Aldehyde
- (2) Amine
- (3) Ether
- (4) Halogens

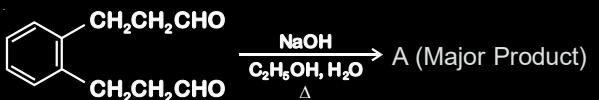
73. Identify A in the following chemical reaction.



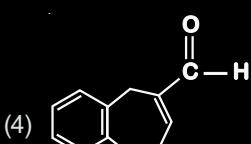
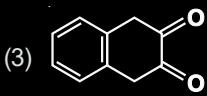
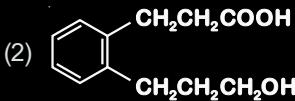
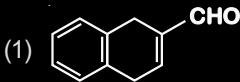
[JEE (Main)-2021]

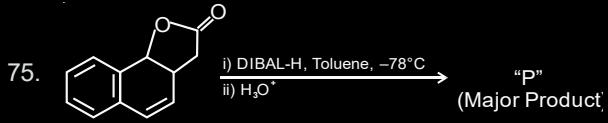


74. Identify A in the given chemical reaction.



[JEE (Main)-2021]

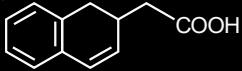
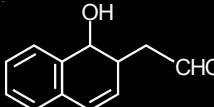
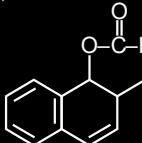




"P"  
 (Major Product)

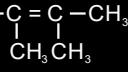
The product "P" in the above reaction is :

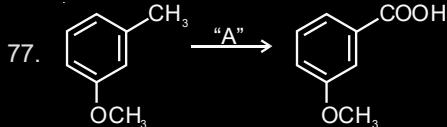
[JEE (Main)-2021]

- (1) 
- (2) 
- (3) 
- (4) 

76. An unsaturated hydrocarbon X on ozonolysis gives A. Compound A when warmed with ammonical silver nitrate forms a bright silver mirror along the sides of the test tube. The unsaturated hydrocarbon X is:

[JEE (Main)-2021]

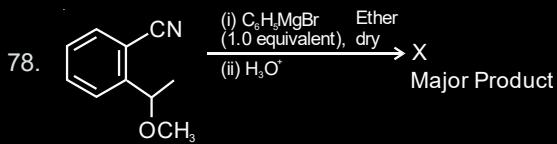
- (1) 
- (2) 
- (3)  $\text{HC} \equiv \text{C} - \text{CH}_2 - \text{CH}_3$
- (4)  $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3$



In the above reaction, the reagent "A" is:

[JEE (Main)-2021]

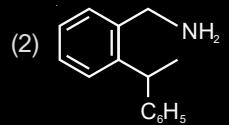
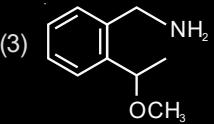
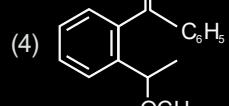
- (1)  $\text{HCl}, \text{Zn} - \text{Hg}$
- (2) Alkaline  $\text{KMnO}_4, \text{H}^+$
- (3)  $\text{LiAlH}_4$
- (4)  $\text{NaBH}_4, \text{H}_3\text{O}^+$



Major Product

The structure of X is:

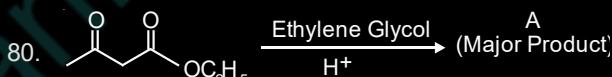
[JEE (Main)-2021]

- (1) 
- (2) 
- (3) 
- (4) 

79. Mesityl oxide is a common name of

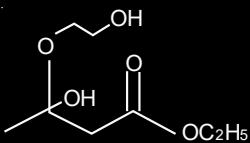
[JEE (Main)-2021]

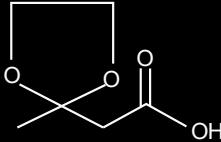
- (1) 3-Methyl cyclohexane carbaldehyde
- (2) 2, 4-Dimethyl pentan-3-one
- (3) 2-Methyl cyclohexanone
- (4) 4-Methyl pent-3-en-2-one

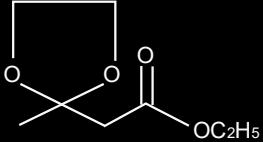


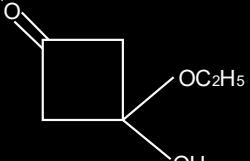
The product "A" in the above reaction is

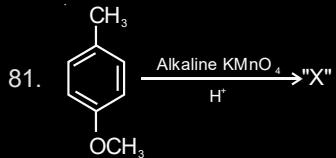
[JEE (Main)-2021]

- (1) 

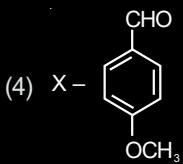
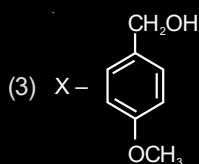
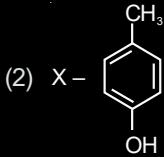
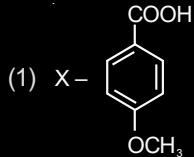
- (2) 

- (3) 

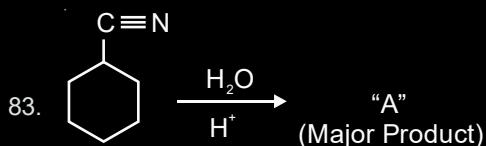
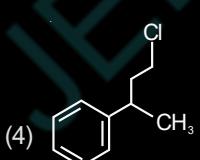
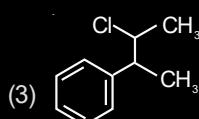
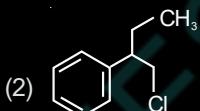
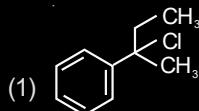
- (4) 



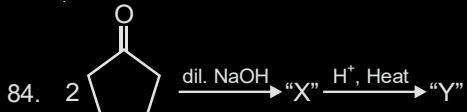
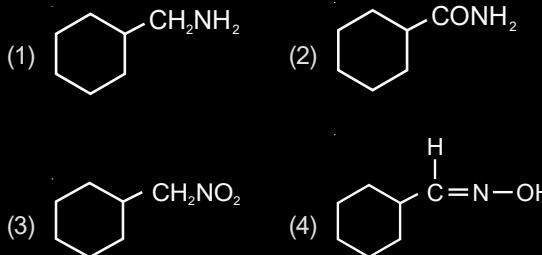
Considering the above chemical reaction, identify the product "X" : [JEE (Main)-2021]



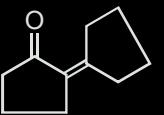
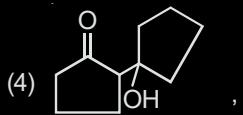
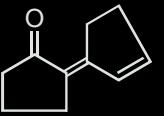
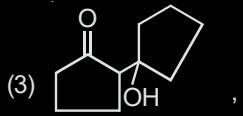
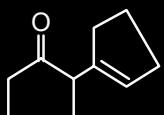
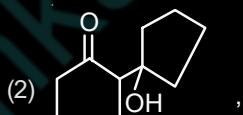
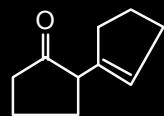
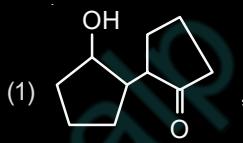
82. Reaction of Grignard reagent,  $C_2H_5MgBr$  with  $C_8H_8O$  followed by hydrolysis gives compound "A" which reacts instantly with Lucas reagent to give compound B,  $C_{10}H_{13}Cl$ . [JEE (Main)-2021]



Consider the above chemical reaction and identify product "A" [JEE (Main)-2021]

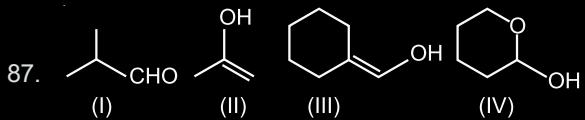


Consider the above reaction, the product 'X' and 'Y' respectively are [JEE (Main)-2021]



85. In Tollen's test for aldehyde, the overall number of electron(s) transferred to the Tollen's reagent formula  $[\text{Ag}(\text{NH}_3)_2]^+$  per aldehyde group to form silver mirror is \_\_\_\_\_. (Round off to the Nearest Integer). [JEE (Main)-2021]

86. The number of nitrogen atoms in a semicarbazone molecule of acetone is \_\_\_\_\_. [JEE (Main)-2021]

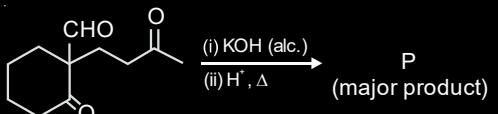


Which among the above compound/s does/do not form Silver mirror when treated with Tollen's reagent?

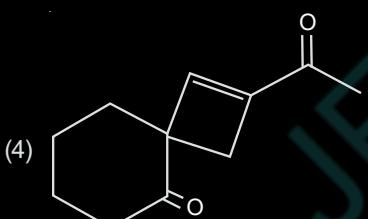
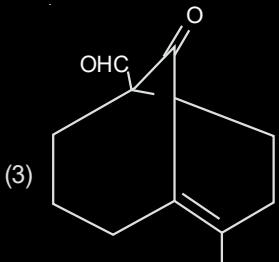
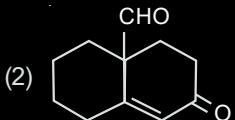
[JEE (Main)-2021]

- (1) (I), (III) and (IV) only    (2) (III) and (IV) only  
 (3) Only (IV)                         (4) Only (II)

88. The major product (P) in the following reaction is



[JEE (Main)-2021]



89. (A)    (B)   
 (C)    (D)

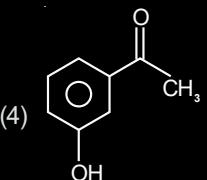
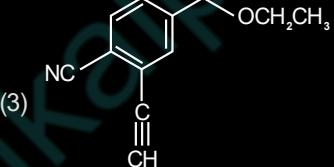
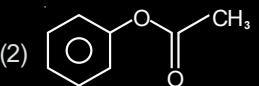
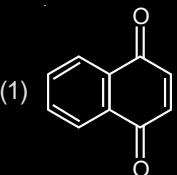
The **correct** order of their reactivity towards hydrolysis at room temperature is

[JEE (Main)-2021]

- (1) (A) > (B) > (C) > (D)  
 (2) (A) > (C) > (B) > (D)  
 (3) (D) > (A) > (B) > (C)  
 (4) (D) > (B) > (A) > (C)

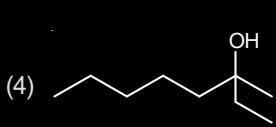
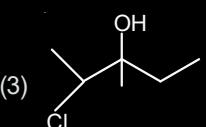
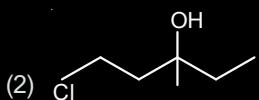
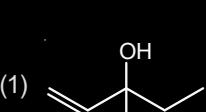
90. Which one of the following compounds will provide a tertiary butyl alcohol on reaction with excess of  $\text{CH}_3\text{MgBr}$  followed by hydrolysis?

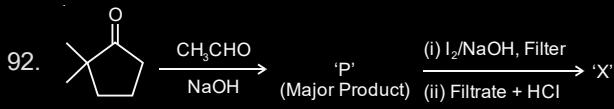
[JEE (Main)-2021]



Consider the above reaction, the major product 'P' is

[JEE (Main)-2021]



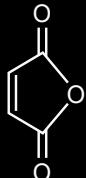


Consider the given reaction, the product 'X' is

[JEE (Main)-2021]

- (1) (2)
- (3) (4)

93.

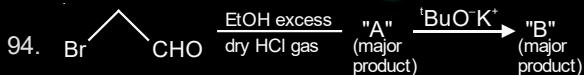


Maleic anhydride

Maleic anhydride can be prepared by :

[JEE (Main)-2021]

- (1) Treating cis-but-2-enedioic acid with alcohol and acid  
 (2) Heating cis-but-2-enedioic acid  
 (3) Treating trans-but-2-enedioic acid with alcohol and acid  
 (4) Heating trans-but-2-enedioic acid

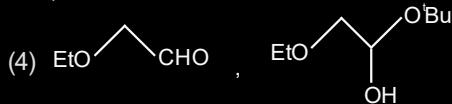


[where Et  $\Rightarrow$   $-C_2H_5$ ,  $tBu \Rightarrow (CH_3)_3C-$ ]

Consider the above reaction sequence, Product "A" and Product "B" formed respectively are :

[JEE (Main)-2021]

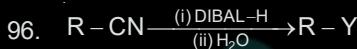
- (1) ,
- (2) ,



95. A reaction of benzonitrile with one equivalent  $CH_3MgBr$  followed by hydrolysis produces a yellow liquid "P". The compound "P" will give positive \_\_\_\_\_.

[JEE (Main)-2021]

- (1) Tollen's test      (2) Schiff's test  
 (3) Ninhydrin's test      (4) Iodoform test



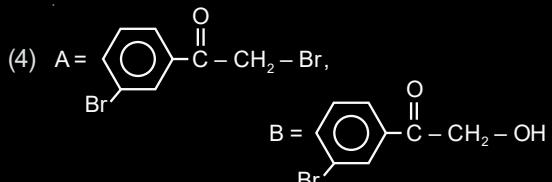
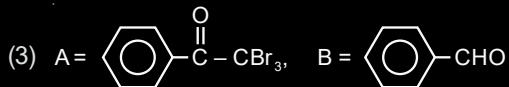
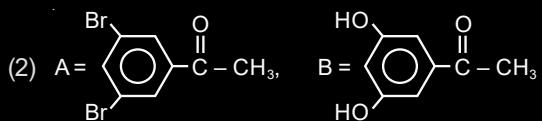
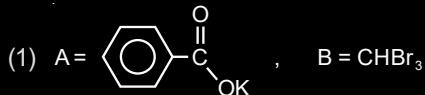
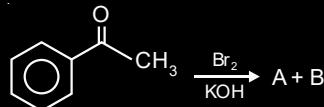
Consider the above reaction and identify "Y".

[JEE (Main)-2021]

- (1)  $-CH_2NH$   
 (2)  $-CHO$   
 (3)  $-COOH$   
 (4)  $-CONH_2$

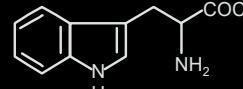
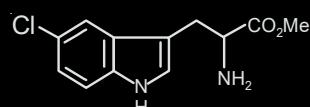
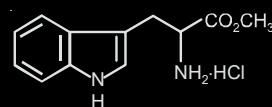
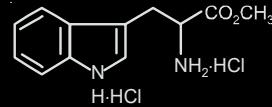
97. The major products formed in the following reaction sequence **A** and **B** are

[JEE (Main)-2021]



98. The major product formed in the following reaction is  
**[JEE (Main)-2021]**



- (1) 
- (2) 
- (3) 
- (4) 

99. Match List-I with List-II.

**List-I**

**List-II**

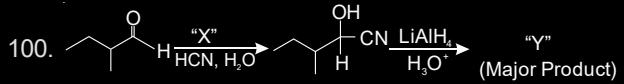
**(Chemical reaction)**      **(Reagent used)**

- |   |   |
|---|---|
| (a) $\text{CH}_3\text{COOCH}_2\text{CH}_3 \rightarrow \text{CH}_3\text{CH}_2\text{OH}$          | (i) $\text{CH}_3\text{MgBr}/\text{H}_3\text{O}^+$<br>(1 equivalent) |
| (b) $\text{CH}_3\text{COOCH}_3 \rightarrow \text{CH}_3\text{CHO}$                               | (ii) $\text{H}_2\text{SO}_4/\text{H}_2\text{O}$                     |
| (c) $\text{CH}_3\text{C} \equiv \text{N} \rightarrow \text{CH}_3\text{CHO}$                     | (iii) DIBAL-H/H <sub>2</sub> O                                      |
| (d) $\text{CH}_3\text{C} \equiv \text{N} \rightarrow \text{CH}_3\text{C}(=\text{O})\text{CH}_3$ | (iv) $\text{SnCl}_2, \text{HCl}/\text{H}_2\text{O}$                 |

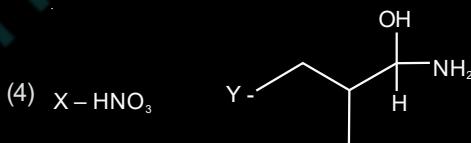
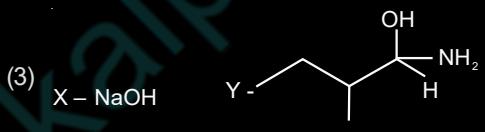
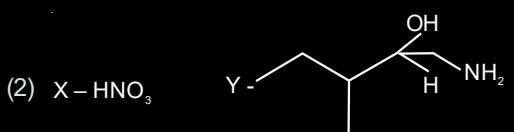
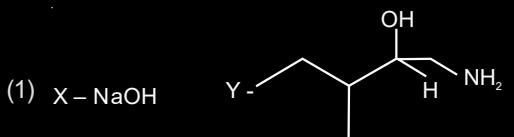
Choose the **most appropriate** match.

**[JEE (Main)-2021]**

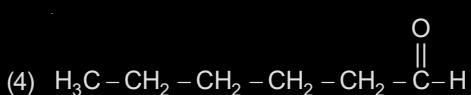
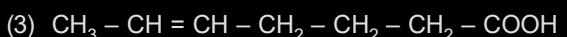
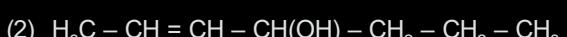
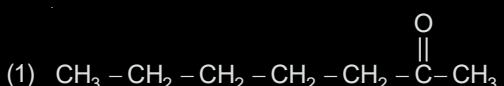
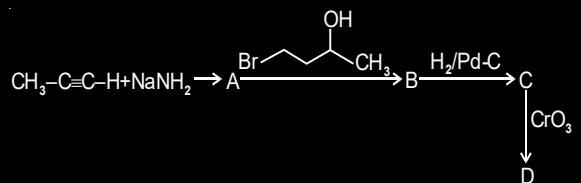
- (1) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
- (2) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)
- (3) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)
- (4) (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)



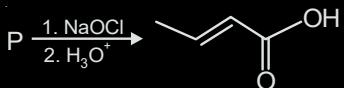
Consider the given reaction, Identify "X" and "Y"  
**[JEE (Main)-2021]**



101. In the following sequence of reactions, the final product D is :  
**[JEE (Main)-2021]**



102. The structure of the starting compound P used in the reaction given below is:



[JEE (Main)-2021]

- (1)
- (2)
- (3)
- (4)

103. Which one of the following reactions will not yield propionic acid?

[JEE (Main)-2021]

- (1)  $\text{CH}_3\text{CH}_2\text{CH}_3 + \text{KMnO}_4(\text{Heat}), \text{OH}^-/\text{H}_3\text{O}^+$
- (2)  $\text{CH}_3\text{CH}_2\text{COCH}_3 + \text{OI}^-/\text{H}_3\text{O}^+$
- (3)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{Mg}, \text{CO}_2 \text{ dry ether}/\text{H}_3\text{O}^+$
- (4)  $\text{CH}_3\text{CH}_2\text{CCl}_3 + \text{OH}^-/\text{H}_3\text{O}^+$

104. Given below are two statements :

**Statement I :** Ethyl pent-4-ynoate on reaction with  $\text{CH}_3\text{MgBr}$  gives a  $3^\circ$ -alcohol.

**Statement II :** In this reaction one mole of ethyl pent-4-ynoate utilizes two moles of  $\text{CH}_3\text{MgBr}$ .

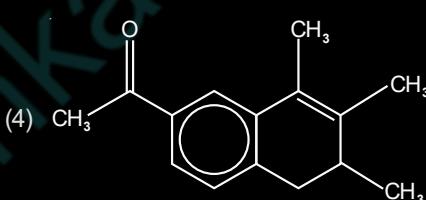
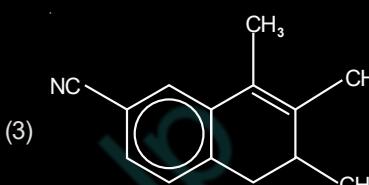
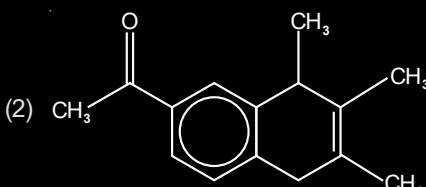
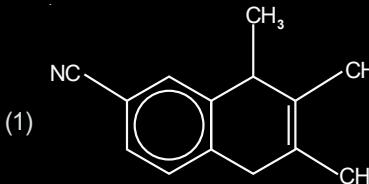
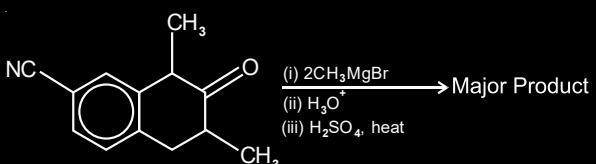
In the light of the above statements, choose the most appropriate answer from the options given below:

[JEE (Main)-2021]

- (1) Both Statement I and Statement II are true
- (2) Statement I is false but Statement II is true
- (3) Statement I is true but Statement II is false
- (4) Both Statement I and Statement II are false

105. Which one of the following is the major product of the given reaction?

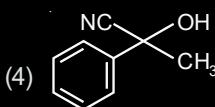
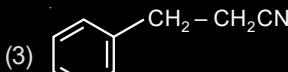
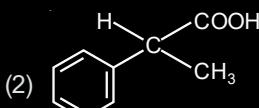
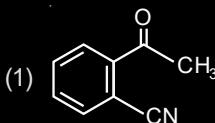
[JEE (Main)-2021]



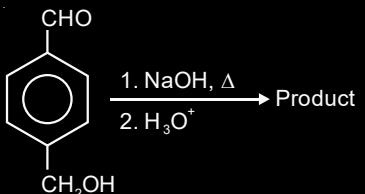
106. The structure of product C, formed by the following sequence of reactions is :



[JEE (Main)-2021]



107. For the reaction given below :



The compound which is not formed as a product in the reaction is a : [JEE (Main)-2021]

- (1) Dicarboxylic acid
- (2) Monocarboxylic acid
- (3) Compound with both alcohol and acid functional groups
- (4) Diol

108. Experimentally reducing a functional group **cannot** be done by which one of the following reagents ?

[JEE (Main)-2021]

- (1) Pd-C/H<sub>2</sub>
- (2) Pt-C/H<sub>2</sub>
- (3) Zn/H<sub>2</sub>O
- (4) Na/H<sub>2</sub>

109. In the following sequence of reactions a compound A, (molecular formula C<sub>6</sub>H<sub>12</sub>O<sub>2</sub>) with a straight chain structure gives a C<sub>4</sub>-carboxylic acid. A is :



[JEE (Main)-2021]

- (1) CH<sub>3</sub> – CH<sub>2</sub> – COO – CH<sub>2</sub> – CH<sub>2</sub> – CH<sub>3</sub>
- (2) CH<sub>3</sub> – CH<sub>2</sub> – CH<sub>2</sub> – O – CH = CH – CH<sub>2</sub> – OH
- (3) CH<sub>3</sub> – CH<sub>2</sub> – CH<sub>2</sub> – COO – CH<sub>2</sub> = CH<sub>3</sub>
- (4) CH<sub>3</sub> – CH<sub>2</sub> – CH(OH) – CH<sub>2</sub> – O – CH = CH<sub>2</sub>

110. In the following sequence of reactions,



The compounds B and C respectively are :

[JEE (Main)-2021]

- (1) Cl<sub>3</sub>COOK, HCOOH
- (2) CHI<sub>3</sub>, CH<sub>3</sub>COOK
- (3) Cl<sub>3</sub>COOK, CH<sub>3</sub>I
- (4) CH<sub>3</sub>I, HCOOK

111. Given below are two statements:

**Statement I** : The nucleophilic addition of sodium hydrogen sulphite to an aldehyde or a ketone involves proton transfer to form a stable ion.

**Statement II** : The nucleophilic addition of hydrogen cyanide to an aldehyde or a ketone yields amine as final product.

[JEE (Main)-2021]

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statement I is true but Statement II is false
- (2) Statement I is false but Statement II is true
- (3) Both Statement I and Statement II are true
- (4) Both Statement I and Statement II are false

112. \_\_\_\_\_ grams of 3-Hydroxy propanal (MW = 74) must be dehydrated to produce 7.8 g of acrolein (MW = 56) (C<sub>3</sub>H<sub>4</sub>O) if the percentage yield is 64. (Round off to the Nearest Integer).

[Given : Atomic masses : C : 12.0 u, H : 1.0 u, O : 16.0 u] [JEE (Main)-2021]

113. What is 'X' in the given reaction?



[JEE (Main)-2021]

- (1)
- (2)
- (3)
- (4)

114. Which one of the following compounds will give orange precipitate when treated with 2, 4-dinitrophenyl hydrazine? [JEE (Main)-2021]

- (1)
- (2)
- (3)
- (4)

115. Two statements are given below:

Statement I: The melting point of monocarboxylic acid with even number of carbon atoms is higher than that of with odd number of carbon atoms acid immediately below and above it in the series.

Statement II: The solubility of monocarboxylic acids in water decreases with increase in molar mass.

Choose the **most appropriate** option:

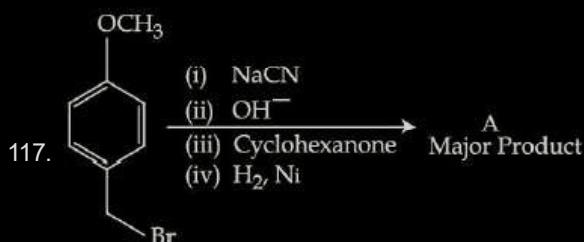
[JEE (Main)-2022]

- (1) Both **Statement I** and **Statement II** are correct.
- (2) Both **Statement I** and **Statement II** are incorrect.
- (3) **Statement I** is correct but **Statement II** is incorrect.
- (4) **Statement I** is incorrect but **Statement II** is correct.

116. Which of the following is an example of conjugated diketone?

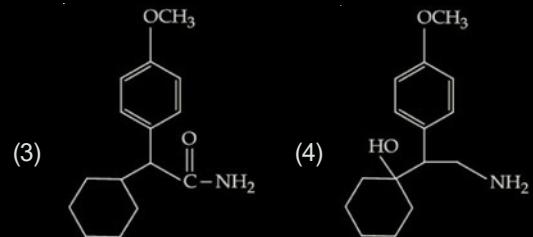
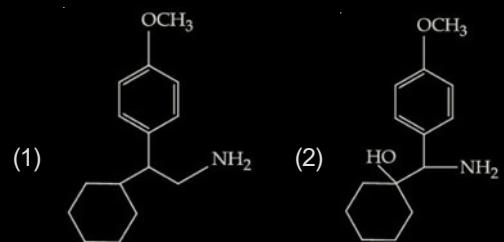
[JEE (Main)-2022]

- (1)
- (2)
- (3)
- (4)

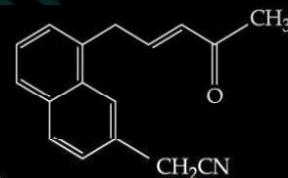


The major product of the above reactions is :

[JEE (Main)-2022]



118. Number of electrophilic centres in the given compound is \_\_\_\_\_.



[JEE (Main)-2022]

119. Hex-4-ene-2-ol on treatment with PCC gives 'A' on reaction with sodium hypoiodite gives 'B', which on further heating with soda lime gives 'C'. The compound 'C' is

[JEE (Main)-2022]

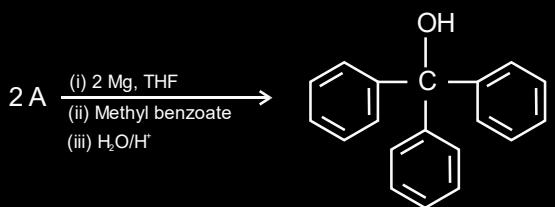
- (1) 2-pentene
- (2) Propanaldehyde
- (3) 2-butene
- (4) 4-methylpent-2-ene

120. The conversion of propan-1-ol to n-butylamine involves the sequential addition of reagents. The correct sequential order of reagents is

[JEE (Main)-2022]

- (1) (i)  $\text{SOCl}_2$  (ii)  $\text{KCN}$  (iii)  $\text{H}_2/\text{Ni}, \text{Na(Hg)}/\text{C}_2\text{H}_5\text{OH}$
- (2) (i)  $\text{HCl}$  (ii)  $\text{H}_2/\text{Ni}, \text{Na(Hg)}/\text{C}_2\text{H}_5\text{OH}$
- (3) (i)  $\text{SOCl}_2$  (ii)  $\text{KCN}$  (iii)  $\text{CH}_3\text{NH}_2$
- (4) (i)  $\text{HCl}$  (ii)  $\text{CH}_3\text{NH}_2$

121. In the given reaction



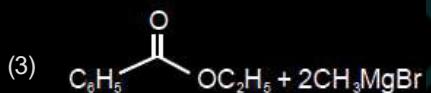
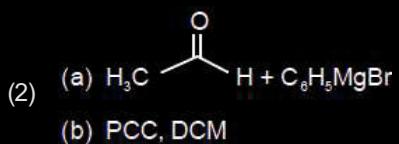
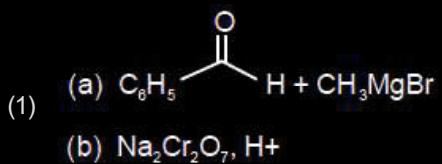
'A' can be

[JEE (Main)-2022]

- (1) Benzyl bromide    (2) Bromo benzene
- (3) Cyclohexyl bromide    (4) Methyl bromide

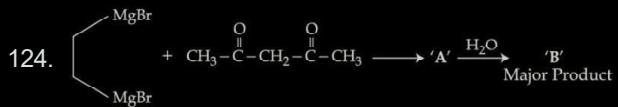
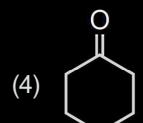
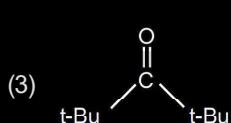
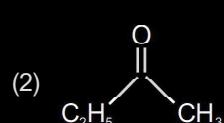
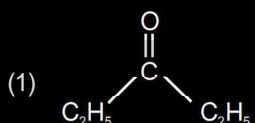
122. Which of the following conditions or reaction sequence will NOT give acetophenone as the major product?

[JEE (Main)-2022]



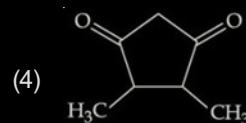
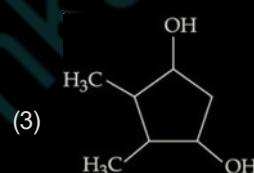
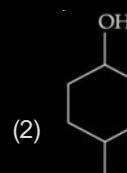
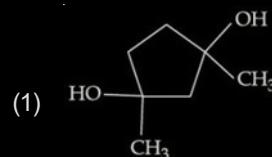
123. Which of the following ketone will NOT give enamine on treatment with secondary amines?  
 [where t-Bu is  $-\text{C}(\text{CH}_3)_3$ ]

[JEE (Main)-2022]



Consider the above reaction sequence and identify the product B.

[JEE (Main)-2022]



125. Oxidation of toluene to benzaldehyde can be easily carried out with which of the following reagents?

[JEE (Main)-2022]

- (1)  $\text{CrO}_3/\text{acetic acid}, \text{H}_3\text{O}^+$
- (2)  $\text{CrO}_3/\text{acetic anhydride}, \text{H}_3\text{O}^+$
- (3)  $\text{KMnO}_4/\text{HCl}, \text{H}_3\text{O}^+$
- (4)  $\text{CO}/\text{HCl}, \text{anhydrous AlCl}_3$

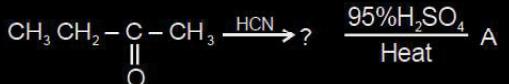
126. The reagent, from the following, which converts benzoic acid to benzaldehyde in one step is



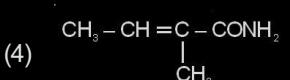
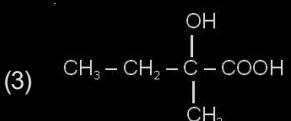
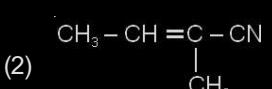
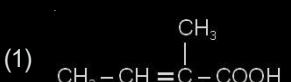
[JEE (Main)-2022]

- (1)  $\text{LiAlH}_4$
- (2)  $\text{KMnO}_4$
- (3)  $\text{MnO}$
- (4)  $\text{NaBH}_4$

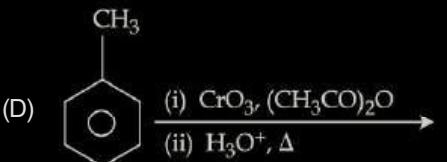
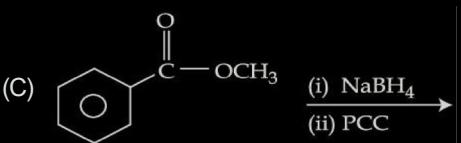
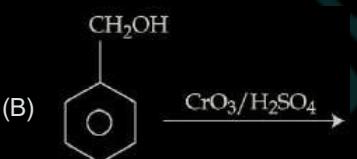
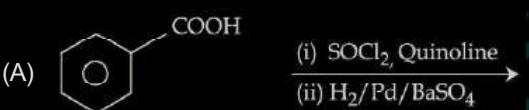
127. The final product 'A' in the following reaction sequence



[JEE (Main)-2022]



128. Which of the following reactions will yield benzaldehyde as a product?



[JEE (Main)-2022]

- (1) (B) and (C)  
(3) (A) and (D)

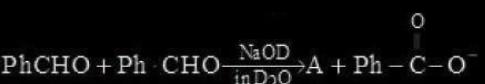
- (2) (C) and (D)  
(4) (A) and (C)

129. Decarboxylation of all six possible forms of diaminobenzoic acid  $\text{C}_6\text{H}_3(\text{NH}_2)_2\text{COOH}$  yields three products A, B and C. Three acids give a product 'A', two acids give a product 'B' and one acid gives a product 'C'. The melting point of product 'C' is

[JEE (Main)-2022]

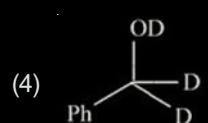
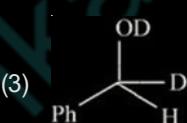
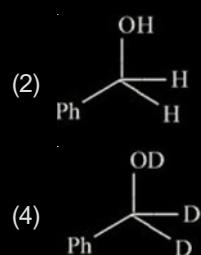
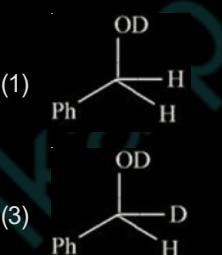
- (1) 63°C  
(3) 104°C  
(2) 90°C  
(4) 142°C

130. The correct structure of product 'A' formed in the following reaction,

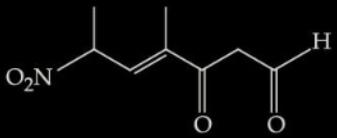


(Ph is  $-\text{C}_6\text{H}_5$ ) is

[JEE (Main)-2022]



131. The correct IUPAC name of the following compound is:

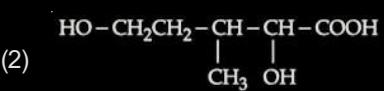
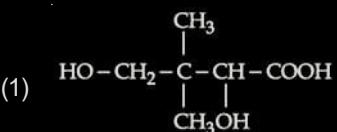


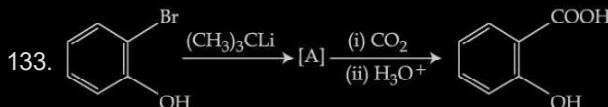
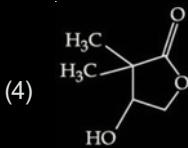
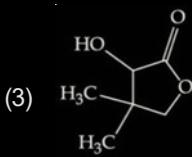
[JEE (Main)-2022]

- (1) 4-methyl-2-nitrohept-3-enal  
(2) 4-methyl-5-oxo-2-nitrohept-3-enal  
(3) 4-methyl-6-nitro-3-oxohept-4-enal  
(4) 6-formyl-4-methyl-2-nitrohex-3-enal

132. Isobutyraldehyde on reaction with formaldehyde and  $\text{K}_2\text{CO}_3$  gives compound 'A'. Compound 'A' reacts with KCN and yields compound 'B', which on hydrolysis gives a stable compound 'C'. The compound 'C' is

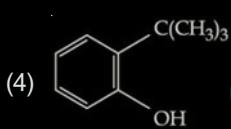
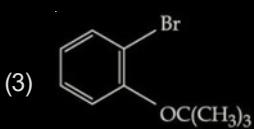
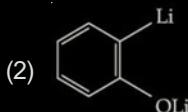
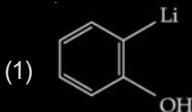
[JEE (Main)-2022]





In the given conversion the compound A is:

[JEE (Main)-2022]



134. Given below are two statements:

**Statement I:** The esterification of carboxylic acid with an alcohol is a nucleophilic acyl substitution.

**Statement II:** Electron withdrawing groups in the carboxylic acid will increase the rate of esterification reaction.

Choose the **most appropriate** option :

[JEE (Main)-2022]

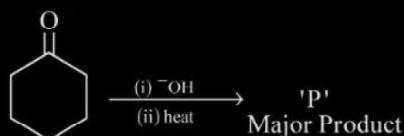
- Both **Statement I** and **Statement II** are correct.
- Both **Statement I** and **Statement II** are incorrect.
- Statement I** is correct but **Statement II** is incorrect.
- Statement I** is incorrect but **Statement II** is correct.



The number of carbon atoms present in the product B is \_\_\_\_\_.

[JEE (Main)-2022]

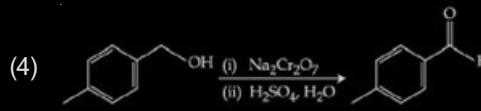
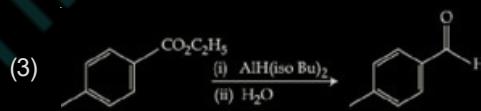
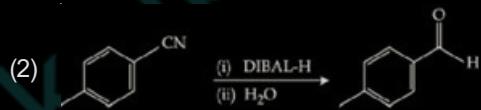
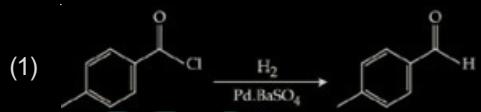
136. In the given reaction,



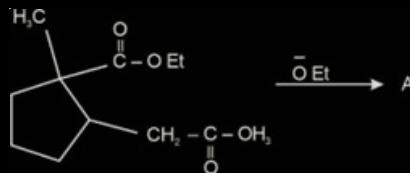
The number of  $\pi$  electrons present in the product 'P' is \_\_\_\_\_. [JEE (Main)-2022]

137. Which one of the following reactions does not represent correct combination of substrate and product under the given conditions?

[JEE (Main)-2022]



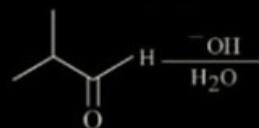
138. In the given reaction,

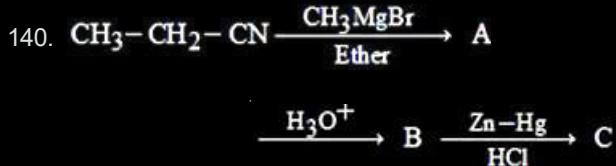
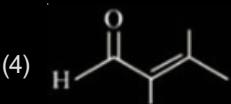
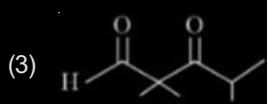
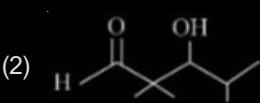
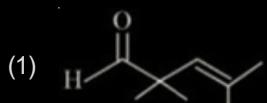


(where Et is  $-\text{C}_2\text{H}_5$ )

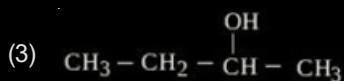
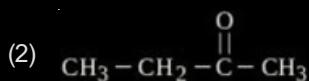
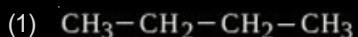
The number of chiral carbon(s) in product A is \_\_\_\_\_. [JEE (Main)-2022]

139. What is the major product of the following reaction?

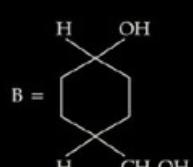
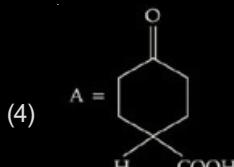
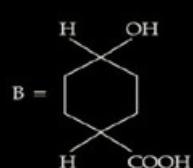
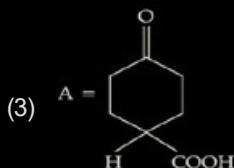
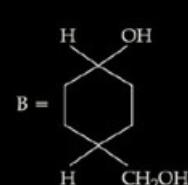
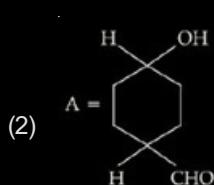
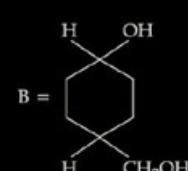
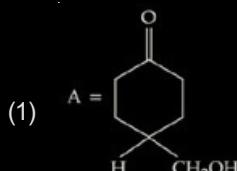
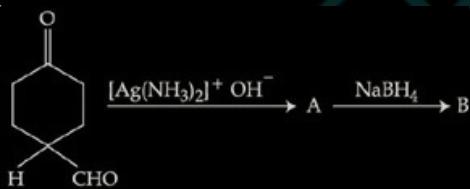




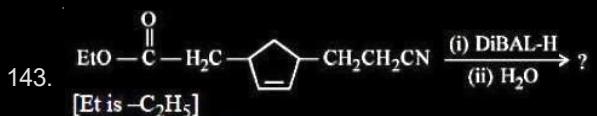
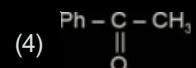
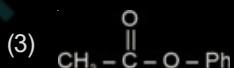
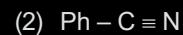
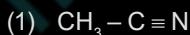
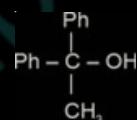
The correct structure of C is



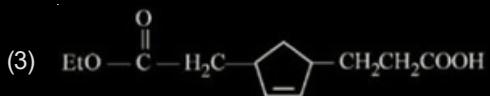
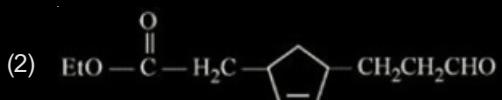
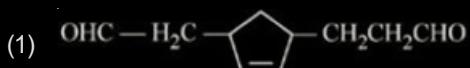
141. The products formed in the following reaction, A and B are



142. Which reactant will give the following alcohol on reaction with one mole of phenyl magnesium bromide ( $\text{PhMgBr}$ ) followed by acidic hydrolysis?

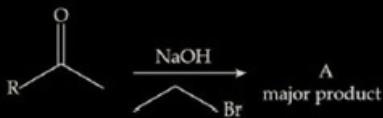


Consider the above reaction and predict the major product.

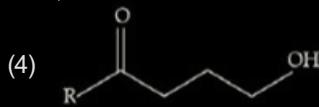
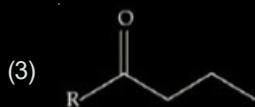
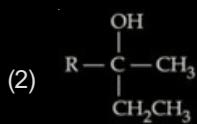
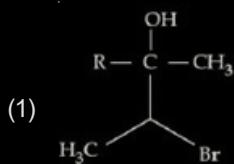


144. The structure of A in the given reaction is:

[JEE (Main)-2022]



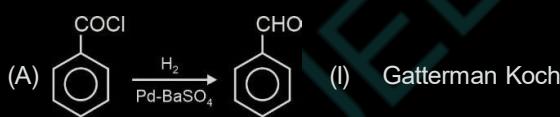
[JEE (Main)-2022]



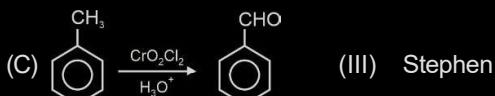
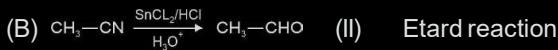
145. Match List-I with List-II

List-I

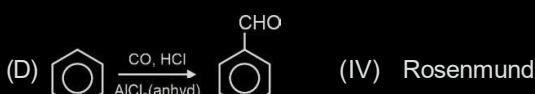
List-II



reaction



reaction



reaction

Choose the correct answer from the options given below:

- (1) (A) - (IV), (B) - (III), (C) - (II), (D) - (I)

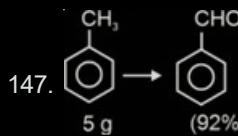
- (2) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

- (3) (A) - (II), (B) - (III), (C) - (IV), (D) - (I)

- (4) (A) - (III), (B) - (II), (C) - (I), (D) - (IV)

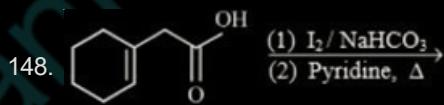
146. The spin only magnetic moment of the complex present in Fehling's reagent is \_\_\_\_\_ B.M. (Nearest integer).

[JEE (Main)-2022]



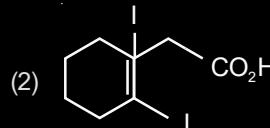
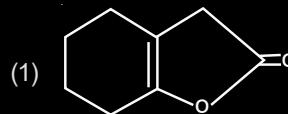
In the above reaction, 5 g of toluene is converted into benzaldehyde with 92% yield. The amount of benzaldehyde produced is \_\_\_\_\_  $\times 10^{-2}$  g. (Nearest integer).

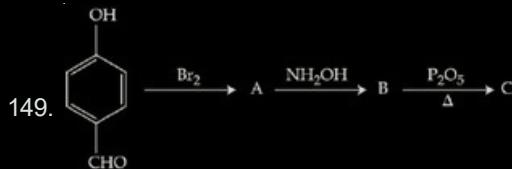
[JEE (Main)-2022]



Find out the major product for the above reaction.

[JEE (Main)-2022]



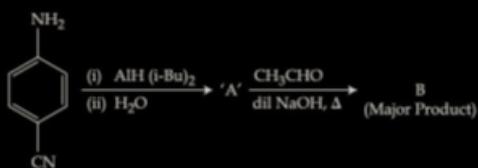


Consider the above reaction sequence, the product 'C' is

[JEE (Main)-2022]

- (1)
- (2)
- (3)
- (4)

150. Consider the following reaction sequence :



The product 'B' is :

[JEE (Main)-2022]

- (1)
- (2)
- (3)
- (4)

151. Correct structure of  $\gamma$ -methylcyclohexane carbaldehyde is

[JEE (Main)-2022]

- (1)
- (2)
- (3)
- (4)

152. The number of stereoisomers formed in a reaction of  $(\pm)$  Ph (C = O) C (OH) (CN) Ph with HCN is \_\_\_\_\_.

[where Ph is  $-\text{C}_6\text{H}_5$ ]

[JEE (Main)-2022]

153. A  $\xrightarrow[\text{(ii)}]{\text{Cl}_2, \Delta}$   $\xrightarrow{\text{(iii)} \text{ H}_2\text{O}/\text{H}^+}$  4-Bromophenyl acetic acid.

In the above reaction 'A' is

[JEE (Main)-2022]

- (1)
- (2)
- (3)
- (4)

# Chapter 26

## Aldehydes, Ketones and Carboxylic Acids

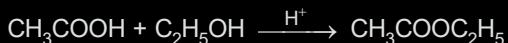
1. Answer (3)



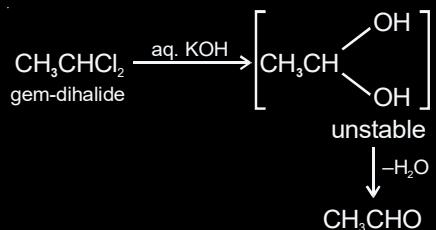
Carboxylic acid



Must be ester



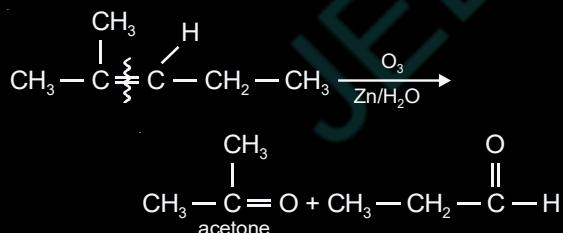
2. Answer (3)



3. Answer (1)

In Cannizzaro reaction, the transfer of hydride to the carbonyl group is the rate determining step.

4. Answer (1)

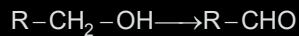


5. Answer (4)

6. Answer (3)

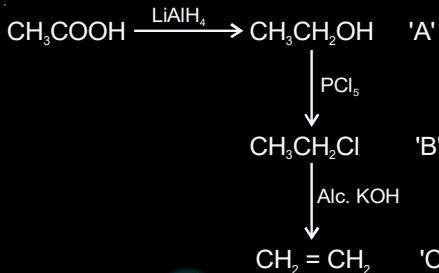
7. Answer (4)

PCC is mild oxidising agent, it will convert

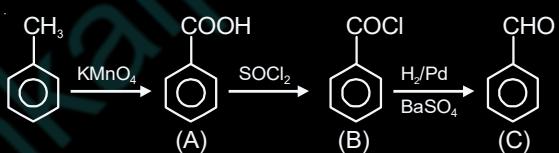


8. Answer (3)

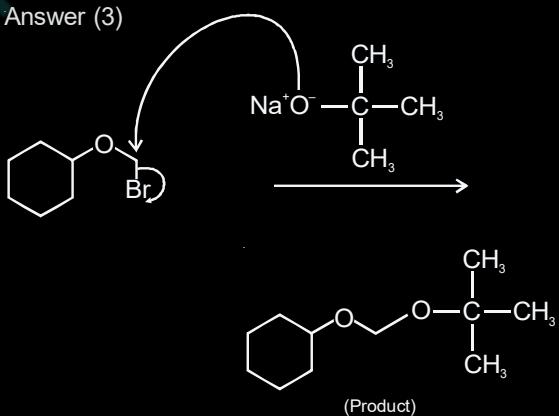
Ethylene



9. Answer (4)



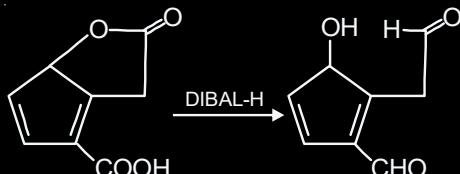
10. Answer (3)



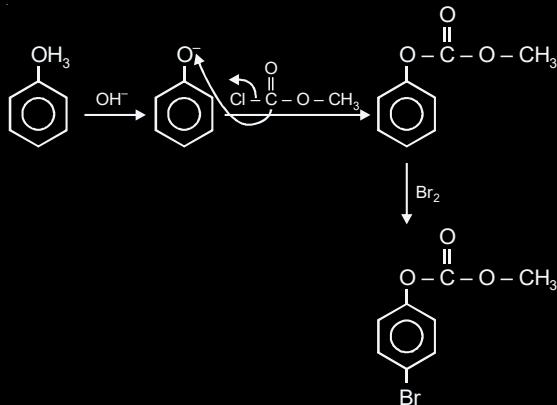
The above product does not have any C = C or C ≡ C bond, so, it will not give Br<sub>2</sub>-water test.

11. Answer (4)

DIBAL — H reduces esters and carboxylic acids into aldehydes

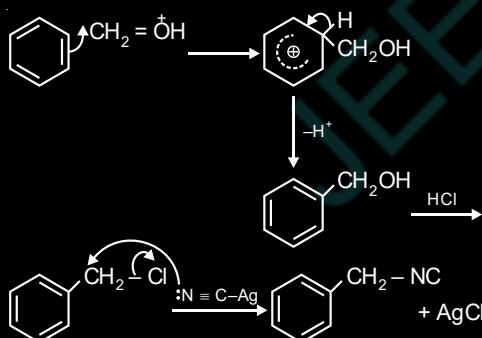
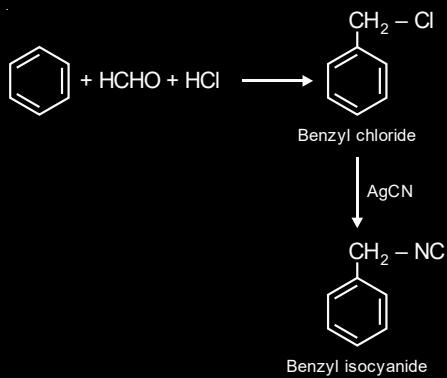


12. Answer (3)

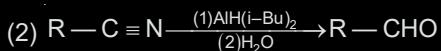


Hence, option (3) is correct.

13. Answer (3)



14. Answer (2)



AlH (i - Bu)<sub>2</sub> is DIBALH which reduces nitriles to aldehydes.

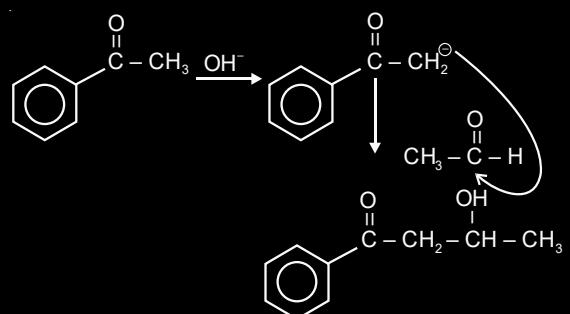
15. Answer (4)

Alumina is an adsorbent (stationary phase)

Benzaldehyde is adsorbate.

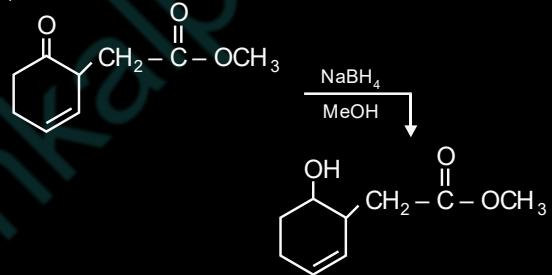
Acetonitrile is mobile phase.

16. Answer (4)

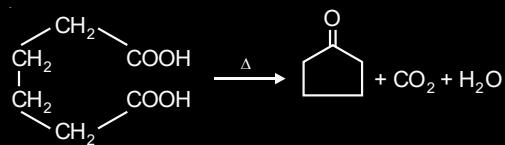


17. Answer (2)

$\text{NaBH}_4$  selectively reduces the ketone, it does not affect alkene and ester.



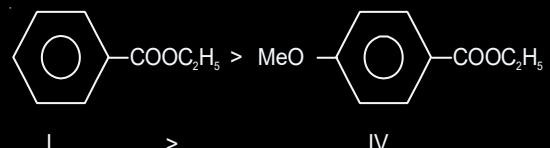
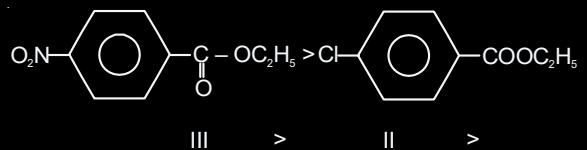
18. Answer (3)



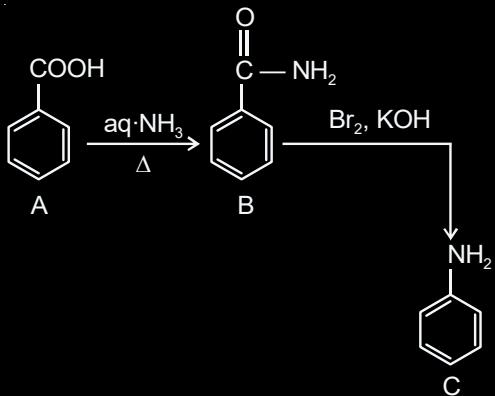
This compound does not form anhydride.

19. Answer (4)

Rate of reaction  $\propto$  positive charge on carbonyl carbon so E.W.G. increase rate while E.D.G. decrease the rate.

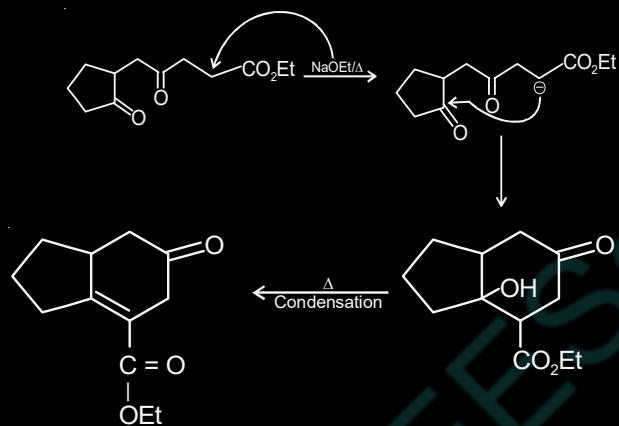


20. Answer (3)

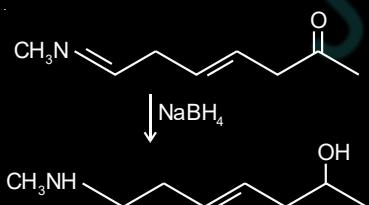


$\therefore$  A is Benzoic Acid

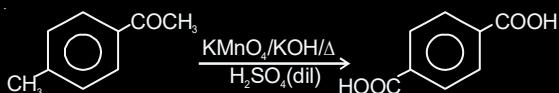
21. Answer (4)



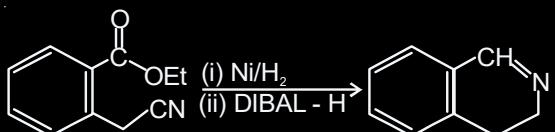
22. Answer (4)



23. Answer (2)



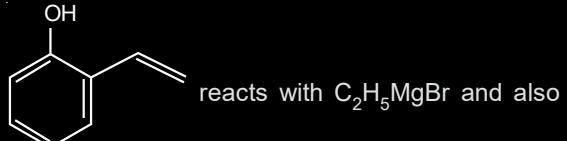
24. Answer (4)



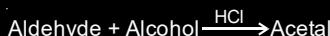
25. Answer (2)

Phenol or unsaturated hydrocarbon (alkene or alkyne) decolourised bromine water solution.

$\text{C}_2\text{H}_5\text{MgBr}$  will react with carbonyl carbon or acidic hydrogen.



26. Answer (1)

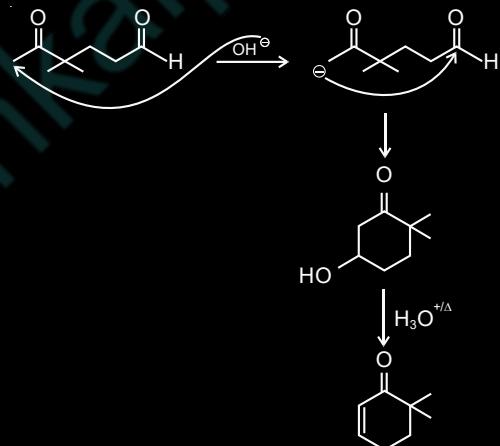


$\uparrow$   
 more  
reactive  
aldehyde

$\uparrow$   
 less steric  
alcohol

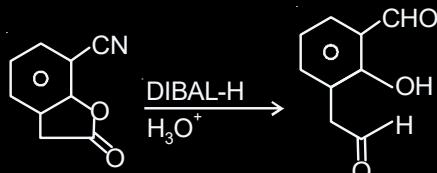
$\therefore$  Best combination is HCHO and MeOH

27. Answer (2)



28. Answer (2)

DIBAL-H followed by hydrolysis converts nitrile to aldehyde and ester to aldehyde and alcohol.



29. Answer (3)

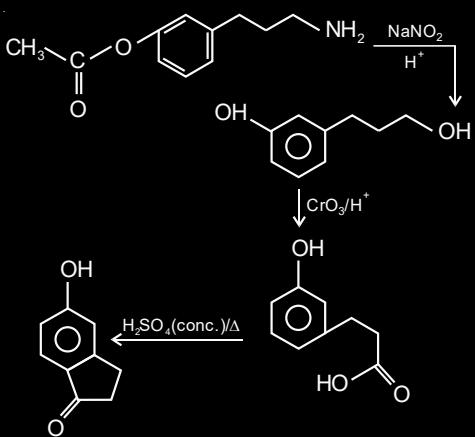
The reactivity order of carboxylic acid derivatives depends on the leaving tendency of the leaving group. Higher the leaving tendency of the leaving group, higher will be the reactivity of the compound. Therefore, reactivity order towards  $\text{LiAlH}_4$  is

Acid halide > Acid anhydride > Ester > Amide

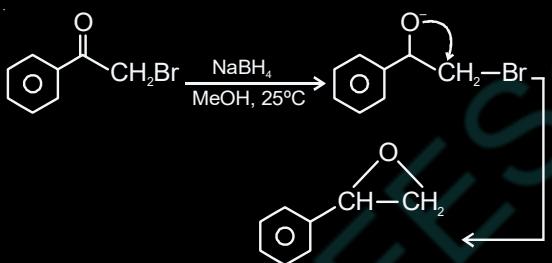
## 30. Answer (2)

Grignard reagent will not react with aldehydes if it has a functional group which contains acidic hydrogen. Options (B) and (D) have  $\text{—COOH}$  and  $\text{—CH}_2\text{OH}$  respectively which contain acidic H-atom.

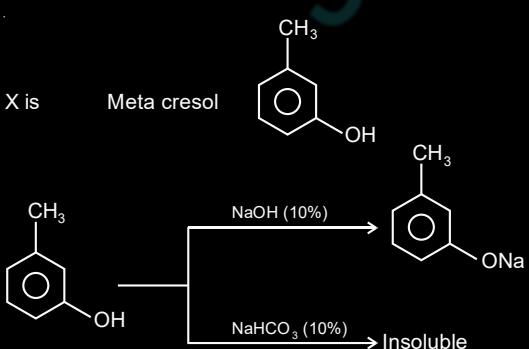
## 31. Answer (1)



## 32. Answer (3)



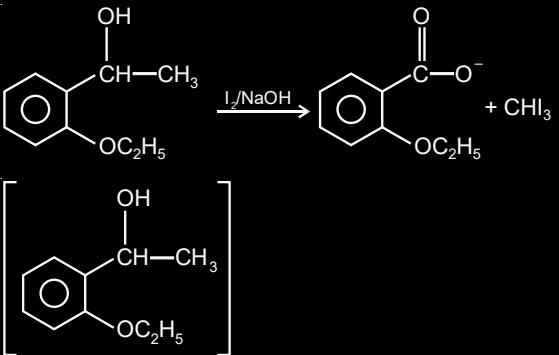
## 33. Answer (4)



Benzamide is amphoteric

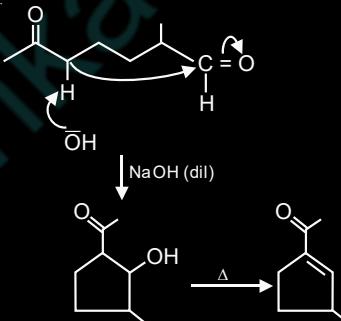
Oleic acid will dissolve in NaOH as well as  $\text{NaHCO}_3$  due to acidic nature.

## 34. Answer (3)



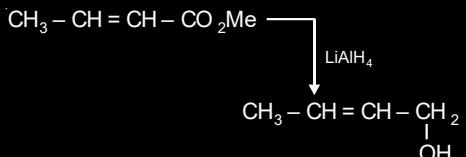
- Reacts with Grignard's reagent due to acidic hydrogen.
- Fehling solution test is negative as there is no  $-\text{CHO}$  group.
- Neutral  $\text{FeCl}_3$  test is negative as there is no phenolic group

## 35. Answer (3)

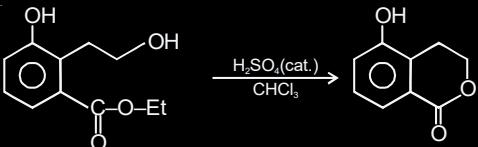


## 36. Answer (4)

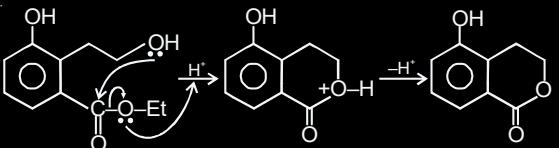
$\text{LiAlH}_4$  reduces esters to alcohols but does not reduce  $\text{C} = \text{C}$ .



## 37. Answer (2)



Acid catalysed intramolecular esterification



38. Answer (3)

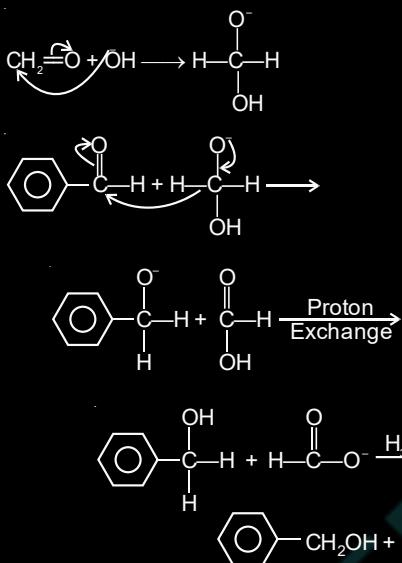


Generally, aldehydes are more reactive than ketones in nucleophilic addition reactions.

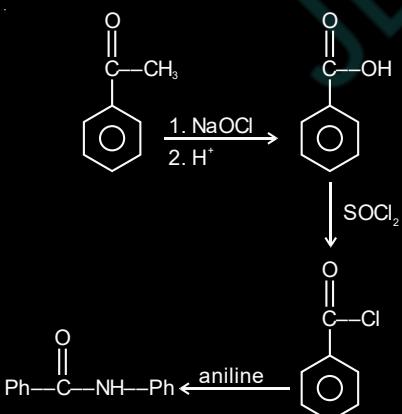
∴ Rate of reaction with alcohol to form acetal and ketal is



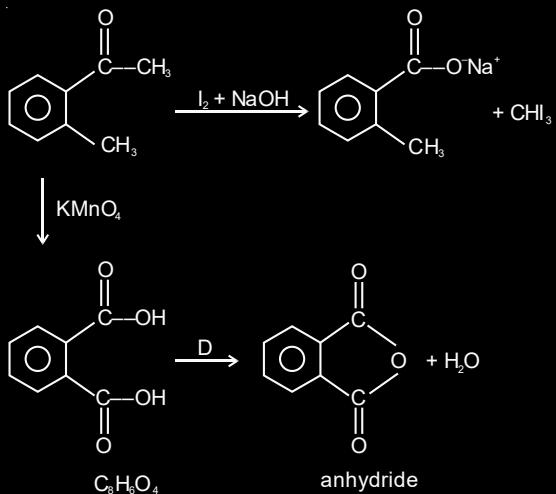
39. Answer (1)



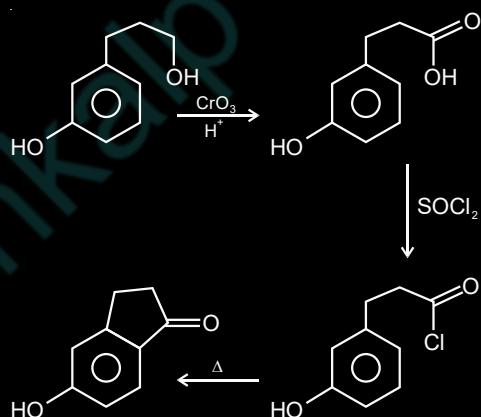
40. Answer (3)



41. Answer (2)

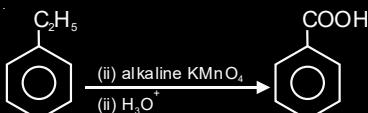


42. Answer (2)

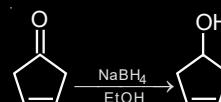


43. Answer (2)

Alkaline KMnO<sub>4</sub> converts  $\text{C}_6\text{H}_5\text{R}$  with a benzylic hydrogen into benzoic acid.



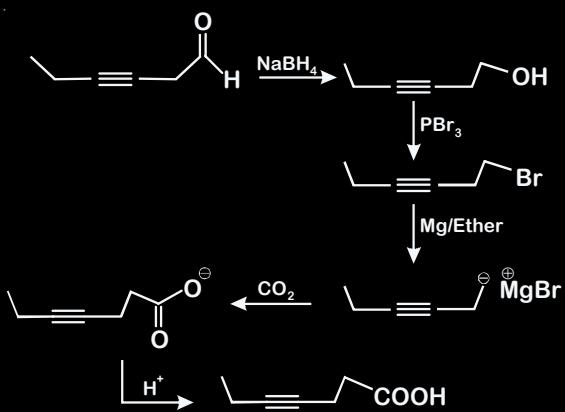
44. Answer (2)



NaBH<sub>4</sub> does not reduce the double bond in β-γ unsaturated aldehydes/ ketones.

Only the keto group will be reduced.

45. Answer (4)



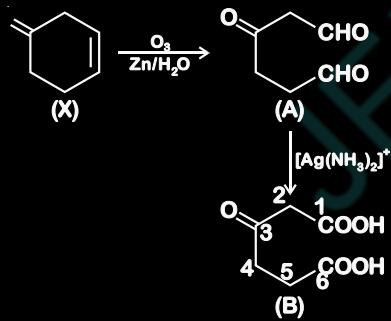
46. Answer (3)

m-chlorobenzoic acid dissolves in aq  $\text{NaHCO}_3$  while m-chlorophenol dissolves in aq  $\text{NaOH}$

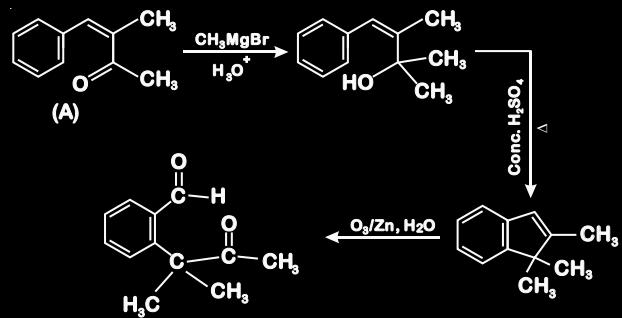
47. Answer (4)

Diborane selectively reduces carboxylic acid to alcohol in preference to other functional groups like amide, carbonyl group and cyano group.

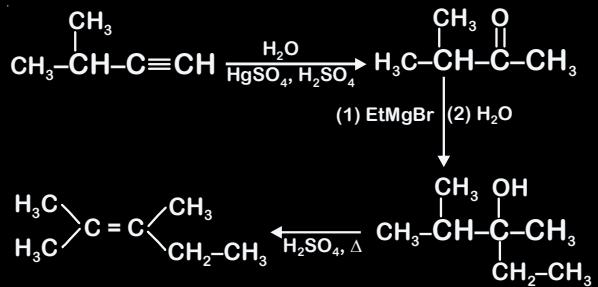
48. Answer (2)



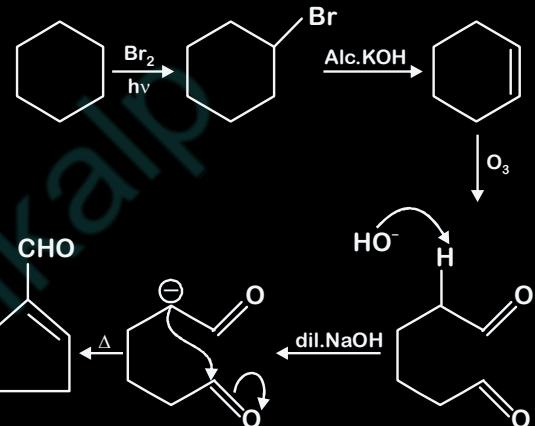
49. Answer (1)



50. Answer (2)



51. Answer (4)



52. Answer (2)

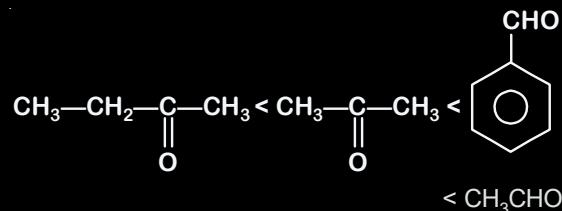
Attack of nucleophile on carbonyl centres depends upon

- (i) Steric factor
- (ii) Electronic factor
- ∴ Rate of reaction should follow the order  
(ii) > (iv) > (i) > (iii)

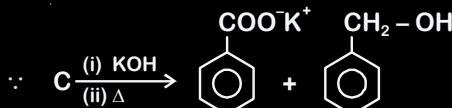
53. Answer (4)

Increasing hindrance and electron releasing group (ERG) attached on carboxyl group decrease the reactivity.

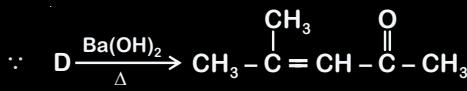
Correct order of nucleophilic addition reaction is



54. Answer (3)



$\therefore \text{C}$  is  $\text{Ph-CHO}$



$\therefore \text{D}$  is  $\text{CH}_3\text{-C(=O)-CH}_3$

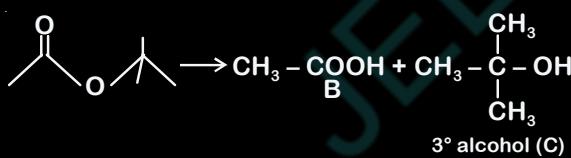
B is  $\text{Ph-CH}=\text{C}(\text{CH}_3)\text{-CH}_3$

A is  $\text{C}_6\text{H}_5\text{-CH}_2\text{-C(=O)-CH}_3$

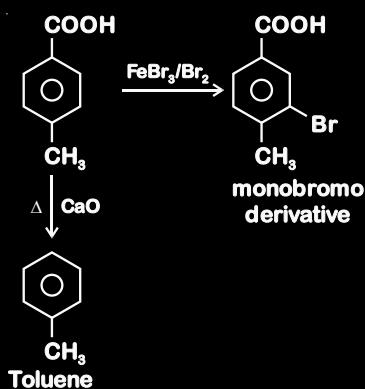
55. Answer (1)



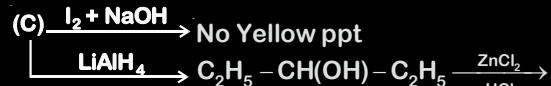
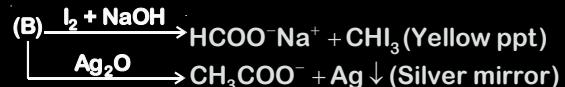
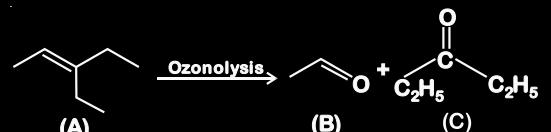
Since C gives turbidity immediately with Lucas reagent (anhydrous  $\text{ZnCl}_2 + \text{conc. HCl}$ ). This means C should be  $3^\circ$  alcohol.



56. Answer (3)

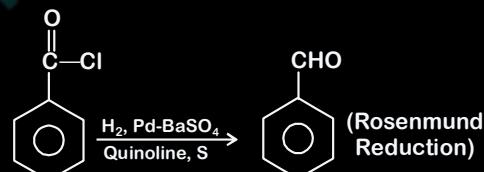
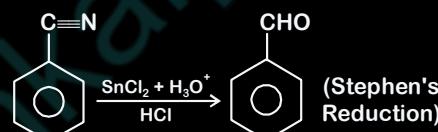
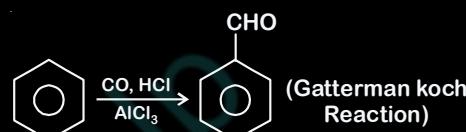


57. Answer (2)

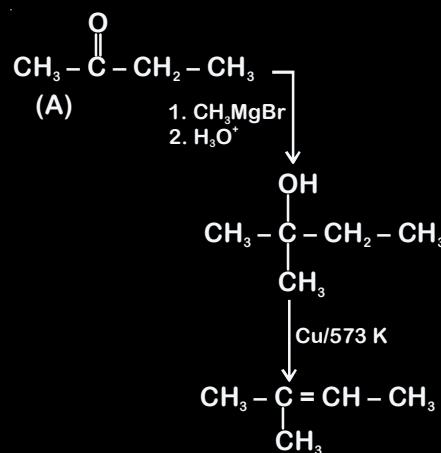


$\text{C}_2\text{H}_5\text{-CH(Cl)-C}_2\text{H}_5$

58. Answer (1)



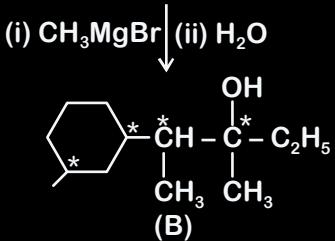
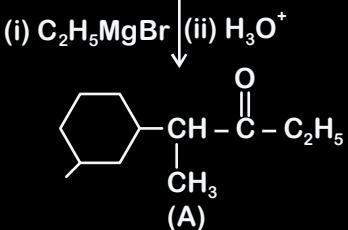
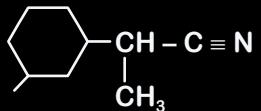
59. Answer (66.67)



A is  $\text{C}_4\text{H}_8\text{O}$

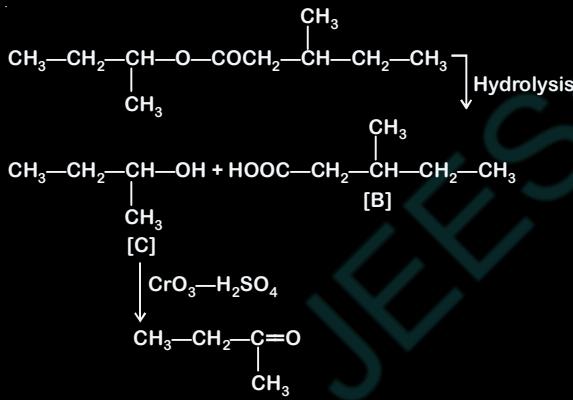
$$\% \text{ of C} = \frac{48}{72} \times 100 = 66.67$$

60. Answer (4)

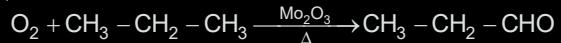
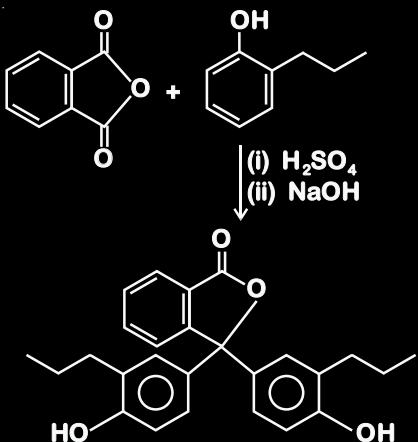


Number of chiral centres in the product (B) = 4.

61. Answer (1)

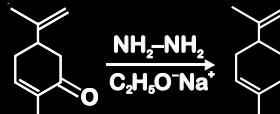


62. Answer (4)

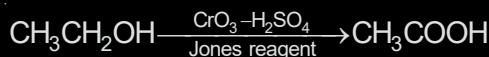


$\text{Mn(OAc)}_2$  – manganese acetate oxidizes alkanes to carboxylic acids in presence of  $\text{O}_2$  and heat.

64. Answer (4)

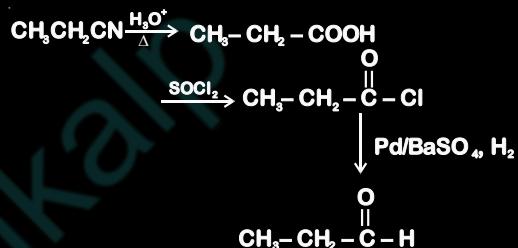


65. Answer (1)



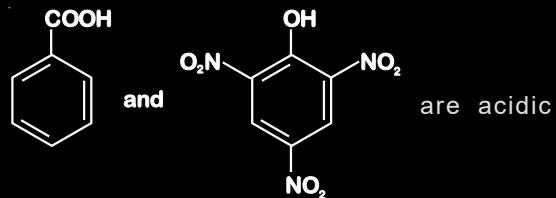
In the rest of the options acetaldehyde will be formed.

66. Answer (3)



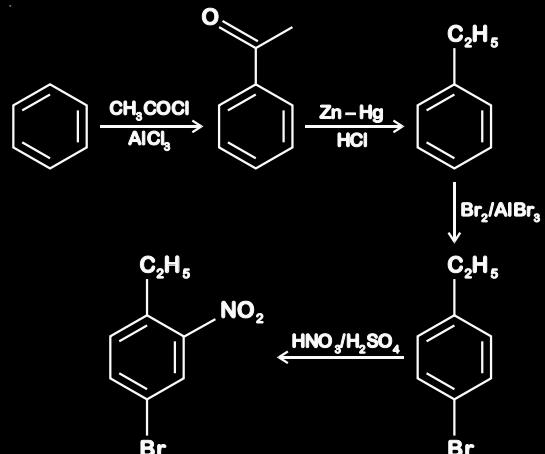
Correct option should be (3)

67. Answer (4)

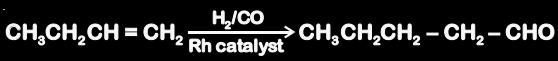


enough to liberate  $\text{CO}_2$  with  $\text{NaHCO}_3$  solution.

68. Answer (1)



69. Answer (3)

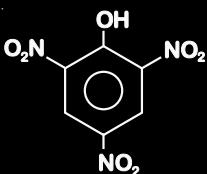


70. Answer (1)

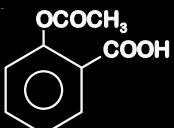
The structures of the given compounds are



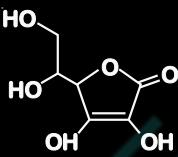
(A) Sulphanilic acid



(B) Picric acid



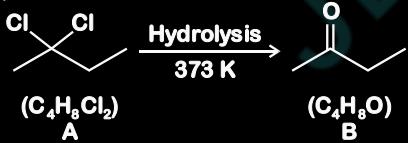
(C) Aspirin



(D) Ascorbic Acid

∴ Only 1 compound has –COOH group

71. Answer (4)



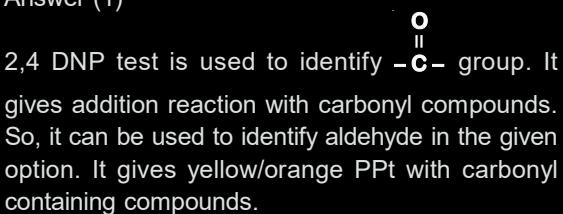
B is a ketone, cannot give Tollen's test.

### A → 2, 2-Dichlorobutane

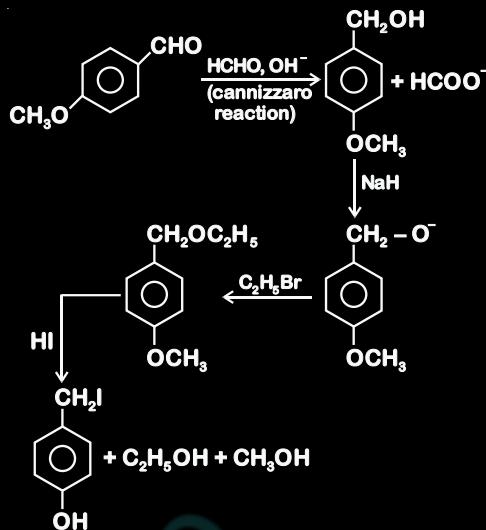
### B → Butan-2-one

So correct option should be (4)

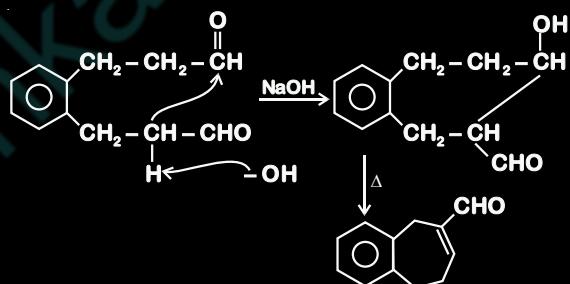
72. Answer (1)



73. Answer (1)

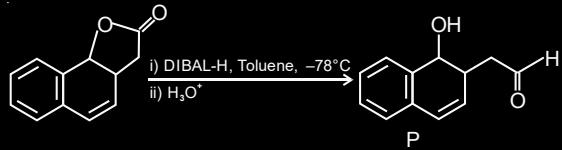


- 74. Answer (4)**

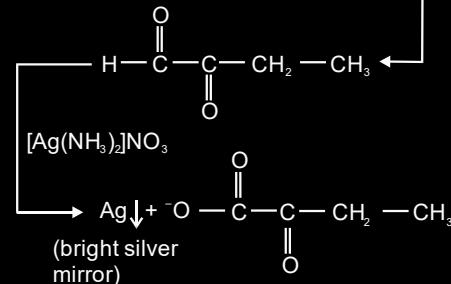
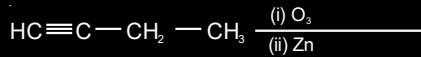


75. Answer (3)

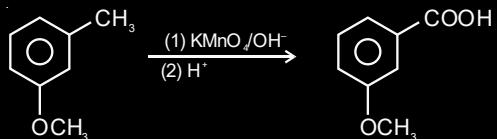
DIBAL-H – diisobutylaluminium hydride selectively reduces nitriles and esters to aldehydes.



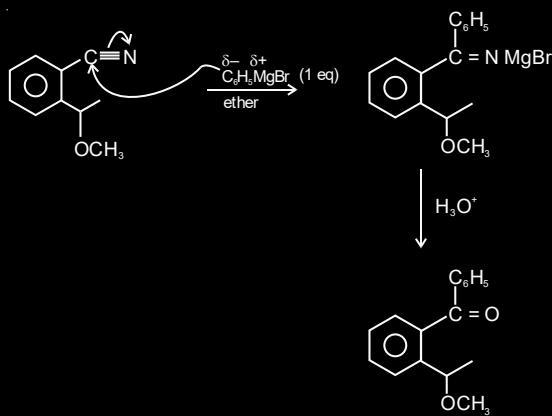
76. Answer (3)



77. Answer (2)

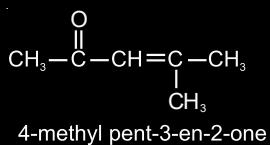


78. Answer (4)



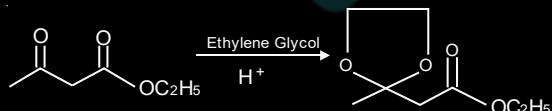
79. Answer (4)

Mesityl oxide is the common name of aldol condensation product of acetone. Its structure and IUPAC name are

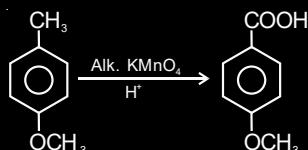


80. Answer (3)

Ethylene glycol in presence of  $\text{H}^+$  will convert ketone into cyclic ketal and the ester group remains intact.

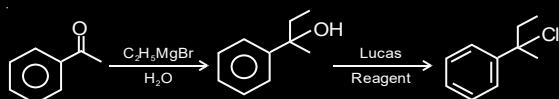


81. Answer (1)

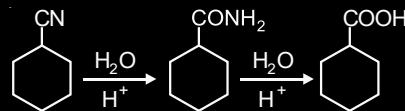


82. Answer (1)

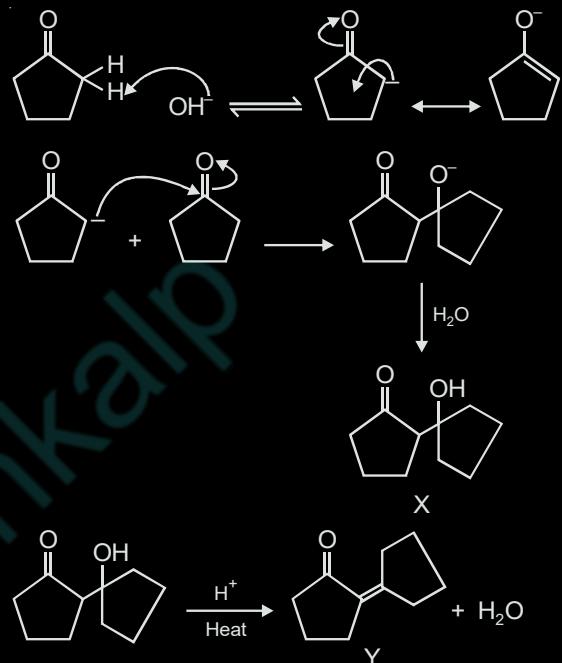
Reaction occur through formation of carbocation.



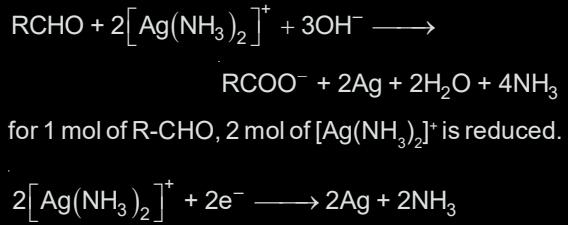
83. Answer (2)



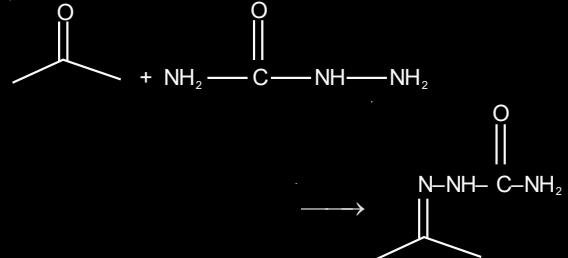
84. Answer (4)



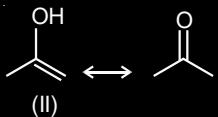
85. Answer (2)



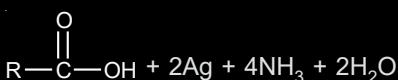
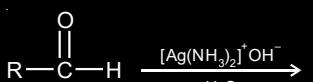
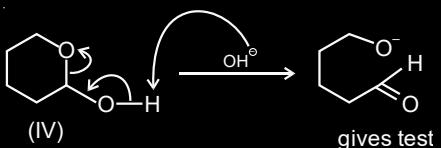
86. Answer (3)



87. Answer (4)

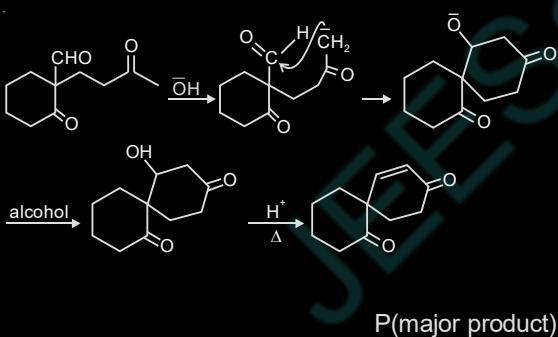


Aldehyde gives Silver mirror test with Tollen's reagent but not ketones.



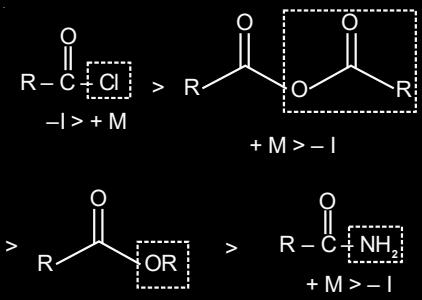
88. Answer (1)

This problem is based on intramolecular aldol condensation reaction.



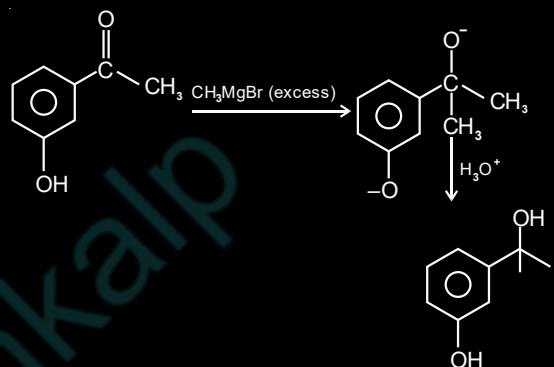
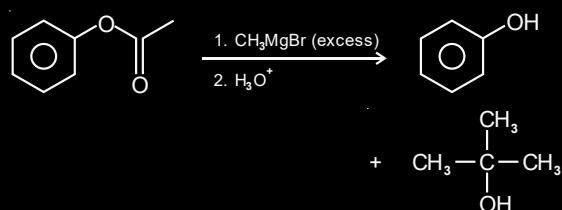
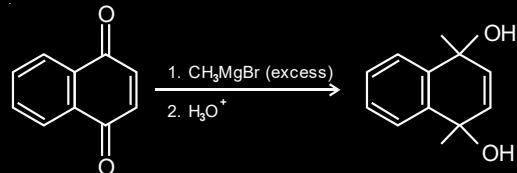
89. Answer (1)

Order of hydrolysis

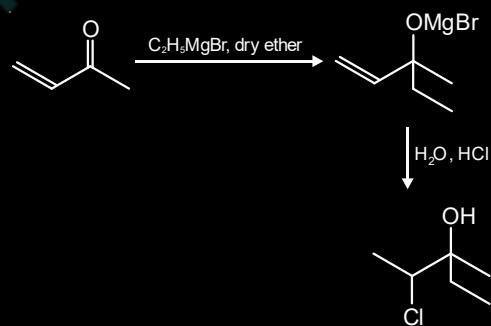


$-\text{NH}_2$  has greater denoting power than  $-\text{OR}'$  group making  $-\text{C}=\text{O}$  less electron deficient.

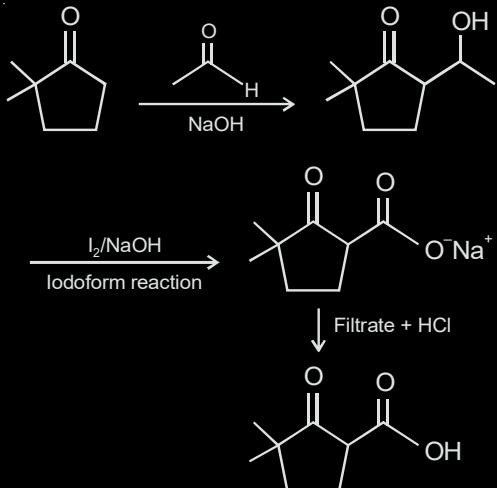
90. Answer (2)



91. Answer (3)

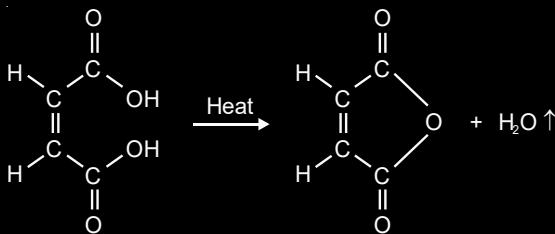


92. Answer (3)

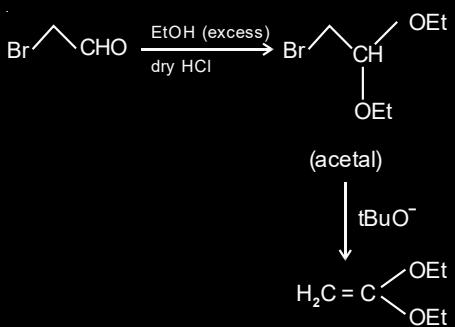


93. Answer (2)

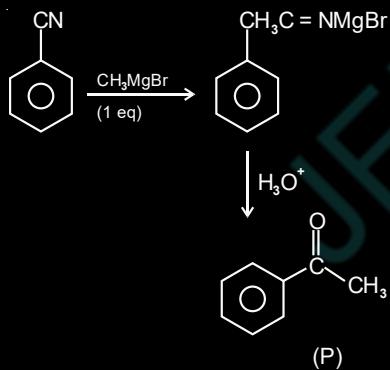
Maleic anhydride can be prepared by heating cis-but-2-enedioic acid



94. Answer (2)

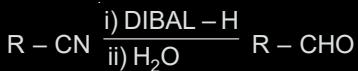


95. Answer (4)

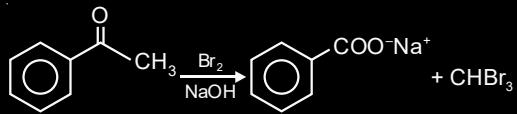


P can give Iodoform test

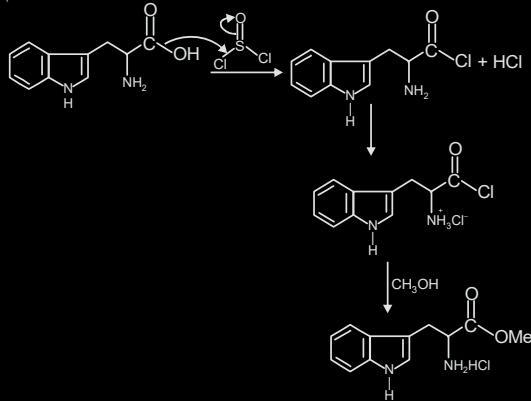
96. Answer (2)



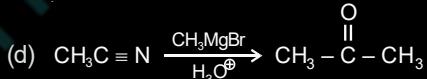
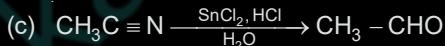
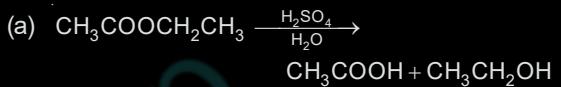
97. Answer (1)



98. Answer (3)



99. Answer (1)

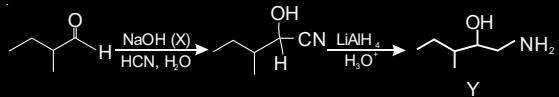


So, the correct match is

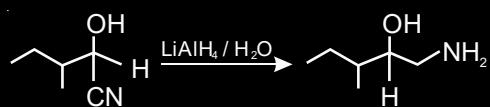
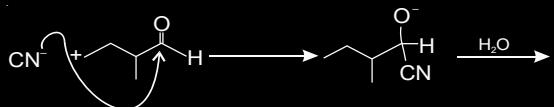
(a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

Cyanides can be converted to aldehydes by DIBAL-H/H<sub>2</sub>O as well.

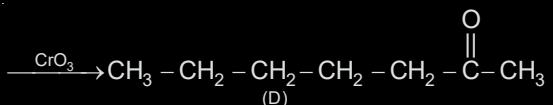
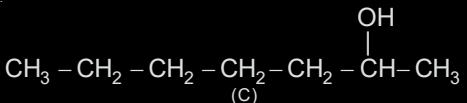
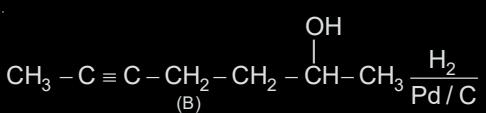
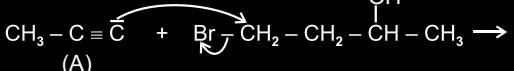
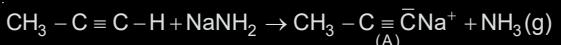
100. Answer (1)



Addition of HCN to aldehydes and ketones occurs slowly because HCN is weak electrolyte and does not produce enough CN<sup>-</sup> ion. A catalytic amount of base can fasten the reaction.



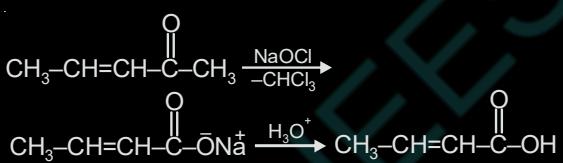
101. Answer (1)



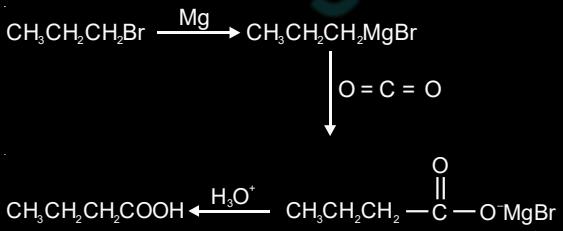
Note : The anion of (A) is a strong base and on its reaction with 4-bromobutan-2-ol, it is likely to pick up proton from alcohol. But looking at the options, nucleophilic substitution is considered to get (B).

102. Answer (2)

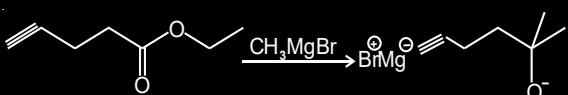
Aldehydes and ketones having 3  $\alpha$ -hydrogen atoms undergo haloform reaction with NaOCl. The carbonyl compound may or may not have a double bond.



103. Answer (3)



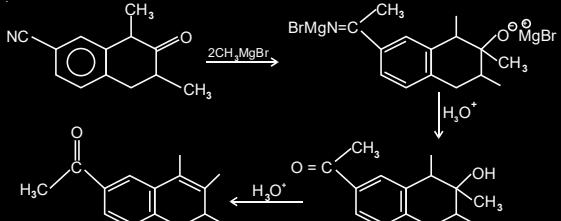
104. Answer (3)



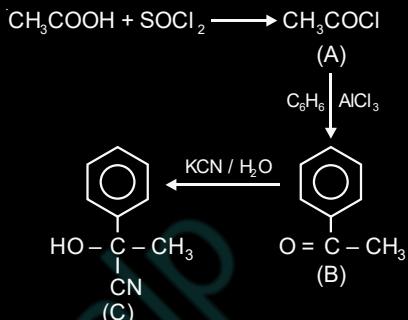
For 1 mole  $\rightarrow$  3 moles of  $\text{CH}_3\text{MgBr}$  is used.

(2 moles required for ester and 1 mole for acidic H of ethyne)

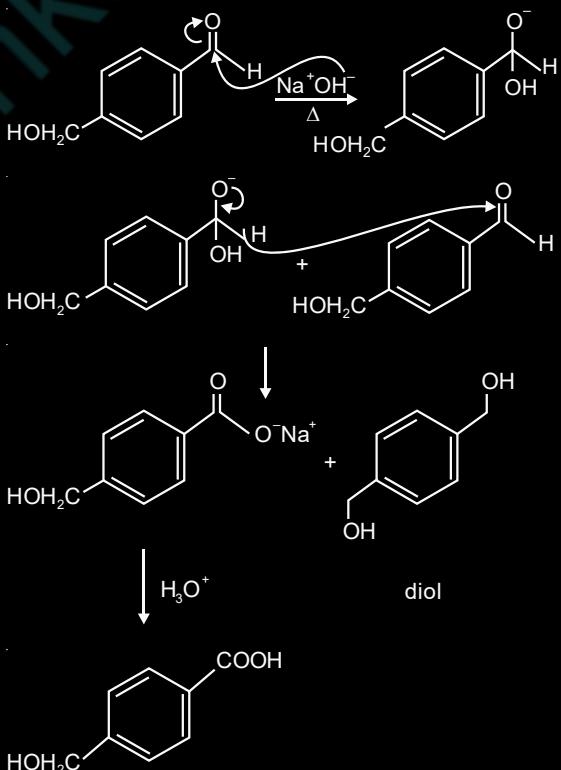
105. Answer (4)



106. Answer (4)



107. Answer (1)



108. Answer (4)

- Na in presence of  $\text{H}_2$ , will not release electron which are required for reduction.
- $\text{H}_2$  gas also not get adsorbed on Na. Hence  $\text{Na}/\text{H}_2$  cannot be used as a reducing agent

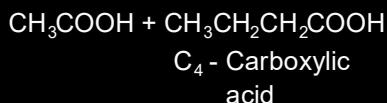
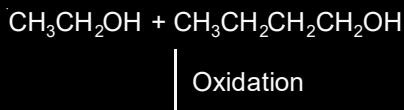
109. Answer (3)



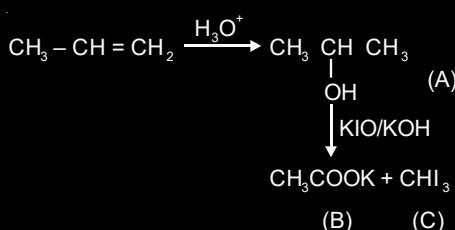
$$\therefore \frac{7.8}{\frac{56}{x}} \times 100 = 64$$

$$\frac{x}{74}$$

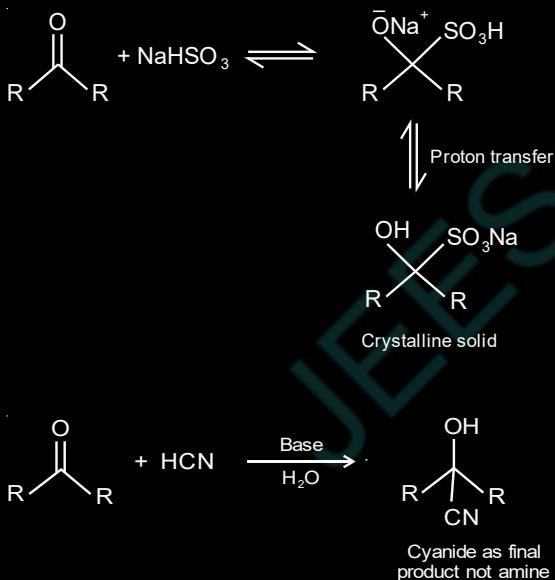
$$x \approx 16$$



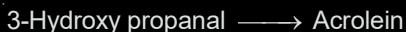
110. Answer (2)



111. Answer (1)



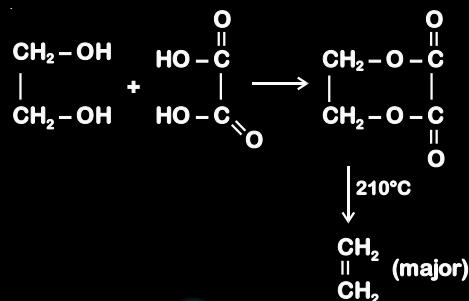
112. Answer (16)



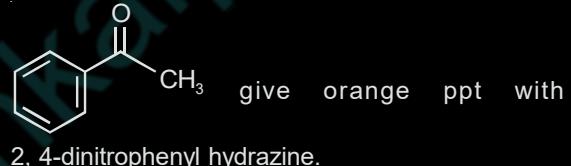
Let            x g                      7.8

$$\text{Moles of acrolein produced} = \frac{7.8}{56} \text{ moles}$$

113. Answer (2)



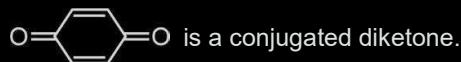
114. Answer (4)



115. Answer (1)

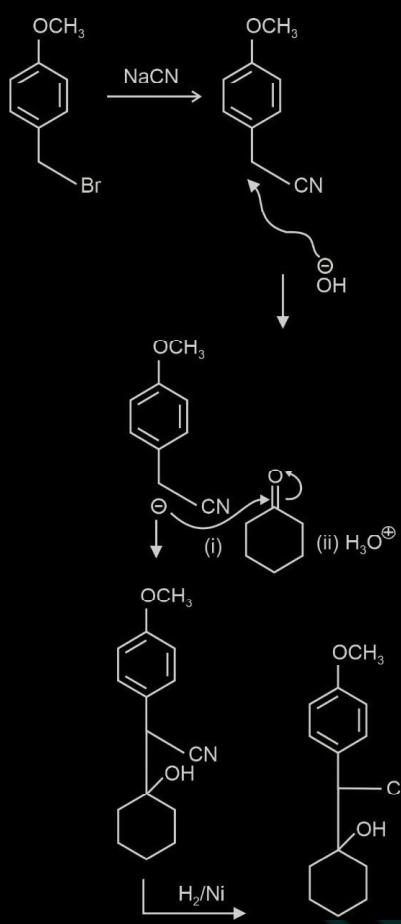
Statement (I) is correct as monocarboxylic acids with even number of carbon atoms show better packing efficiency in solid state, statement (II) is also correct as the solubility of carboxylic acids decreases with increase in molar mass due to increase in the hydrophobic portion with increase in the number of carbon atoms.

116. Answer (3)



In rest of the diketones given in the question, the two ( $\text{C}=\text{O}$ ) groups are not in conjugation with each other.

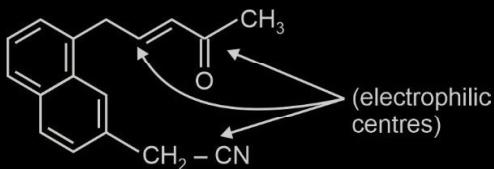
117. Answer (4)



Hence, the correct option is (4).

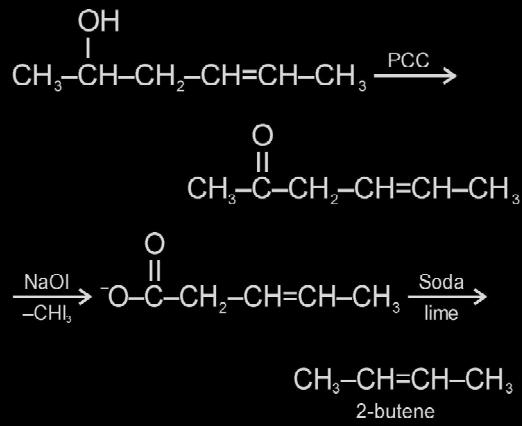
118. Answer (3)

Given compounds :

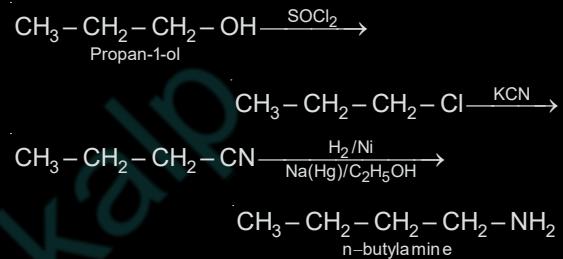


Number of electrophilic centres = 3

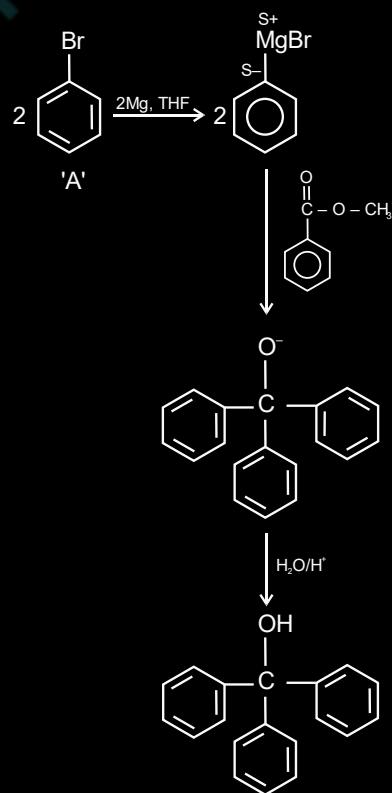
119. Answer (3)



120. Answer (1)



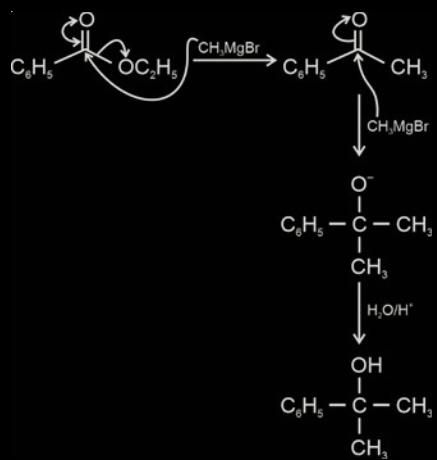
121. Answer (2)



Hence 'A' is bromobenzene.

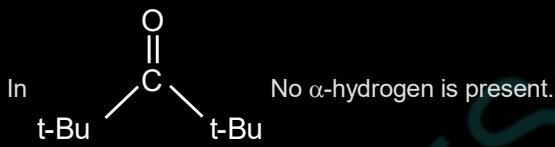
122. Answer (3)

C will not give acetophenone



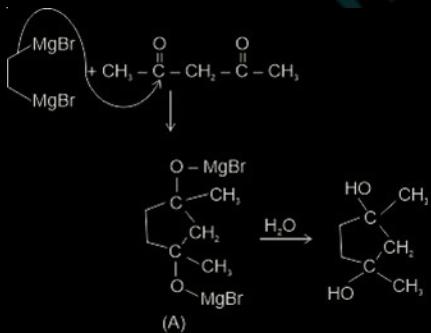
123. Answer (3)

In order to form enamine from the reaction of carbonyl compound with  $2^\circ$  amine, the carbonyl compound must have  $\alpha$ -hydrogen.

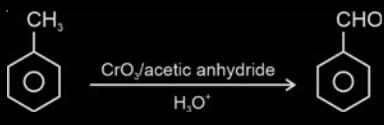


Along with this, due to steric **crowding** by t-Bu group, it is difficult for  $2^\circ$  amine to attack on this compound.

124. Answer (1)



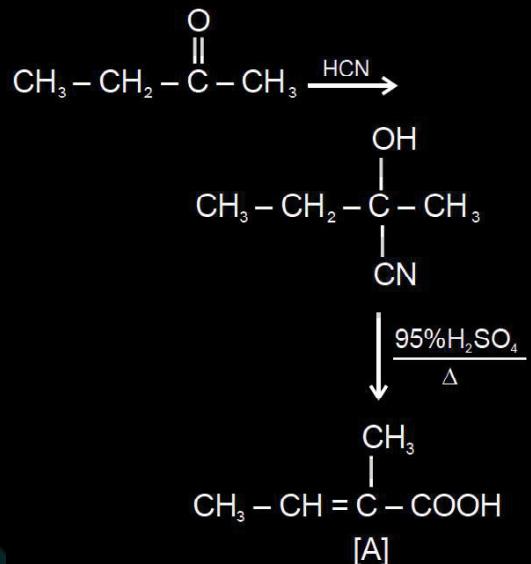
125. Answer (2)



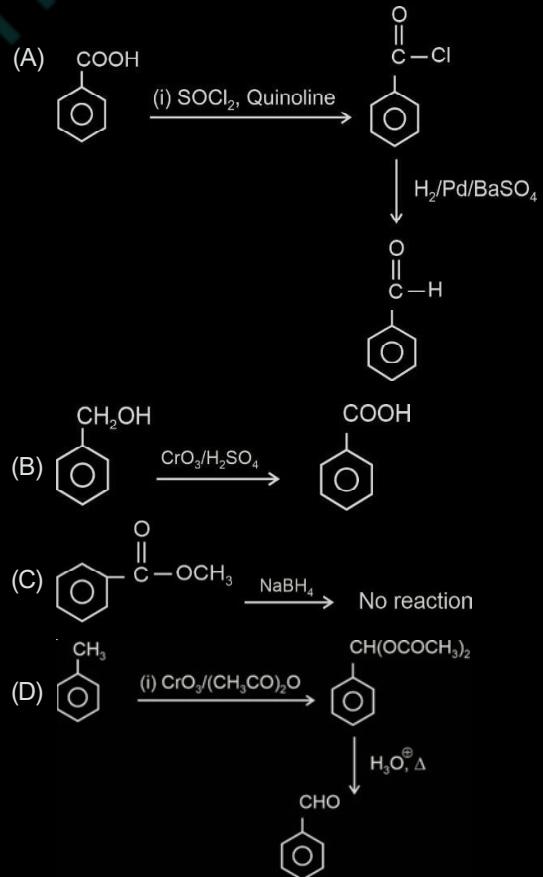
126. Answer (3)

Benzoic acid can be converted to benzaldehyde in presence of  $\text{MnO}_2$ .

127. Answer (1)

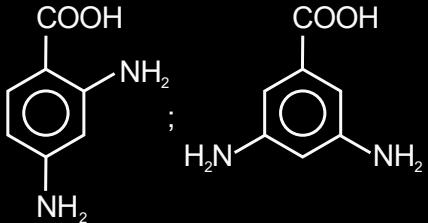


128. Answer (3)



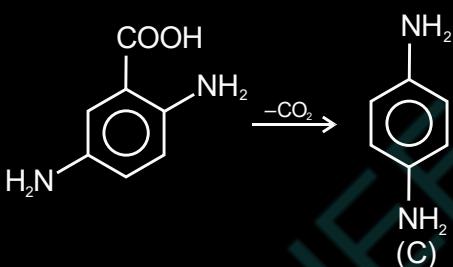
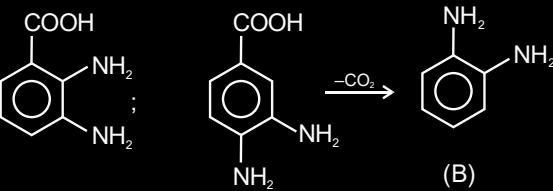
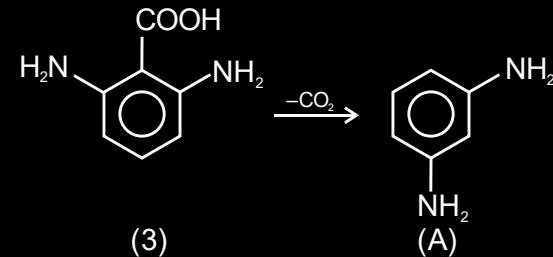
129. Answer (4)

The six possible forms of diaminobenzoic acid are



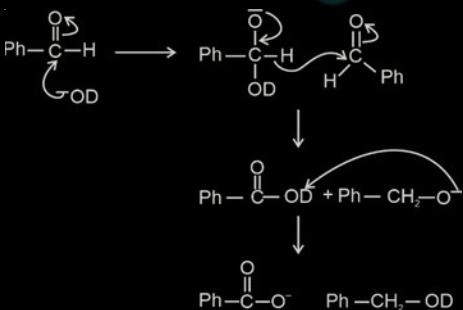
(1)

(2)

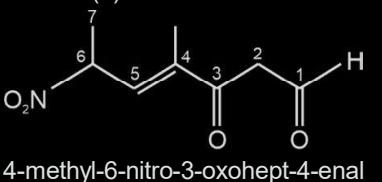


Melting point of product (C) = 142°C

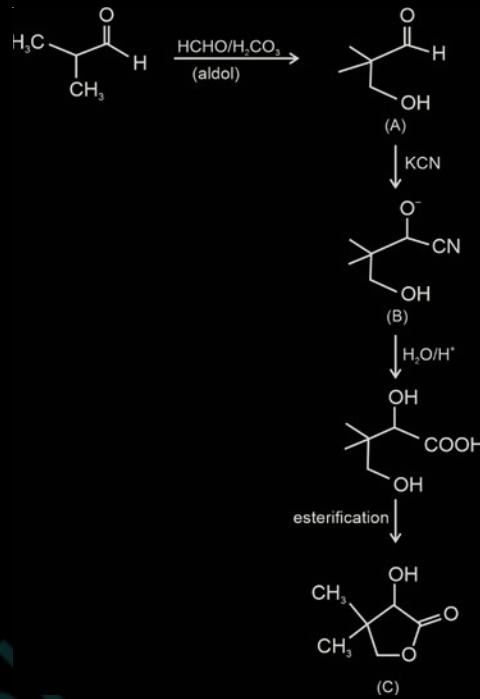
130. Answer (1)



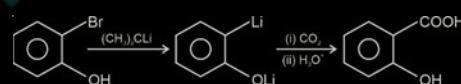
131. Answer (3)



132. Answer (3)



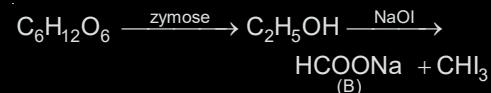
133. Answer (2)



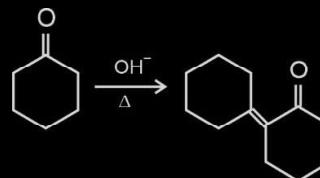
134. Answer (1)

Esterification of carboxylic acid with an alcohol is nucleophilic acyl substitution and presence of electron withdrawing group in the carboxylic acid increases the rate of esterification reaction.

135. Answer (1)

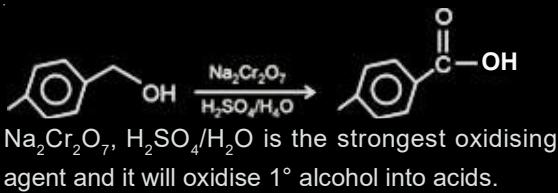


136. Answer (4)

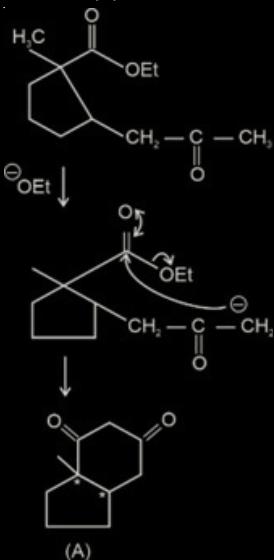


Total 4π electrons are there. Reaction is aldol condensation.

137. Answer (4)

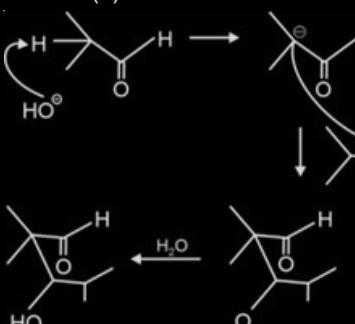


138. Answer (2)

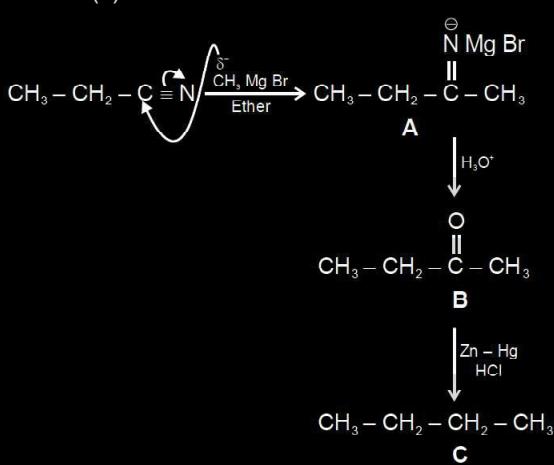


2 chiral carbons are there in product A.

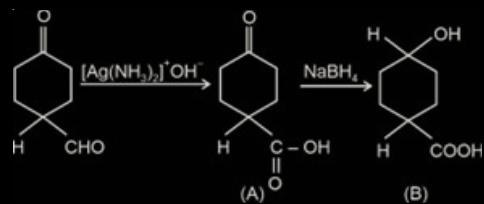
139. Answer (2)



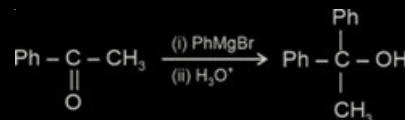
140. Answer (1)



141. Answer (3)

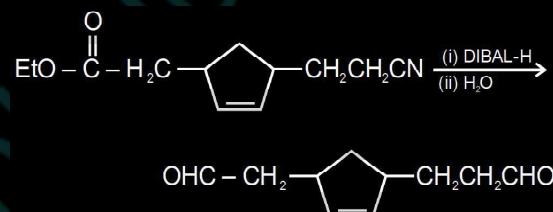


142. Answer (4)

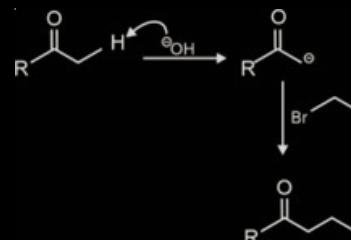


143. Answer (1)

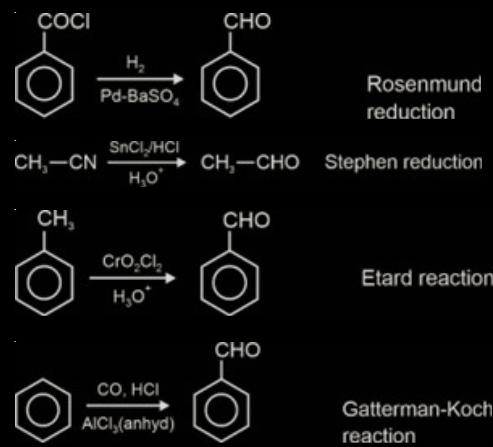
DIBAL-H reduces both the cyanides and esters to aldehydes.



144. Answer (3)



145. Answer (1)



## 146. Answer (02.00)

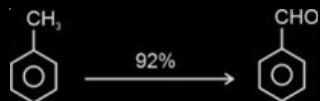
In the complex present in Fehling's reagent,  $\text{Cu}^{+2}$  ion is present.

So, spin only magnetic moment

$$= \sqrt{1(1+2)}$$

$$= \sqrt{3} \approx 2 \text{ B.M}$$

## 147. Answer (530)



$$\text{Moles} = \frac{5}{92}$$

Moles of benzaldehyde produced

$$= \frac{5}{92} \times 0.92 = 0.05$$

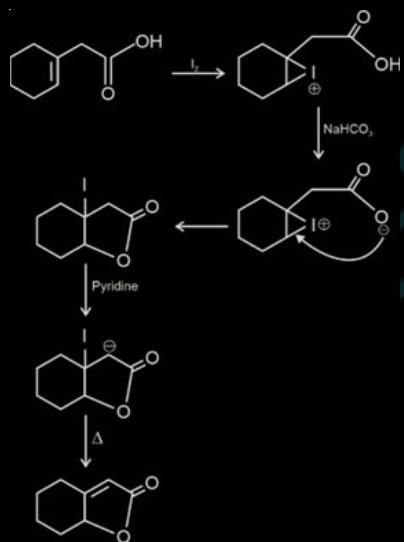
$\therefore$  Mass of benzaldehyde formed

$$= 0.05 \times 106$$

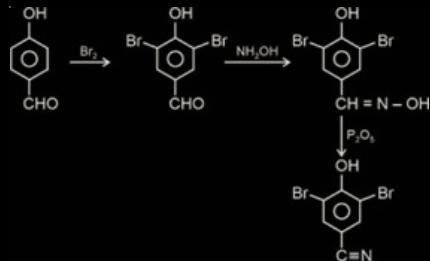
$$= 5.3 \text{ g}$$

$$= 530 \times 10^{-2}$$

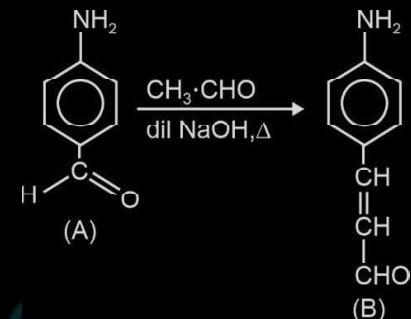
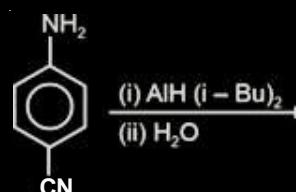
## 148. Answer (3)



## 149. Answer (4)

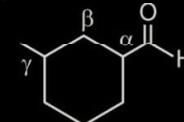


## 150. Answer (2)



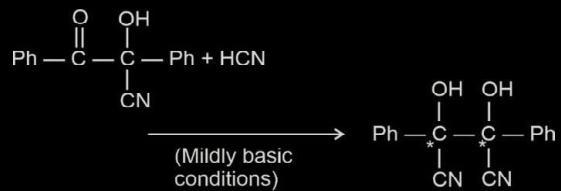
2nd reaction is the cross aldol reaction.

## 151. Answer (1)



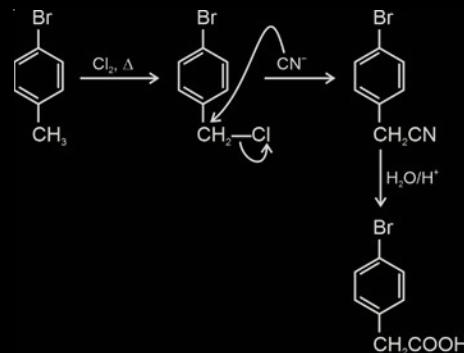
$\gamma$ -Methyl cyclohexane carbaldehyde

## 152. Answer (3)



Number of stereoisomers = 3

## 153. Answer (3)



4-bromophenyl acetic acid