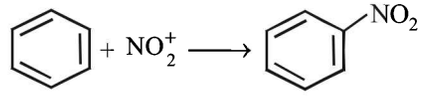
26 Aldehydes, Ketones and Carboxylic Acids

Conceptual MCQs

1. Which of the following is disproportionation reaction?

(a) $2HCHO \xrightarrow{NaOH} CH_3OH + HCOONa$

(b) $2CH_3CHO \xrightarrow{NaOH} CH_3CH(OH)CH_2CHO$

(c) 

(d) Both (a) & (b)

2. Ketones [$R-\overset{\overset{O}{\|}}{C}-R_1$, where $R = R_1$ = alkyl groups] can be obtained in one step by :

(a) oxidation of primary alcohols.
(b) hydrolysis of esters.
(c) oxidation of secondary alcohols.
(d) reaction of acid halides with alcohols.

3. Hydride ion transfer takes place in :

(a) Frankland method (b) Wurtz reaction
(c) Cannizzaro's reaction (d) Wolf-Kishner reduction

4. Calcium formate on distillation gives :

(a) HCOOH (b) CH_3COOH
(c) CH_5CHO (d) HCHO

5. The cyanohydrin of a compound on hydrolysis gives an optically active α-hydroxy acid. The compound is :

(a) diethyl ketone (b) formaldehyde
(c) acetaldehyde (d) acetone

6. Formalin is an aqueous solution of :

(a) fluorescein (b) formic acid
(c) formaldehyde (d) furfuraldehyde

7. The catalyst used in Rosenmund's reduction is :

(a) $HgSO_4$ (b) $Pd/BaSO_4$
(c) anhydrous $AlCl_3$ (d) anhydrous $ZnCl_2$

8. Acetaldehyde reacts with :

(a) electrophiles only.
(b) nucleophiles only.
(c) free radicals only.
(d) both electrophiles and nucleophiles.

9. Strongest acid among the following is :

(a) CF_3COOH (b) CBr_3COOH
(c) CH_3COOH (d) CCl_3COOH

10. Pinacolone is :

(a) 2, 3-dimethyl-2 3-butanediol
(b) 3, 3-dimethyl-2 butanone
(c) 1-phenyl-2propanone
(d) 1,1-diphenyl-2-ethandiol.

11. Which one of the following compounds will not react with CH_3MgBr?

(a) Ethyl acetate (b) Acetone
(c) Dimethyl ether (d) Ethanol

12. Appropriate reducing agent for the following conversion is–

$$CH_2=CH-CH_2-\overset{\overset{O}{\|}}{C}-H \longrightarrow CH_3-CH_2-CH_2-CH_2OH$$

(a) $LiAlH_4/H_2O$ (b) $NaBH_4/H_2O$
(c) $Na + C_2H_5OH$ (d) B_2H_6/H^+

13. In Cannizzaro reaction given below

$$2PhCHO \xrightarrow{:\bar{O}H} PhCH_2OH + PhC\ddot{O}_2^-$$

the slowest step is :

(a) the transfer of hydride to the carbonyl group
(b) the abstraction of proton from the carboxylic group
(c) the deprotonation of Ph CH_2OH
(d) the attack of : OH^- at the carboxyl group

14. Aldol condensation would not occur in :

(a) CH_3COCH_3 (b) CH_3CH_2CHO
(c) HCHO (d) CH_3CHO

15. Iodoform can be prepared from all except :

(a) Ethyl methyl ketone (b) Isopropyl alcohol
(c) 3-Methyl 2-butanone (d) Isobutyl alcohol

16. Cannizzaro reaction occurs with :

(a) CH_3-CH_2OH (b) C_6H_5CHO
(c) CH_3CHO (d) $CH_3-CO-CH_3$

17. In which of the following, the number of carbon atoms does not remain same when carboxylic acid is obtained by oxidation?

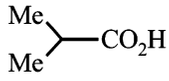
(a) CH_3COCH_3 (b) CCl_3CH_2CHO
(c) $CH_3CH_2CH_2OH$ (d) CH_3CH_2CHO

18. Which of the following compound will show positive silver mirror test ?

(a) HCOOH (b) $CH_3(CHOH)_3CHO$
(c) $CH_3CO(CHOH)CH_3$ (d) Both (a) and (b)

19. The correct order of increasing acid strength of the compounds

(A) CH_3CO_2H (B) $MeOCH_2CO_2H$

(C) CF_3CO_2H (D) 

is :

(a) D<A<B<C (b) A<D<B<C

(c) B<D<A<C (d) D<A<C<B

20. 2-pentanone and 3-pentanone can be distinguished by :

(a) Cannizaro's reaction (b) Aldol condensation

(c) Iodoform reaction (d) Clemmensen's reduction

Application Based MCQs

21. Which of the following statement is incorrect about the reaction of ammonia derivatives with carbonyl compounds?

(a) pH of solution is maintained between 4 to 5.

(b) Addition of ammonia derivatives occur followed by elimination of H_2O.

(c) At very low pH (less than 3) ammonia derivatives are protonated and do not act as nucleophile.

(d) At very high pH reaction becomes explosive.

22. Identify the product C in the series.

(a) CH_3COOH (b) CH_3CH_2NHOH

(c) CH_3CONH_2 (d) CH_3CHO

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

(a) 1 – Pentene

(b) 2 – Pentene

(c) 2 – Methyl – 2 – pentene

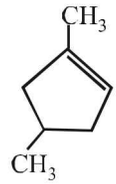
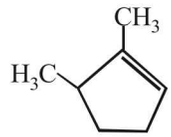
(d) 2 – Methyl – 1 – pentene

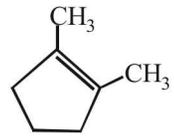
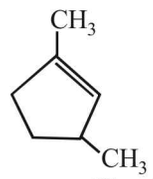
24. Benzaldehyde reacts with ethanoic KCN to give :

(a) $C_6H_5CHOHCN$ (b) $C_6H_5CHOHCOC_6H_5$

(c) $C_6H_5CHOHCOOH$ (d) $C_6H_5CHOHCHOHC_6H_5$

25. Which compound would give 5 - keto - 2 - methylhexanal upon ozonolysis ?

(a)  (b) 

(c)  (d) 

26. Aldehydes and ketones will not form crystalline derivatives with :

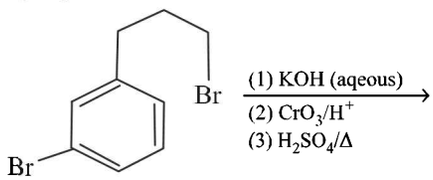
(a) sodium bisulphite

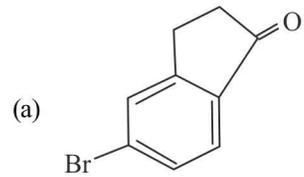
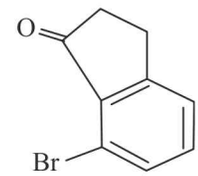
(b) phenylhydrazine

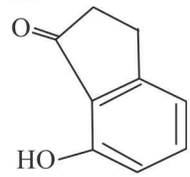
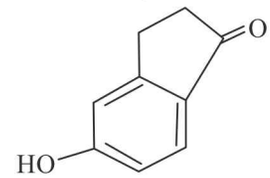
(c) semicarbazide hydrochloride

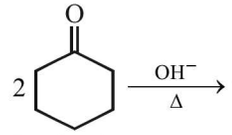
(d) dihydrogen sodium phosphate.

27. The major product of the following reaction is:

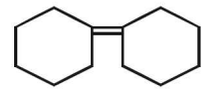
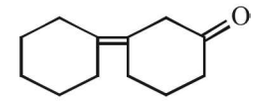


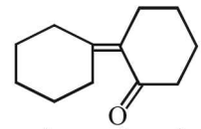
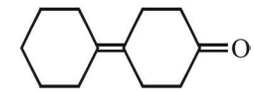
(a)  (b) 

(c)  (d) 

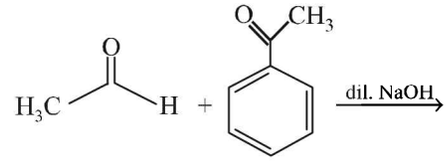
28. 

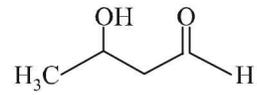
Product is :

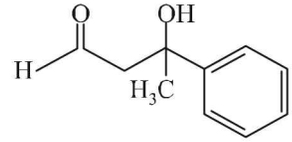
(a)  (b) 

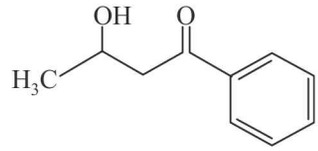
(c)  (d) 

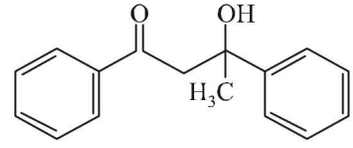
29. The major product formed in the following reaction is:



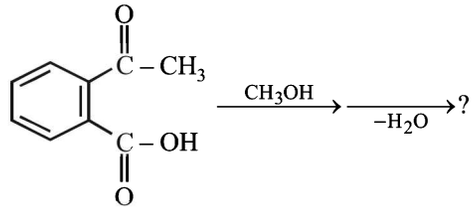
(a) 

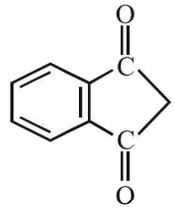
(b) 

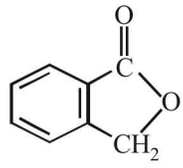
(c) 

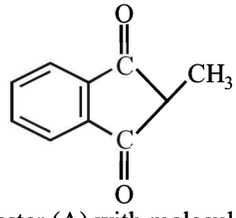
(d) 

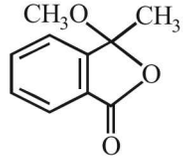
30. What is the final product of the following reaction ?



(a) 

(b) 

(c) 

(d) 

31. An ester (A) with molecular fomula, $C_9H_{10}O_2$ was treated with excess of CH_3MgBr and the complex so formed was treated with H_2SO_4 to give an olefin (B). Ozonolysis of (B) gave a ketone with molecular formula C_8H_8O which shows positive iodoform test. The structure of (A) is :

(a) $C_6H_5COOC_2H_5$

(b) $C_2H_5COOC_6H_5$

(c) $H_3COCH_2COC_6H_5$

(d) $p-H_3CO-C_6H_4-COCH_3$

32. Which of the following is an example of aldol condensation?

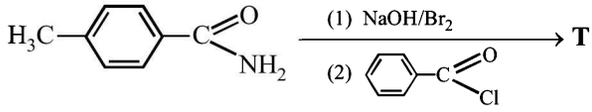
(a) $2CH_3COCH_3 \xrightarrow{\text{dil NaOH}} CH_3C(OH)CH_2COCH_3$

(b) $2HCHO \xrightarrow{\text{dil NaOH}} CH_3OH$

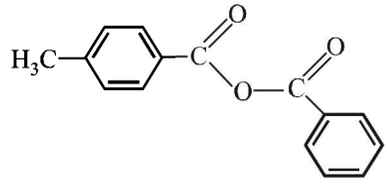
(c) $C_6H_5CHO + HCHO \xrightarrow{\text{dil NaOH}} C_6H_5CH_2OH$

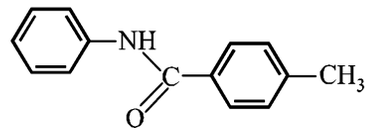
(d) None of the above

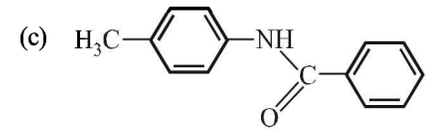
33. In the reaction

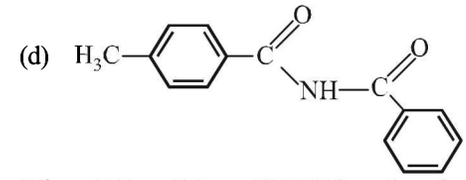


the structure of the product **T** is :

(a) 

(b) 

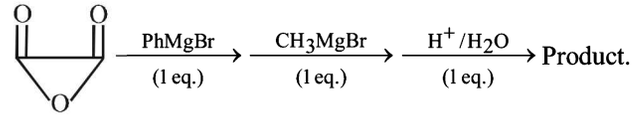
(c) 

(d) 

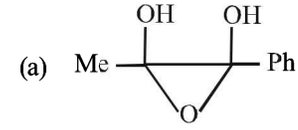
34. When $CH_2 = CH - COOH$ is reduced with $LiAlH_4$, the compound obtained will be

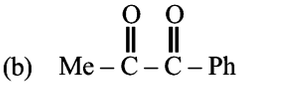
(a) $CH_2=CH-CH_2OH$ (b) $CH_3-CH_2-CH_2OH$

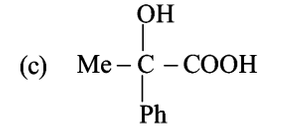
(c) CH_3-CH_2-CHO (d) CH_3-CH_2-COOH

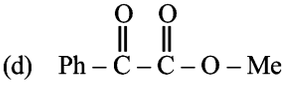
35. 

The product formed in the reaction is –

(a) 

(b) 

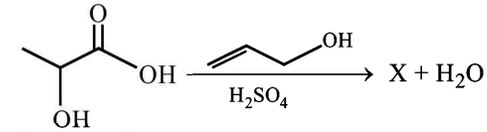
(c) 

(d) 

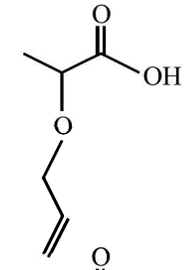
36. The strongest acid among the following is –

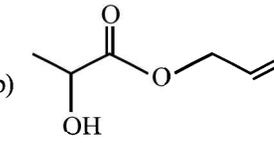
(a) Salicylic acid (b) *m*-hydroxybenzoic acid

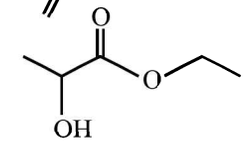
(c) *p*-hydroxybenzoic acid (d) Benzoic acid

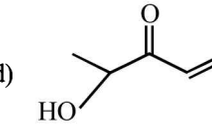
37. 

Product (X) of the reaction is–

(a) 

(b) 

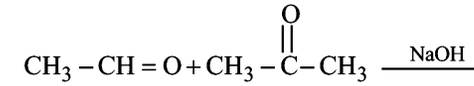
(c) 

(d) 

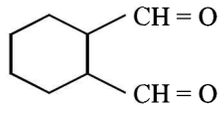
38. $CH_3COOH \xrightarrow{A} CH_3COCl$. What is A ?

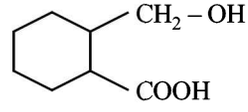
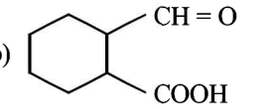
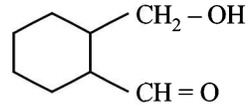
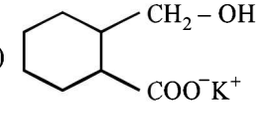
(a) PCl_5 (b) Cl_2 (c) HCl (d) $COCl_2$

39. How many cross aldol products (without counting stereoisomers) are produced in the following reaction?



(a) 5 (b) 2 (c) 3 (d) 1

40.  $\xrightarrow[\text{(ii) } H_2O/H^+]{\text{(i) KOH}/\Delta}$ [X]. What is [X]?

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

41. Order of hydrolysis for the following :

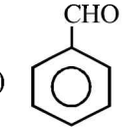
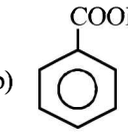
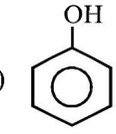
(I) RCOCl (II) RCOOR
(III) $RCONH_2$ (IV) $(RCO)_2O$
(a) I > IV > II > III (b) I > II > III > IV
(c) I > III > II > IV (d) IV > III > II > I

42. Which of the following compound will not give benzoic acid on oxidation with $KMnO_4/OH^-/\Delta$ –

(a) $C_6H_5-CH_3$ (b) $C_6H_5-C(CH_3)_3$
(c) $C_6H_5-CH(CH_3)_2$ (d) $C_6H_5-CH_2-COOH$

43.  $\xrightarrow[\text{(ii) } H_2O]{\text{(i) } CO_2}$ P

In the reaction, product P is :

(a) 
(b) 
(c) 
(d) $C_6H_5-\overset{\overset{O}{\|}}{C}-C_6H_5$

44. The reactivity of carbonyl compounds towards nucleophilic addition reaction increases by which factor?

(a) Magnitude of positive charge on carbonyl carbon atom
(b) Steric hindrance
(c) Presence of electron withdrawing groups surrounding carbonyl group
(d) Both (a) and (c)

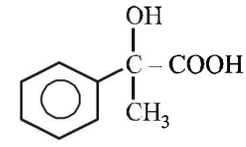
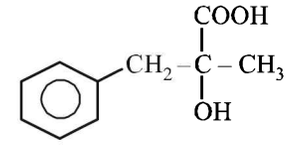
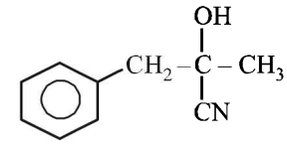
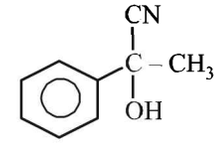
45. The increasing order of the rate of HCN addition to compound A – D is

(A) HCHO (B) CH_3COCH_3
(C) $PhCOCH_3$ (D) PhCOPh
(a) D < C < B < A (b) C < D < B < A
(c) A < B < C < D (d) D < B < C < A

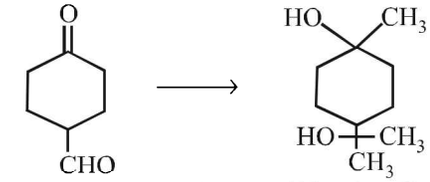
Skill Based MCQs

46. In a set of reactions acid yield a product D. Identify D :

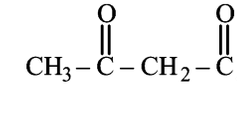
$CH_3COOH \xrightarrow{SOCl_2} A \xrightarrow[\text{Anhy. } AlCl_3]{\text{Benzene}} B \xrightarrow{HCN} C \xrightarrow{HOH} D$

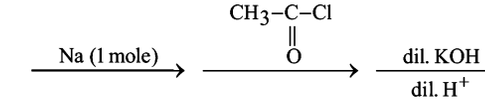
(a) 
(b) 
(c) 
(d) 

47. The correct sequence of reagents for the following conversion will be :



(a) $[Ag(NH_3)_2]^+OH^-$, H^+/CH_3OH, CH_3MgBr
(b) CH_3MgBr, H^+/CH_3OH, $[Ag(NH_3)_2]^+OH^-$
(c) CH_3MgBr, $[Ag(NH_3)_2]^+OH^-$, H^+/CH_3OH
(d) $[Ag(NH_3)_2]^+OH^-$, CH_3MgBr, H^+/CH_3OH

48. 



The final product is –

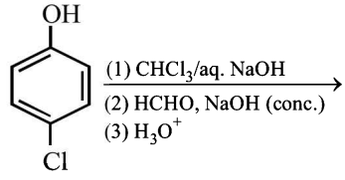
(a) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-\overset{\overset{O}{\|}}{C}-CH_3$

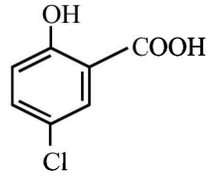
(b) $CH_3-\overset{\overset{O}{\|}}{C}-OH$

(c) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-COOH$

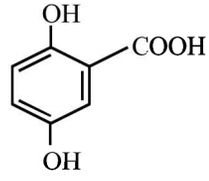
(d) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-\overset{\overset{O}{\|}}{C}-CH_3$

49. The major products of the following reaction are :

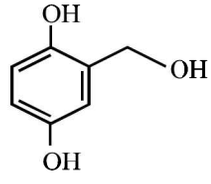


(a) 

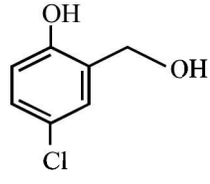
and Methanol

(b) 

and Methanol

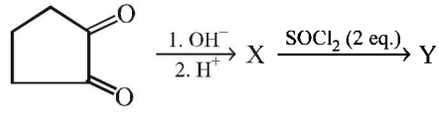
(c) 

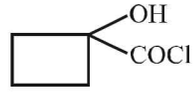
and Formic acid

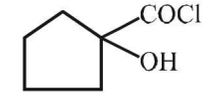
(d) 

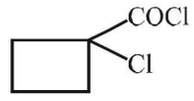
and Formic acid

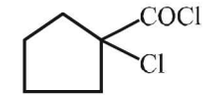
50. In the following sequence of reaction find the product Y:



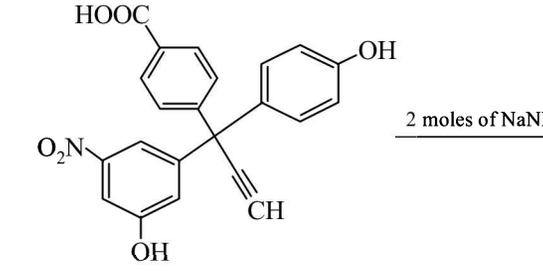
(a) 

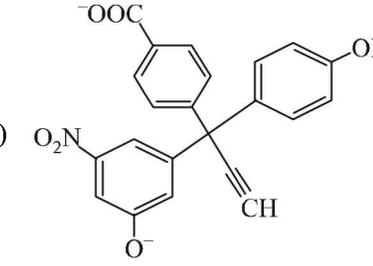
(b) 

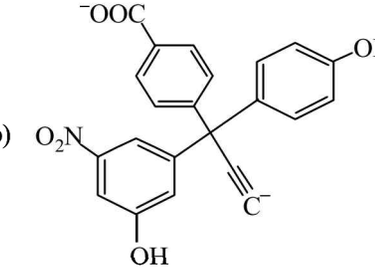
(c) 

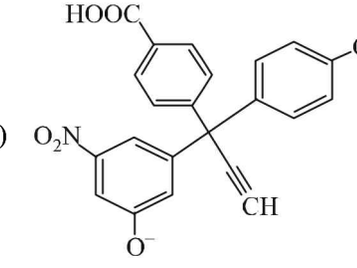
(d) 

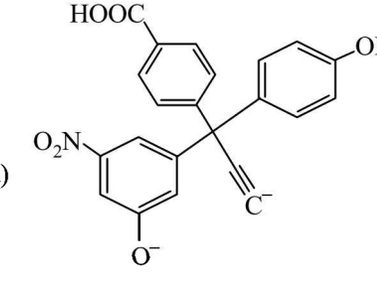
51. Identify the product in following reaction



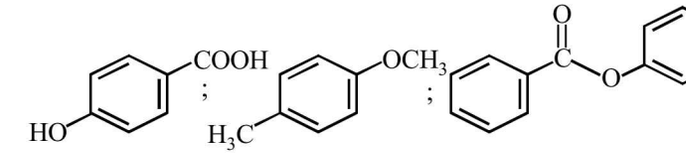
(a) 

(b) 

(c) 

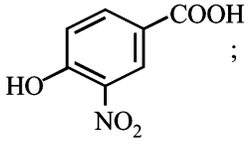
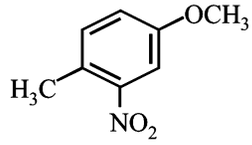
(d) 

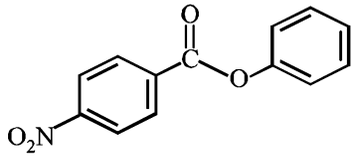
52. The compounds P, Q and S

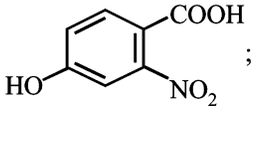
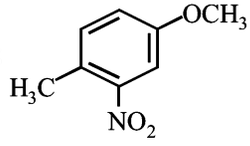


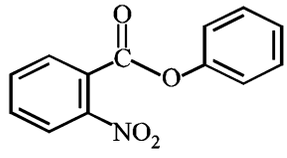
P Q S

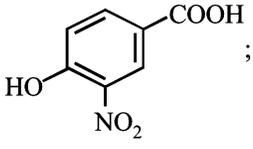
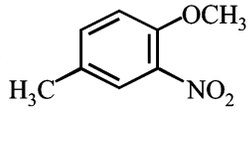
were separately subjected to nitration using HNO_3/H_2SO_4 mixture. The major product formed in each case respectively, is :

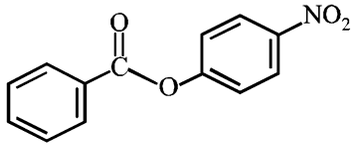
(a)  ;  ;

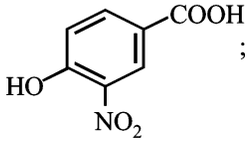
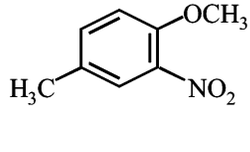


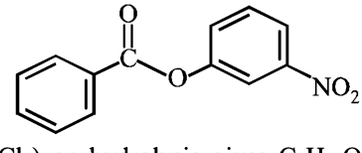
(b)  ;  ;



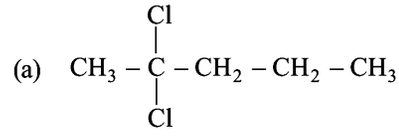
(c)  ;  ;

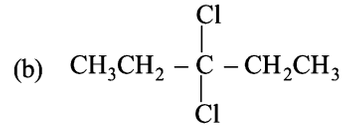


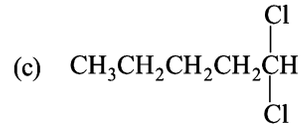
(d)  ;  ;

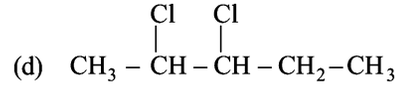


53. A compound A ($C_5H_{10}Cl_2$) on hydrolysis gives $C_5H_{10}O$ which reacts with NH_2OH and forms iodoform but does not give Fehling test. A is :

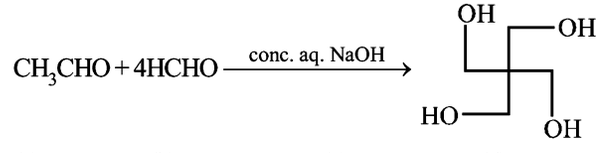
(a) 

(b) 

(c) 

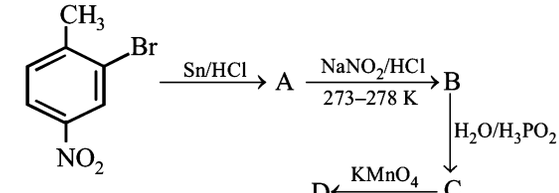
(d) 

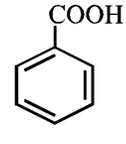
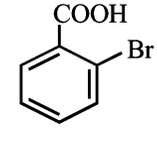
54. The number of aldol reaction(s) that occurs in the given transformation is :

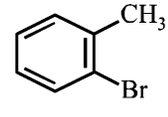
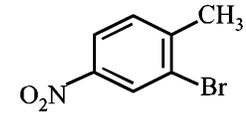


(a) 1 (b) 2 (c) 3 (d) 4

55. Identify the product (D) in the following sequence of reactions.



(a)  (b) 

(c)  (d) 

ANSWER KEY																			
Conceptual MCQs																			
1	(a)	**3**	(c)	**5**	(c)	**7**	(b)	**9**	(a)	**11**	(c)	**13**	(a)	**15**	(d)	**17**	(a)	**19**	(a)
2	(c)	**4**	(d)	**6**	(c)	**8**	(b)	**10**	(b)	**12**	(d)	**14**	(c)	**16**	(b)	**18**	(d)	**20**	(c)
Application Based MCQs																			
21	(d)	**24**	(b)	**27**	(a)	**30**	(d)	**33**	(c)	**36**	(a)	**39**	(b)	**42**	(b)	**45**	(a)		
22	(d)	**25**	(d)	**28**	(c)	**31**	(a)	**34**	(a)	**37**	(b)	**40**	(a)	**43**	(b)				
23	(c)	**26**	(d)	**29**	(c)	**32**	(a)	**35**	(c)	**38**	(a)	**41**	(a)	**44**	(d)				
Skill Based MCQs																			
46	(a)	**47**	(a)	**48**	(a)	**49**	(d)	**50**	(c)	**51**	(a)	**52**	(c)	**53**	(a)	**54**	(c)	**55**	(b)