

# Aldehydes, Ketones and Carboxylic Acids

1. A liquid was mixed with ethanol and a drop of concentrated  $H_2SO_4$  was added. A compound with a fruity smell was formed. The liquid was

[AIEEE-2009]

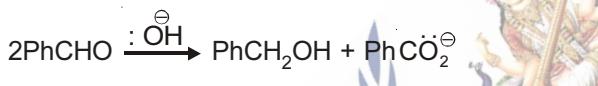
- (1)  $HCHO$
- (2)  $CH_3COCH_3$
- (3)  $CH_3COOH$
- (4)  $CH_3OH$

2. Which of the following on heating with aqueous KOH, produces acetaldehyde?

[AIEEE-2009]

- (1)  $CH_3CH_2Cl$
- (2)  $CH_2ClCH_2Cl$
- (3)  $CH_3CHCl_2$
- (4)  $CH_3COCl$

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  $PhCH_2OH$
- (4) The attack of  $:\ddot{O}H$  at the carboxyl group

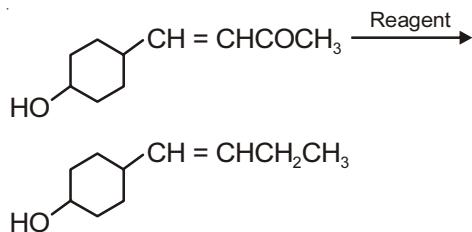
4. Ozonolysis of an organic compound 'A' produces acetone and propionaldehyde in equimolar mixture. Identify 'A' from the following compounds

[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]



- (1)  $Zn - Hg/HCl$
- (2)  $Na, Liq. NH_3$

- (3)  $NaBH_4$
- (4)  $NH_2NH_2, :\ddot{O}H$

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. An organic compound A upon reacting with  $NH_3$  gives B. On heating, B gives C. C in presence of KOH reacts with  $Br_2$  to give  $CH_3CH_2NH_2$ . A is

[JEE (Main)-2013]

- (1)  $CH_3COOH$
- (2)  $CH_3CH_2CH_2COOH$
- (3)  $\begin{matrix} CH_3 & - & CH & - & COOH \\ & | & & & \\ & CH_3 & & & \end{matrix}$
- (4)  $CH_3CH_2COOH$

8. The most suitable reagent for the conversion of  $R - CH_2 - OH \rightarrow R - CHO$  is

[JEE (Main)-2014]

- (1)  $KMnO_4$
- (2)  $K_2Cr_2O_7$
- (3)  $CrO_3$
- (4) PCC (Pyridinium Chlorochromate)

9. In the reaction,

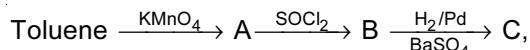


the product C is

[JEE (Main)-2014]

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

10. 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)  $\text{C}_6\text{H}_5\text{CHO}$

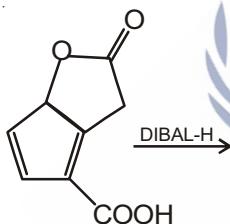
11. Which of the following, upon treatment with *tert*-BuONa followed by addition of bromine water, fails to decolorize the colour of bromine?

[JEE (Main)-2017]

- (1)      (2)   
 (3)      (4)

12. The major product obtained in the following reaction is

[JEE (Main)-2017]

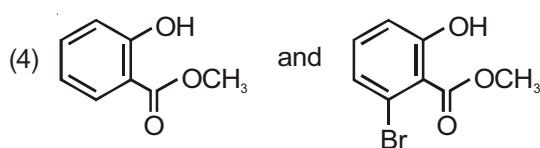
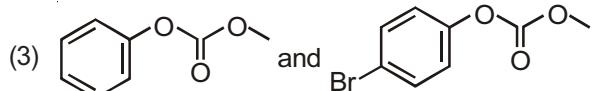


- (1)      (2)   
 (3)      (4)

13. Phenol reacts with methyl chloroformate in the presence of NaOH to form product A. A reacts with  $\text{Br}_2$  to form product B. A and B are respectively

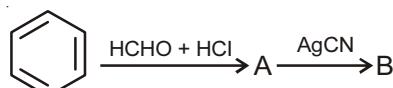
[JEE (Main)-2018]

- (1) and   
 (2) and



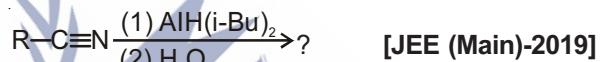
14. The compounds A and B in the following reaction are, respectively

[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

15. The major product of following reaction is



- (1)  $\text{RCH}_2\text{NH}_2$       (2)  $\text{RCHO}$   
 (3)  $\text{RCONH}_2$       (4)  $\text{RCOOH}$

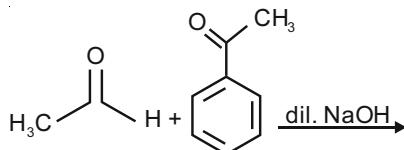
16. The correct match between Item I and Item II is

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

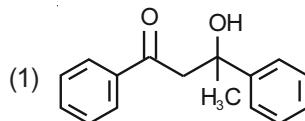
[JEE (Main)-2019]

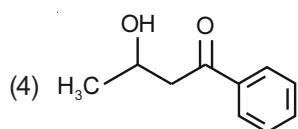
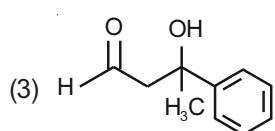
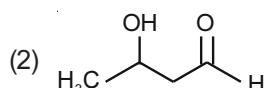
- (1) (A)  $\rightarrow$  (Q), (B)  $\rightarrow$  (R), (C)  $\rightarrow$  (P)  
 (2) (A)  $\rightarrow$  (Q), (B)  $\rightarrow$  (P), (C)  $\rightarrow$  (R)  
 (3) (A)  $\rightarrow$  (P), (B)  $\rightarrow$  (R), (C)  $\rightarrow$  (Q)  
 (4) (A)  $\rightarrow$  (R), (B)  $\rightarrow$  (Q), (C)  $\rightarrow$  (P)

17. The major product formed in the following reaction is

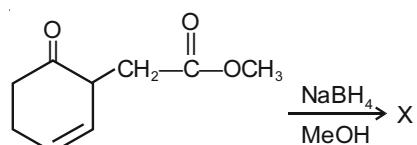


[JEE (Main)-2019]

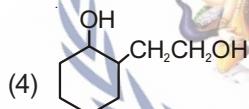
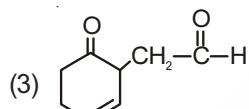
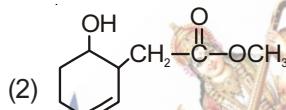
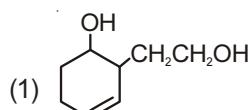




18. The major product 'X' formed in the following reaction is

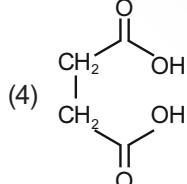
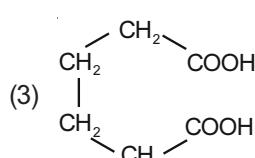
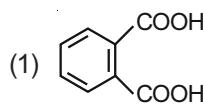


[JEE (Main)-2019]

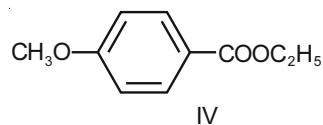
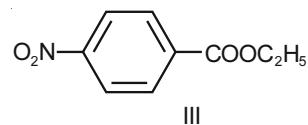
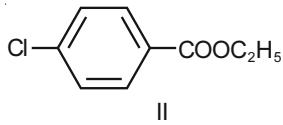
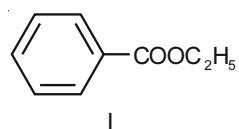


19. Which dicarboxylic acid in presence of a dehydrating agent is least reactive to give an anhydride?

[JEE (Main)-2019]



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



[JEE (Main)-2019]

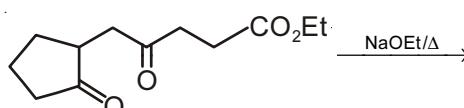
- (1) III > II > IV > I      (2) IV > II > III > I  
 (3) II > III > I > IV      (4) III > II > I > IV

21. 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

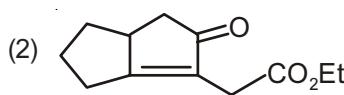
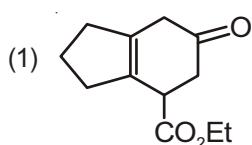
[JEE (Main)-2019]

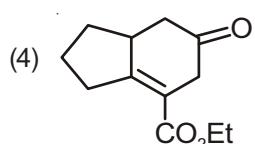
- (1)
- (2)
- (3)
- (4)

22. The major product obtained in the following reaction is

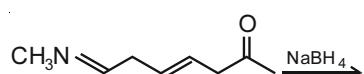


[JEE (Main)-2019]





23. The major product of the following reaction is



[JEE (Main)-2019]

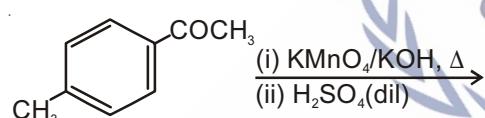
- (1)  $\text{CH}_3\text{N}=\text{CCCCCC(OH)}$

(2)  $\text{CH}_3\text{N}=\text{CC=CCCC(OH)}$

(3)  $\text{CH}_3\text{NH}-\text{CCCCCC}(=\text{O})$

(4)  $\text{CH}_3\text{NH}-\text{CC(=O)CCCCC(OH)}$

24. The major product of the following reaction is



[JEE (Main)-2019]

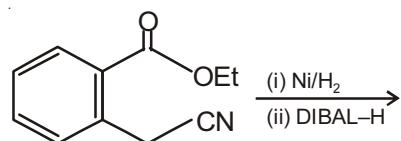
- (1) 

(2) 

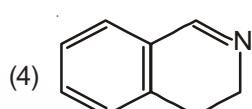
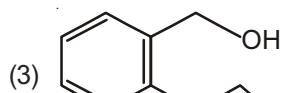
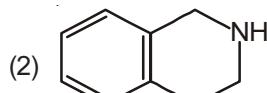
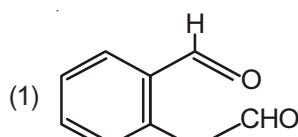
(3) 

(4) 

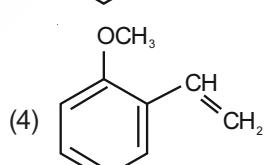
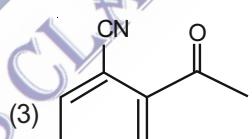
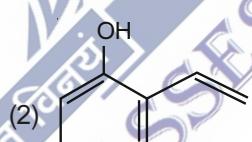
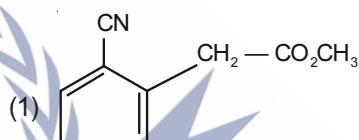
25. The major product of the following reaction is:



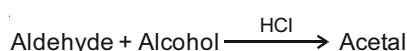
[JEE (Main)-2019]



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



27. In the following reaction



### Aldehyde

Alcohol

HCHO

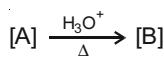
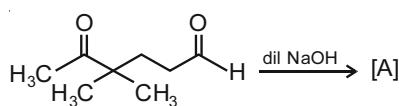
MeOH

The best combination is

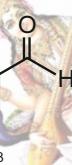
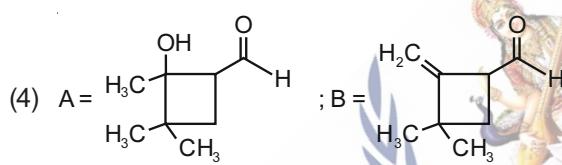
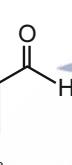
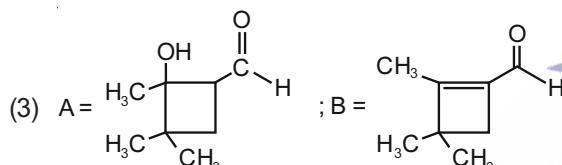
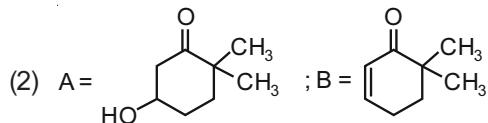
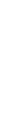
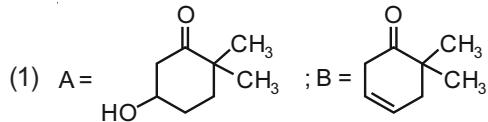
[JEE (Main)-2019]

- (1) HCHO and MeOH
  - (2) HCHO and  $t\text{BuOH}$
  - (3)  $\text{CH}_3\text{CHO}$  and  $t\text{BuOH}$
  - (4)  $\text{CH}_3\text{CHO}$  and MeOH

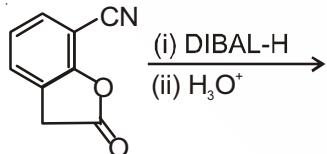
28. In the following reactions, products A and B are



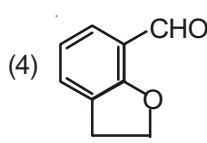
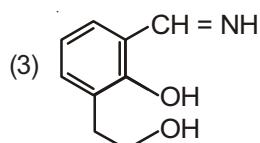
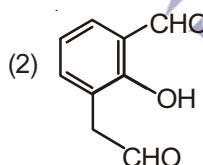
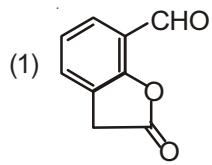
[JEE (Main)-2019]



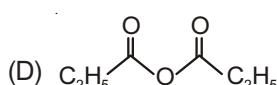
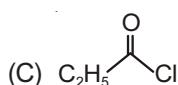
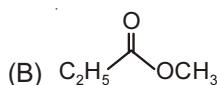
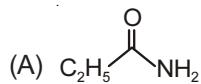
29. The major product of the following reaction



[JEE (Main)-2019]



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



[JEE (Main)-2019]

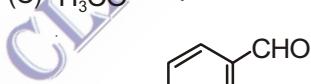
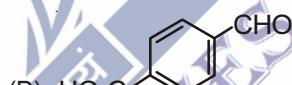
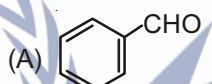
(1) (A) < (B) < (C) < (D)

(2) (B) < (A) < (D) < (C)

(3) (A) < (B) < (D) < (C)

(4) (B) < (A) < (C) < (D)

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



[JEE (Main)-2019]

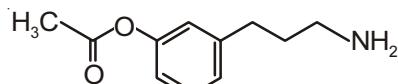
(1) (B), (C)

(2) (B), (D)

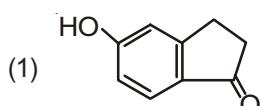
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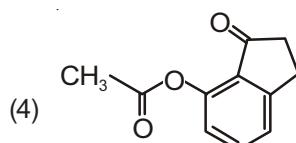
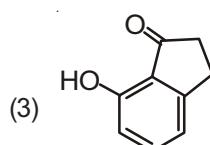
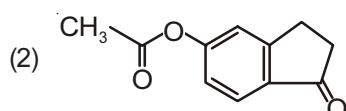
(4) (C), (D)

32. The major product of the following reaction is

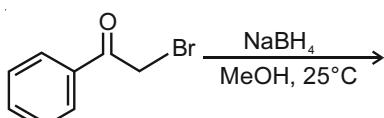


[JEE (Main)-2019]





33. The major product of the following reaction is



[JEE (Main)-2019]

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

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

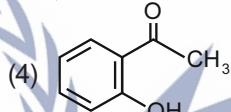
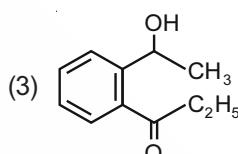
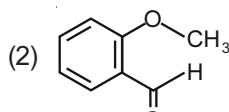
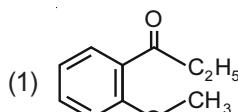
X	water	→ insoluble
	5% HCl	→ insoluble
	10% NaOH	→ soluble
	10% NaHCO <sub>3</sub>	→ insoluble

[JEE (Main)-2019]

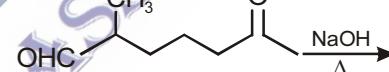
- (1) Benzamide  
 (2) Oleic acid  
 (3) o-Toluidine  
 (4) m-Cresol

35. 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]

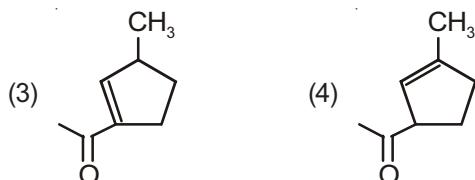


36. The major product obtained in the following reaction is



[JEE (Main)-2019]

- (1)
- (2)



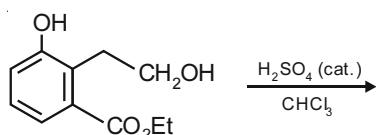
37. The major product of the following reaction is



[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

38. The major product of the following reaction is



[JEE (Main)-2019]

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

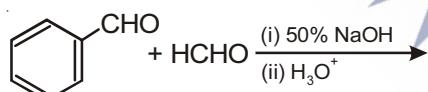
39. In the following reaction



Rate of the reaction is the highest for

[JEE (Main)-2019]

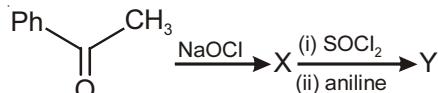
- (1) Acetone as substrate and methanol in excess  
 (2) Propanal as substrate and methanol in stoichiometric amount  
 (3) Propanal as substrate and methanol in excess  
 (4) Acetone as substrate and methanol in stoichiometric amount
40. Major products of the following reaction are :



[JEE (Main)-2019]

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

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



[JEE (Main)-2019]

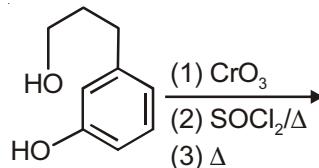
- (1)
- (2)
- (3)
- (4)

42. 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)

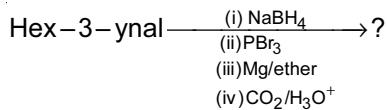
43. The major product of the following reaction is



[JEE (Main)-2019]

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

44. What is the product of following reaction?



[JEE (Main)-2020]

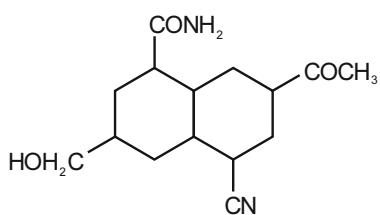
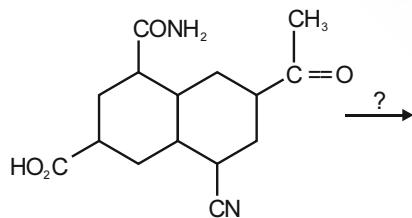
- (1)
- (2)
- (3)
- (4)

45. 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

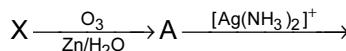
46. The most suitable reagent for the given conversion is



[JEE (Main)-2020]

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

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



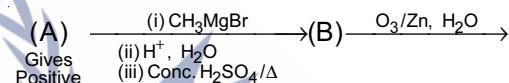
B(3-oxo-hexanedicarboxylic acid)

X will be

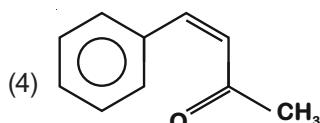
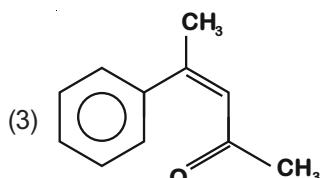
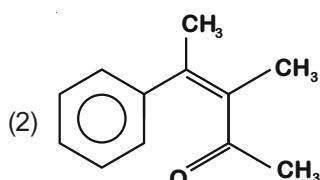
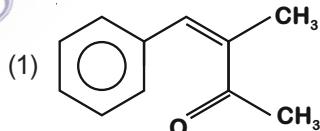
[JEE (Main)-2020]

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

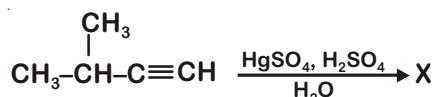
48. Identify (A) in the following reaction sequence.



[JEE (Main)-2020]

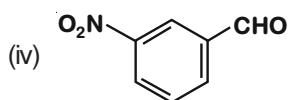
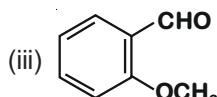


49. The major product (Y) in the following reaction is

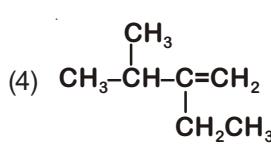
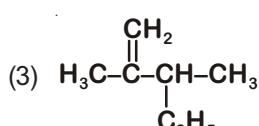
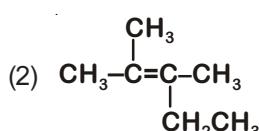
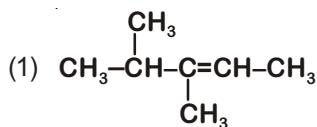


- (i)  $\text{C}_2\text{H}_5\text{MgBr}, \text{H}_2\text{O} \rightarrow Y$   
(ii) Conc.  $\text{H}_2\text{SO}_4/\Delta$

[JEE (Main)-2020]



[JEE (Main)-2020]



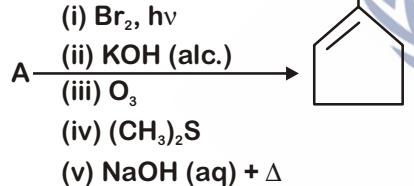
- (1) (iii) < (iv) < (ii) < (i)  
(2) (iii) < (i) < (iv) < (ii)  
(3) (iii) < (iv) < (i) < (ii)  
(4) (i) < (iii) < (iv) < (ii)

52. The increasing order of the reactivity of the following compounds in nucleophilic addition reaction is  
Propanal, Benzaldehyde, Propanone, Butanone

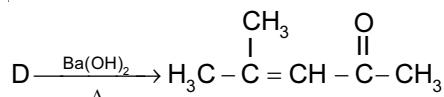
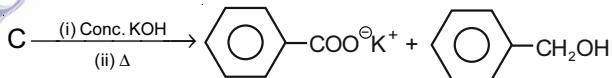
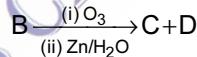
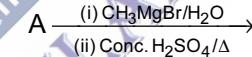
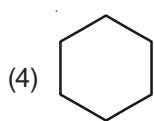
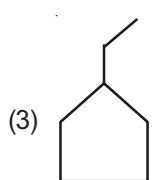
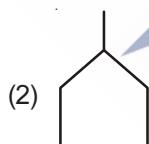
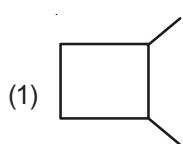
[JEE (Main)-2020]

- (1) Propanal < Propanone < Butanone < Benzaldehyde  
(2) Benzaldehyde < Propanal < Propanone < Butanone  
(3) Benzaldehyde < Butanone < Propanone < Propanal  
(4) Butanone < Propanone < Benzaldehyde < Propanal

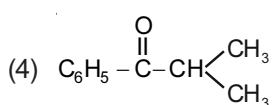
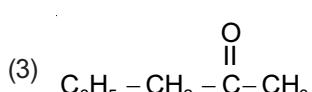
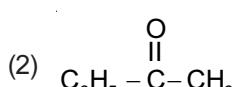
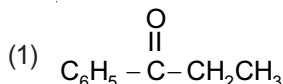
53. The compound A in the following reactions is



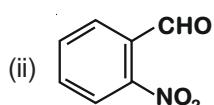
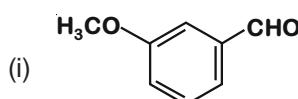
[JEE (Main)-2020]



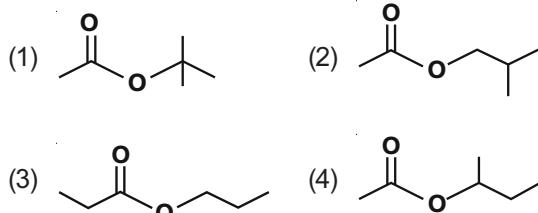
[JEE (Main)-2020]



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

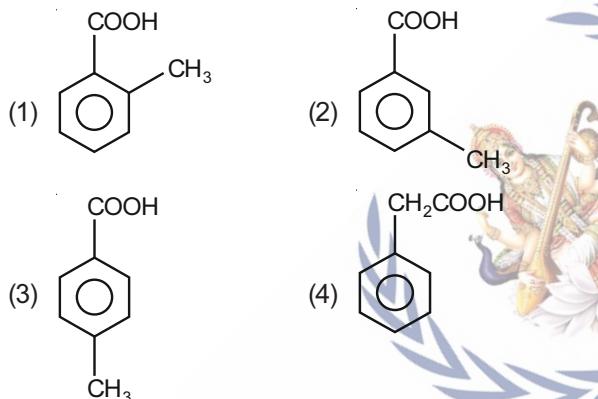


54. An organic compound (A) (molecular formula  $C_6H_{12}O_2$ ) was hydrolysed with dil.  $H_2SO_4$  to give a carboxylic acid (B) and an alcohol (C). 'C' gives white turbidity immediately when treated with anhydrous  $ZnCl_2$  and conc. HCl. The organic compound (A) is  
**[JEE (Main)-2020]**

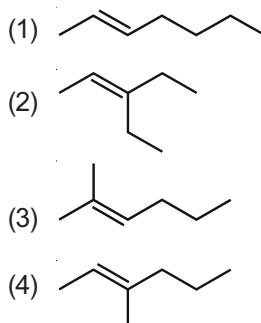
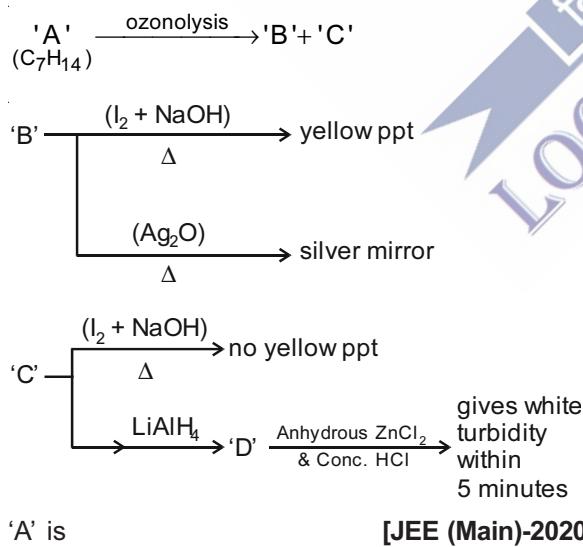


55. [P] on treatment with  $Br_2/FeBr_3$  in  $CCl_4$  produced a single isomer  $C_8H_7O_2Br$  while heating [P] with sodalime gave toluene. The compound [P] is

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



56. Consider the following reactions



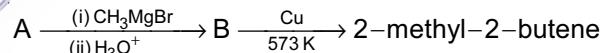
57. The correct match between Item-I (starting material) and Item-II (reagent) for the preparation of benzaldehyde is

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)

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



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

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

59. The number of chiral centres present in [B] is \_\_\_\_\_.

