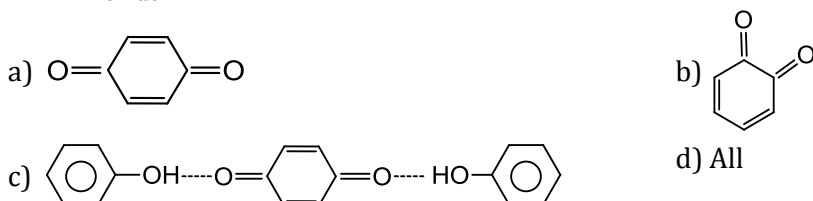


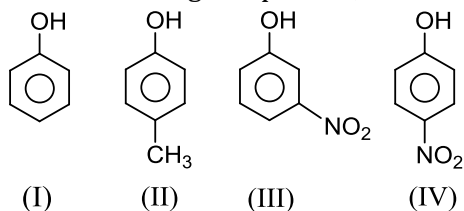
11. ALCOHOLS, PHENOLS AND ETHERS

Single Correct Answer Type

- HBr reacts fastest with:
 - 2-Methyl propan-2-ol
 - Propan-1-ol
 - Propan-2-ol
 - 2-Methyl propan-1-ol
- Diethyl ether on heating with cons. HI gives two moles of:
 - Ethanol
 - Iodoform
 - Ethyl iodide
 - Methyl iodide
- Phenol $\xrightarrow[\text{oxide}]{\text{Aerial}}$ coloured product. This is due to the formation of:



- The strongest acid among the following aromatic compound is:
 - o*-Nitrophenol
 - p*-Chlorophenol
 - p*-Nitrophenol
 - m*-Nitrophenol
- The crown-guest complex is called an inclusion compound. The crown ether allows the inorganic salt to dissolve in non-polar solvents. KMnO_4 forms a complex with crown ether. In this complex, the host is..... and the guest is.....
 - K^\oplus and crown ether
 - Crown ether and K^\oplus
 - MnO_4^\ominus and crown ether
 - Crown ether and MnO_4^\ominus
- In the following compounds,



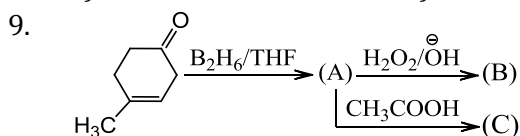
The order of acidity is:

- $\text{III} > \text{IV} > \text{I} > \text{II}$
- $\text{I} > \text{IV} > \text{III} > \text{II}$
- $\text{II} > \text{I} > \text{III} > \text{IV}$
- $\text{IV} > \text{III} > \text{I} > \text{II}$

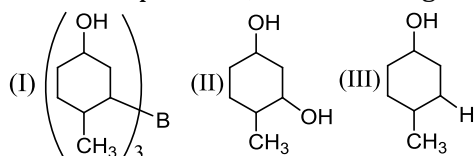
- $\text{CH}_3\text{CH}_2\text{OH} + \text{CH}_2\text{N}_2 \xrightarrow{\text{HBF}_4}$ Products
Which of the following statements is true about the above reaction?

- The product is $\text{CH}_3\text{CH}_2\text{OCH}_3$
 - the strong acid HBF_4 first protonates CH_2N_2 to give $\text{CH}_2\text{N}_2^\ominus$, from which N_2 (an extremely good leaving group) is displaced
 - $\text{CH}_3\text{CH}_2\text{OH}$ acts as a nucleophile
 - CH_2N_2 acts as a nucleophile
- i and ii
 - i, ii, and iii
 - i, ii, and iv
 - All

- The compound which reacts fastest with Lucas reagent at room temperature is:
 - Butan-2-ol
 - Butan-1-ol
 - 2-Methyl propan-1-ol
 - 2-Methyl propan-2-ol



Three compounds I, II and III are given

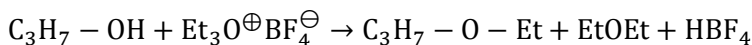


The compounds (A), (B) and (C), respectively, are:

- a) I, II, and III b) I, III, and II c) II, I and III d) II, III, and I
10. Benzene diazonium chloride on reaction with phenol in a basic medium gives:
 a) Diphenyl ether b) *p*-Hydroxy azobenzene
 c) Chlorobenzene d) Benzene
11. Which of the following alcohols has the highest boiling point?
 a) Methanol b) 2-Butanol c) 1-Butanol d) 2-Methyl-2-propanol
12. Which of the following is produced during the following reaction?

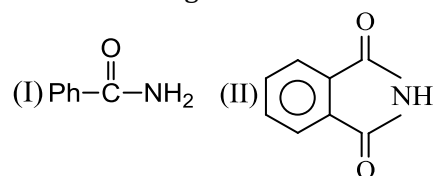
$$\text{CO(g)} + \text{H}_2\text{(g)} \xrightarrow[\text{ZnO, Cr}_2\text{O}_3]{575\text{K}} \dots \dots \dots ?$$
- a) Ethanol b) Ethanal c) Methanol d) Methanal

13. Consider the reaction



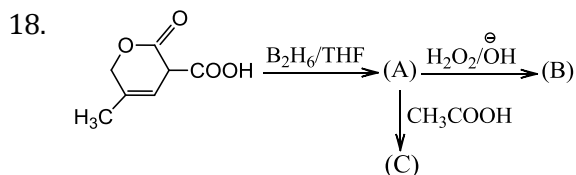
Which of the following statements is **wrong**?

- a) The nucleophile in the reaction is $\text{C}_3\text{H}_7\text{OH}$ b) The nucleophile in the reaction is BF_4^{\ominus}
 c) The leaving group is Et_2O d) S_N^2 reaction occurs
14. Which of the following reactions is possible?
 a) $\text{Me}_3\text{C} - \text{ONa} + \text{Me}_3\text{C} - \text{Br} \rightarrow \text{Me}_3\text{C} - \text{O} - \text{CMe}_3$
 b) $\text{Me}_2\text{CH} - \text{ONa} + \text{Me}_2\text{CHBr} \rightarrow \text{Me}_2\text{CH} - \text{O} - \text{CHMe}_2$
 c) $\text{PhONa} + \text{PhBr} \rightarrow \text{PhOPh}$
 d) $\text{PhONa} + \text{CH}_3\text{Br} \rightarrow \text{PhOCH}_3$
15. Which of the following ethers is present in clove oil?
 a) Anethole b) Eugenol c) Vanillin d) Thymol
16. The decreasing order of acidic character of the following is:

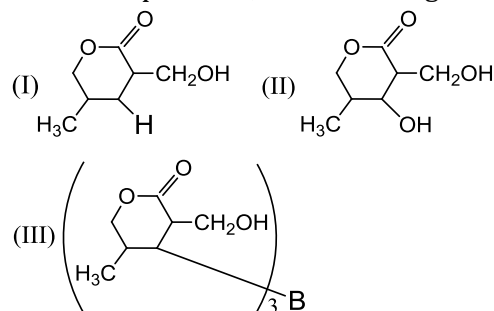


(III) PhNH_2

- a) $\text{II} > \text{I} > \text{III}$ b) $\text{III} > \text{I} > \text{II}$ c) $\text{II} > \text{III} > \text{I}$ d) $\text{I} > \text{III} > \text{II}$
17. When propanol is heated with Al_2O_3 at 380°C (633 K), the product obtained is:
 a) Dipropyl ether b) Propene c) Ethene d) Diethyl ether



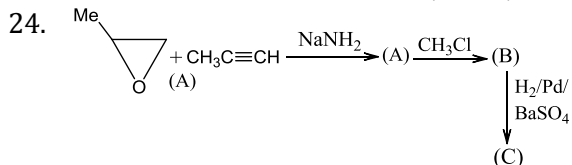
Three compounds I, II and III are given



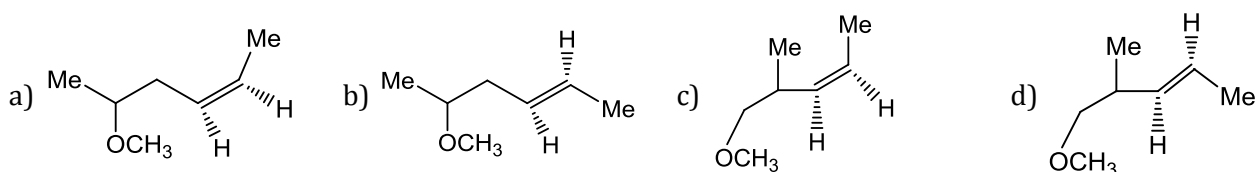
The compounds (A), (B), and (C), respectively, are:

- a) I, II, and III b) I, III, and II c) III, II, and I d) III, I, and II
19. Amongst the following phenols which one is most acidic?
 a) Picric acid b) 2-Nitrophenol c) 2,4-Dinitrophenol d) *m*-Nitrophenol

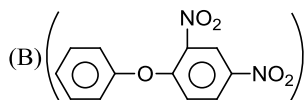
20. Which among the following compounds will not give effervescence with sodium bicarbonate?
 a) $C_6H_5CO_2H$ b) $C_6H_5SO_3H$ c) C_6H_5OH d) Picric acid
21. An organic compound (A) with molecular formula C_7H_8O dissolves in NaOH and gives characteristic colour with $FeCl_3$. On treatment with Br_2 , it gives a tribromo product $C_7H_5OBr_3$. The compound is:
 a) *p*-Hydroxybenzene b) 2-Methoxy-2-phenyl propane
 c) *m*-Cresol d) *p*-Cresol
22. Rubbing alcohol, used for rubdowns, on its evaporation reduces fever. It is cheaper and has replaced ethanol for this purpose. Its name is:
 a) Methanol b) Ethanol c) Amyl alcohol d) Isopropyl alcohol
23. Power alcohol is:
 a) Absolute alcohol :Petrol (20:80) b) Absolute alcohol :Petrol (80:20)
 c) Rectified spirit : Benzene (20:80) d) Rectified spirit : Benzene (80:20)



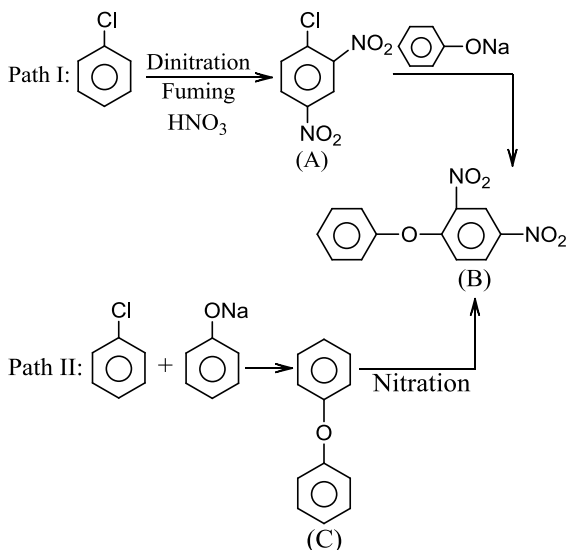
The product (C) is:



25. A compound (A) has a molecular formula C_2Cl_3OH . It reduces Fehling's solution and on oxidation gives a monocarboxylic acid (B). It can be obtained by the action of chlorine on ethyl alcohol, (A) is:
 a) Methyl chloride b) Monochloroacetic acid
 c) Chloral d) Chloroform
26. Which of the following alcohols is expected to give haloform test?
 a) 1-pentanol b) 3-pentanol c) 2-propanol d) None of above
27. Which statement is correct for the conversion of ROH to RX by reagents (A) ($SOCl_2$, PBr_3 , PCl_3 , PI_3 and $TsCl$) compared to using HX?
 a) No rearrangement occurs with predictable stereochemistry by reagents(A)
 b) Reagents (A) are not useful for 3° alcohols, while HX reacts easily with 3° alcohols involving no rearrangement
 c) Reagents (A) must be used in anhydrous conditions because all react vigorously with H_2O and they produce harmful gases (SO_2 , HCl, HBr, and HI)
 d) All
28. Absolute alcohols (100% ethanol) are prepared from rectified spirit (95% ethanol) by mixing a suitable amount of and subjected to fractional distillation (azeotropic distillation)
 a) Toluene b) *o*-Xylene c) Methanol d) Benzene
29. Which of the following will react fastest with Lucas reagent?
 a) Butan-1-ol b) Butan-2-ol
 c) 2-Methyl propane-2-ol d) 2-Methyl propane
30. Grain alcohol, a product of yeast fermentation of sugars in grains and fruits, is:
 a) Ethanol b) 1-Butanol c) 2-Methyl-1-propanol d) Methanol
31. There are two paths (I and II) for the preparation of phenyl-2,4-dinitro phenyl ether



Which of the following statements is true?



Which of the following statements is true?

Path I is feasible, whereas path II is not

Path II is feasible, whereas path I is not

iii. The Cl of (A) undergoes SN reaction because it is activated by the two EWG(-NO₂) groups

iv. The nitration of (C) does not give (B) but it gives because the first nitro group is deactivating, so the second nitro group enters the other ring

a) i

b) ii

c) i, iii, iv

d) i and iv

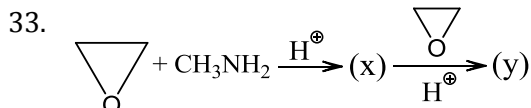
32. Which of the following is most basic in character?

a) H₂O

b) CH₃CH₂OH

c) CH₃OCH₃

d) C₆H₅OH



The product (x) and (y) are:

x = HOCH₂ - CH₂ - NH - CH₃

a) y = HOH₂C - CH₂ - N - CH₂CH₂OH

|
CH₃

b) x = HOCH₂ - CH₂ - CH₂ - NH₂

y = HOH₂C - CH₂ - CH₂ - NH - CH₂ - CH₂OH

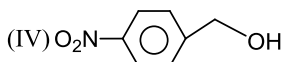
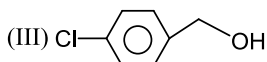
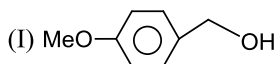
c) x = HOCH₂ - CH₂ - NH - CH₃

y = HOCH₂ - CH₂ - CH₂ - NH - CH₂ - CH₂OH

x = HO - CH₂ - CH₂ - CH₂NH₂

d) y = HO-CH₂-CH₂-N(CH₃)-CH₂CH₂OH

34. Give the decreasing order of the reaction rates of the following benzyl with HBr



- a) I > II > III > IV b) IV > III > II > I c) II > I > III > IV d) IV > III > I > II

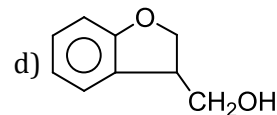
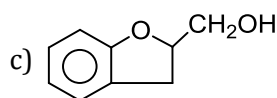
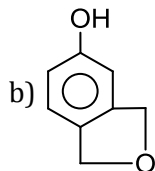
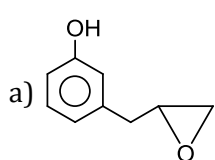
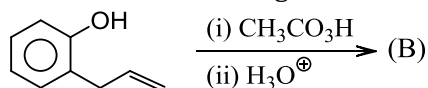
35. The crown ethers are heterocyclic polyethers, usually with at least four oxygen atoms. The 12-crown-4 ether contains.....carbon atoms

- a) 12 b) 4 c) 8 d) 16

36. When benzene sulphonic acid and *p*-nitrophenol are treated with NaHCO₃, the gases released respectively are

- a) SO₂, NO₂ b) SO₂, NO c) SO₂, CO₂ d) CO₂, CO₂

37. Consider the following reaction and identify (B)



38. Diethylene glycol is obtained by heating glycol with:

- a) Conc. H₂SO₄ b) Conc. H₃PO₄ c) Aq. KOH d) Conc. HNO₃

39. The best method to prepare cyclohexene from cyclohexanol is by using

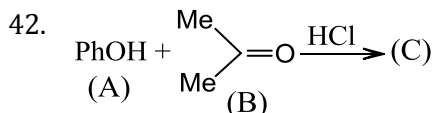
- a) Conc. HCl + ZnCl₂ b) Conc. H₃PO₄ c) HBr d) Conc. HCl

40. Hydrogen bonding is maximum in:

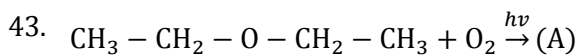
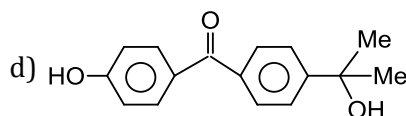
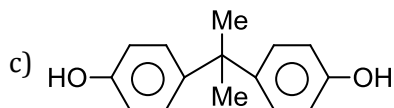
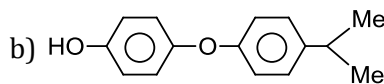
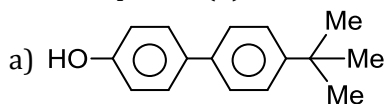
- a) Ethanol b) Diethyl ether c) Ethyl chloride d) Triethyl amine

41. Wine with 24 proof is.....by volume of alcohol

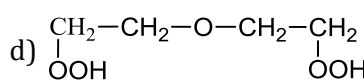
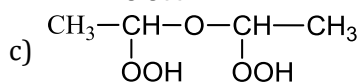
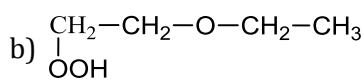
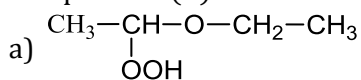
- a) 12% b) 24% c) 48% d) 6%



The compound (C) is:



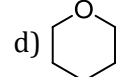
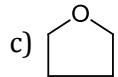
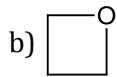
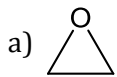
The product (A) is:



44. When ethanol is heated with conc. H₂SO₄ at 140°C(413K), the product obtained as:

- a) Diethyl sulphate b) Ethene c) Diethyl ether d) All

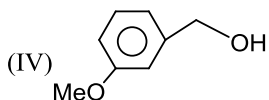
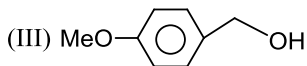
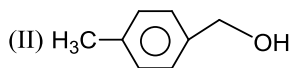
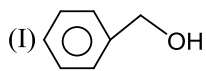
45. Which of the following is oxetene?



46. When glycerol is treated with a small amount of HI or PI_3 , the product obtained is:

- a) Glycerol triiodide b) Allyl iodide c) 2-Iodopropane d) None

47. Give the decreasing order of reactivity of the following compounds with HBr

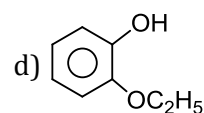
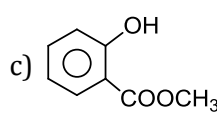
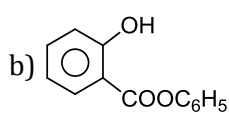
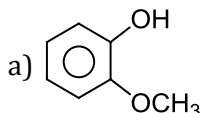


- a) III > IV > II > I
 b) III > II > IV > I
 c) III > II > I > IV
 d) II > III > IV > I

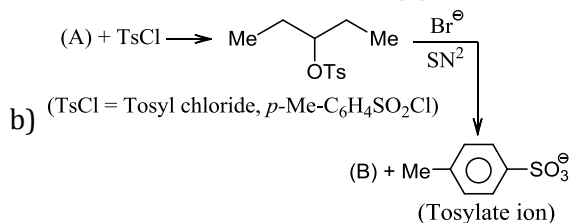
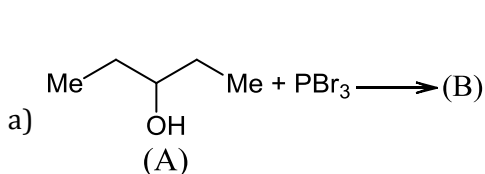
48. In $\text{CH}_3\text{CH}_2\text{OH}$, the bond that undergoes heterolytic cleavage most readily is:

- a) C – C b) C – O c) C – H d) O – H

49. The intestinal antiseptic Salol is correctly represented as:

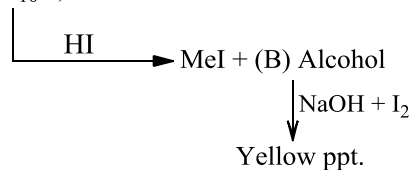


50. Which is the best method for the conversion of (A) pentan-3-ol to 3-bromopentane (B)?

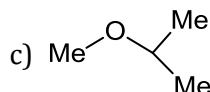
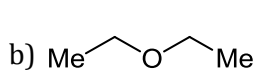
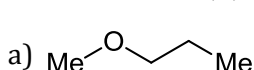


- c) (A) $\xrightarrow{\text{HBr}}$ (B) d) Both (a) and (b)

51. (A) ($\text{C}_6\text{H}_{10}\text{O}$) $\xrightarrow{\text{Na}}$ No reaction



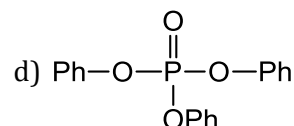
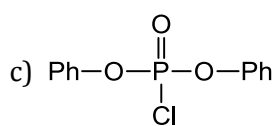
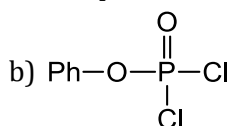
The compound (A) is:



d) None

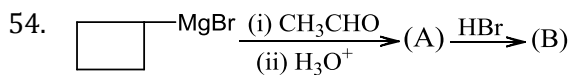
52. Phenol reacts with PCl_5 , the main product is:

a) PhCl

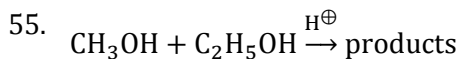
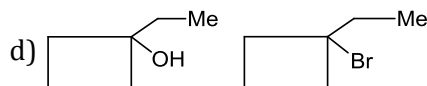
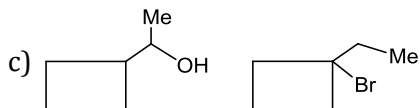
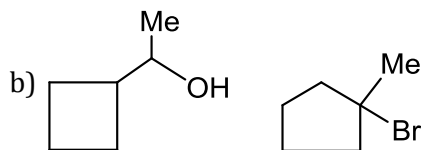
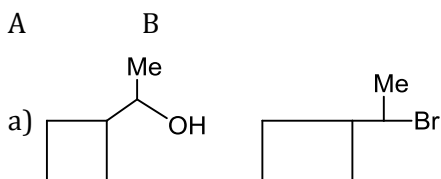


53. In Zeisel's method for the determination of methoxyl groups, a sample of 2.68 gm of a compound (A) gave 14.08 gm of AgI. If the molecular weight of compound (A) is 134, the number of ($-\text{OCH}_3$) group (s) in the compound (A) is:

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



The compounds (A) and (B) are

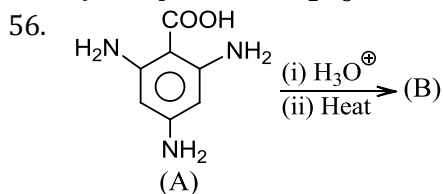


a) The product is $\text{CH}_3 - \text{O} - \text{C}_2\text{H}_5$

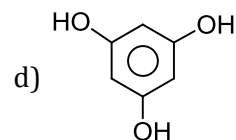
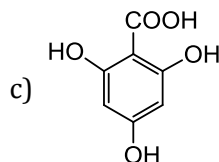
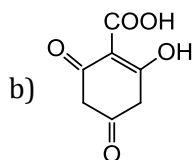
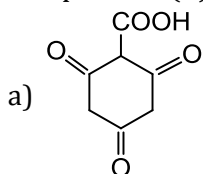
c) The product is $\text{C}_2\text{H}_5 - \text{O} - \text{C}_2\text{H}_5$

b) The product is $\text{CH}_3 - \text{O} - \text{CH}_3$

d) All



The product (B) is:



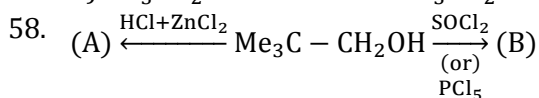
57. Which of the following reactions is possible?

a) $(\text{CH}_3)_3\text{C} - \text{CH}_2 - \text{ONa} + (\text{CH}_3)_3\text{C} - \text{CH}_2\text{Br} \rightarrow (\text{CH}_3)_3\text{C} - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{C}(\text{CH}_3)_3$

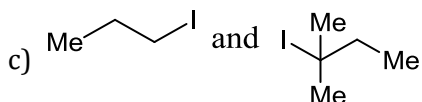
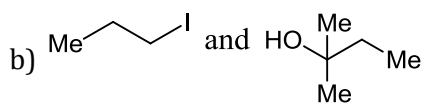
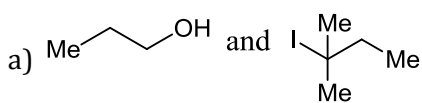
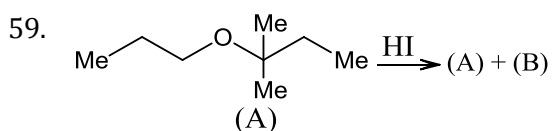
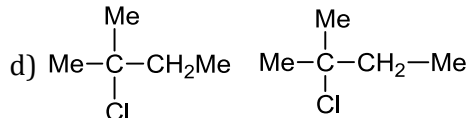
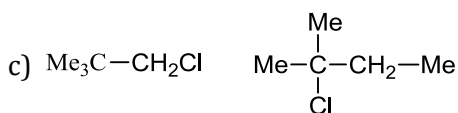
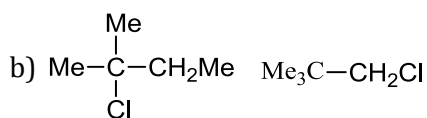
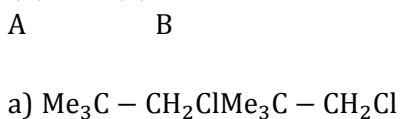
b) $\text{CH}_3\text{CH} = \text{CH} - \text{ONa} + \text{CH}_3\text{CH} = \text{CH} - \text{Br} \rightarrow \text{CH}_3\text{CH} = \text{CH} - \text{O} - \text{CH} = \text{CH} - \text{CH}_3$

c) $(\text{CH}_3)_3\text{C} - \text{ONa} + \text{CH}_3\text{CH}_2\text{Br} \rightarrow (\text{CH}_3)_3\text{C} - \text{O} - \text{CH}_2 - \text{CH}_3$

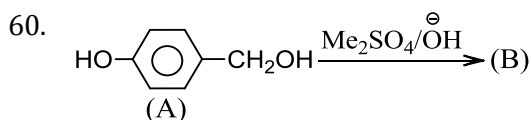
d) $\text{CH}_3\text{CH}_2\text{ONa} + \text{PhBr} \rightarrow \text{CH}_3\text{CH}_2\text{O} - \text{Ph}$



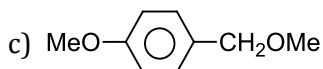
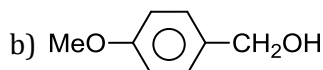
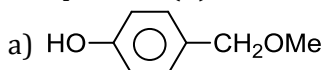
(A) and (B) are:



d) All



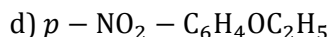
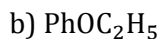
The product (B) is:



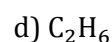
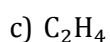
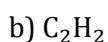
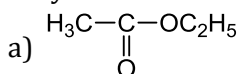
d) All

61. When glycerol is heated with a large amount of HI or PI₃, the product obtained is:
 a) Glycerol triiodide b) Allyl iodide c) 2- Iodopropane d) None

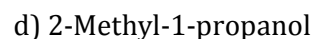
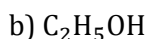
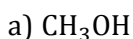
62. Which of the following ether is called phenetole?



63. Ethyl alcohol is heated with conc. H₂SO₄. The product formed is:



64. Which of the following is wood alcohol?



65. Which of the following statements is/ are **wrong**?

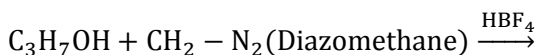
a) When diethyl ether is treated with excess of Cl₂ in light, perchloro diethyl ether is obtained (C₂Cl₅)₂O

b) When diethyl ether is treated with 1 mol of Cl₂ in dark, 1-chloro ethyl ether is obtained

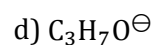
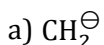
c) When diethyl ether is treated with 2 mol of Cl₂ in dark, 1,1'-dichlorodiethyl is obtained

d) When diethyl ether is treated with 2 mol of Cl₂ in dark, 1,1'-dichloro and 1,2-dichloroethyl ether are obtained

66. Consider the reaction



The leaving group is:



67. Dioxane used as a solvent is obtained by distilling.....with.....

a) Glycerol, conc.H₂SO₄ b) Glycerol, conc. H₃PO₄ c) Glycol, conc. H₂SO₄ d) Glycol,conc. H₃PO₄

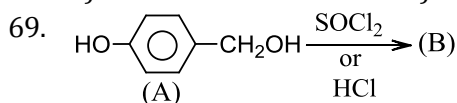
68. The presence of peroxides in old samples of ethers is detected by shaking them with a freshly prepared solution of Fe²⁺(FeSO₄) followed by the addition of KCNS. The appearance of.....colour indicates the presence of peroxides

a) Blue

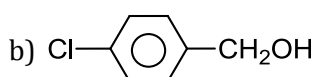
b) Green

c) Red

d) Brown

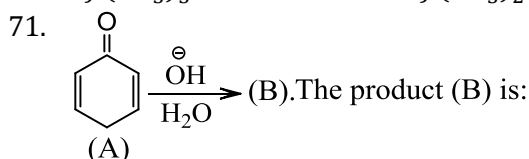
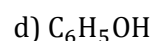
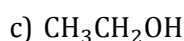
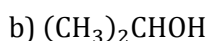
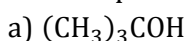


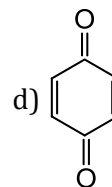
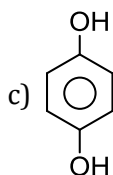
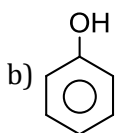
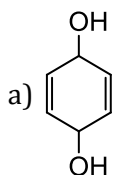
The product (B) is:



d) All

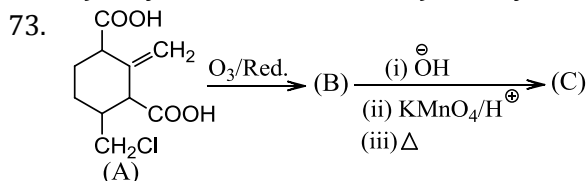
70. The compound that will react with HBr most readily is:



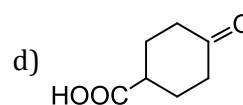
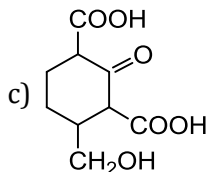
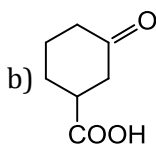
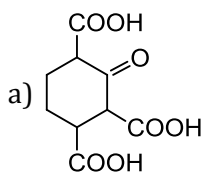


72. Fusel oil (Greek, inferior oil) is a mixture of alcohols obtained in small amounts along with ethanol in the fermentation of starch. The major component in fusel oil is:

- a) Amyl alcohol b) Isoamyl alcohol c) Cetyl alcohol d) Butyl alcohol



The compound (C) is:



74. Which of the following is not used as inhalation anaesthetic?

- a) Ethoxyethane b) Anethole c) Ethrane d) Isoflurane

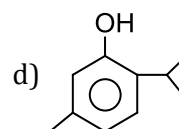
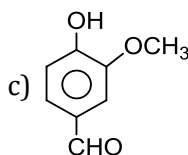
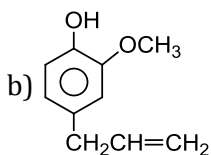
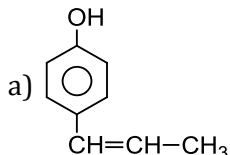
75. The product of combustion of an aliphatic thiol(RSH) at 298 K are:

- a) CO₂(g), H₂O(g), and SO₂(g) b) CO₂(g), H₂O(l), and SO₂(g)
c) CO₂(l), H₂O(l), and SO₂(g) d) CO₂(g), H₂O(l), and SO₂(l)

76. When phenyl magnesium bromide reacts with *t*-butanol, the product would be

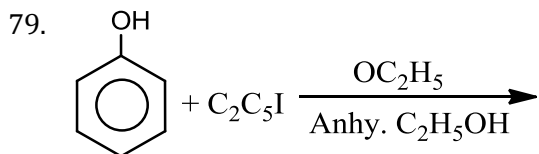
- a) Benzene b) Phenol c) *t*-butyl benzene d) *t*-butyl phenyl ether

77. Which of the following structure represents Vanillin?



78. Brandy is distilled from fermented fruits, rum is distilled from molasses, Bourbon whisky from corn, rye whisky from rye, scotch whisky from barley, Irish whisky from potatoes, Saki from rice, and beer from.....

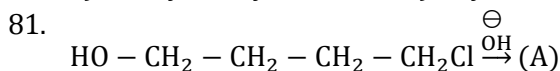
- a) Malt b) Yeast c) Grapes d) Apples



- a) C₆H₅OC₂H₅ b) C₂H₅OC₂H₅ c) C₆H₅OC₆H₅ d) C₆H₅I

80. Which of the following is not used as a flavouring agent in perfumes?

- a) Methyl salicylate b) Thymol c) Phenyl salicylate d) Eugenol



Which of the following statements is true?

i. The product (A) is HO – CH₂ – CH₂ – CH₂ – CH₂OH

ii. The product (A) is (tetrahydrofuran, THF)

iii. (A) is prepared by SN² reaction

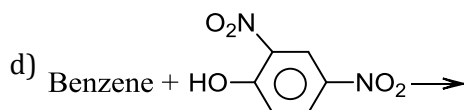
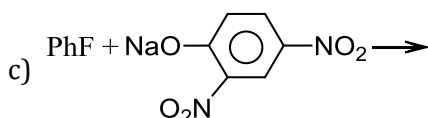
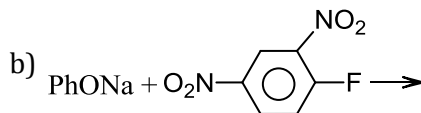
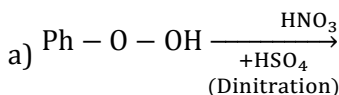
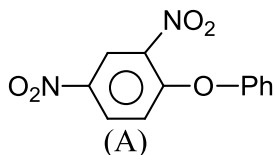
iv. (A) is prepared by intramolecular SN² reaction

- a) i b) ii and iv c) i and iv d) ii and iii

82. An industrial method for preparation of methanol is:

- a) Catalytic reduction of carbon monoxide in the presence of $ZnO - Cr_2O_3$
 b) By reacting methane with steam at $900^\circ C$ with nickel as catalyst
 c) By reacting formaldehyde with aqueous sodium hydroxide solution
 d) None of these

83. Which of the following is the best synthesis of the ether (A) shown below:



84. Which of the following is most acidic?

- a) Benzyl alcohol b) 2-Butanol c) *tert*-Butyl alcohol d) Hydroxybenzene

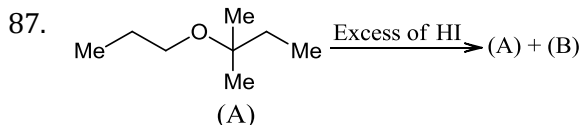
85. Which of the following statements is correct?

- i. Glycerol on reaction with oxalic acid at $110^\circ C$ ($383K$) and followed by heating and hydrolysis gives formic acid and glycerol
 ii. Glycerol on reaction with oxalic acid at $230^\circ C$ ($503K$) and followed by heating gives allyl alcohol
 iii. Glycerol on oxidation with conc. HNO_3 gives glyceric acid and tartaric acid
 iv. Glycerol on oxidation with conc. HNO_3 gives glyceric acid

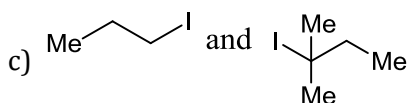
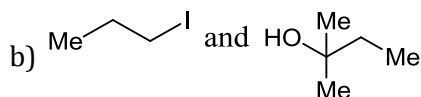
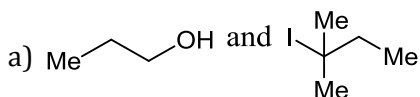
- a) i and ii b) i and iii c) iii and iv d) i,ii,iii,iv

86. Proof is defined as.....the percentage by volume of alcohol in ethanol-water mixture

- a) Twice b) Thrice c) Half d) Four times

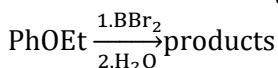


The products (A) and (B) are:



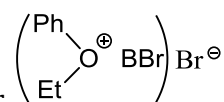
d) All

88. Which of the following statements is wrong about the following reaction?



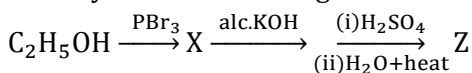
a)

BBr_3 plays a role similar to the H in HI by forming a complex with the ether



- b) The liberated Br^- attacks Et, displacing $PhOBBR_2$, which is ultimately hydrolysed to give the products
 c) The products are $PhOH + EtBr + H_3BO_3$
 d) The products are $PhBr + EtOH + H_3BO_3$

89. Identify Z in the following series:

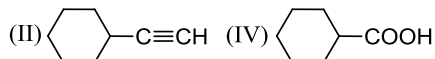
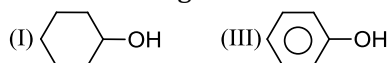


- a) $CH_2 = CH_2$ b) $CH_3 - CH_2OH$
 c) $CH_3 - CH_2 - O - CH_2 - CH_3$ d) None

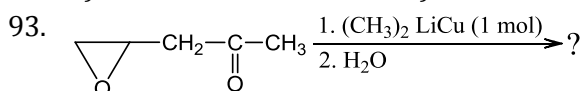
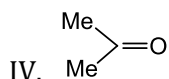
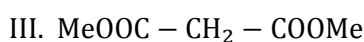
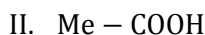
90. Give the decreasing order of reactivity of the following alkyl halides in the Williamson's reaction



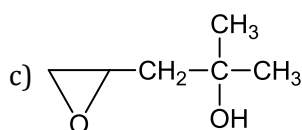
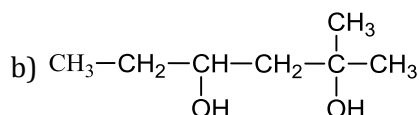
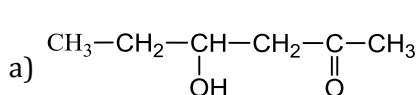
91. The decreasing order of acidic character of the following is:



92. The decreasing order of acidic character of the following is:



The product is:

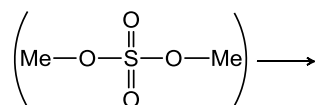


d) All

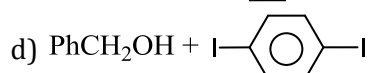
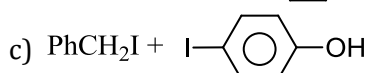
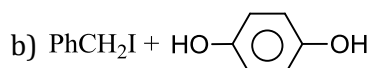
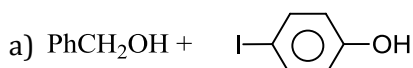
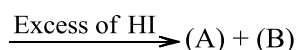
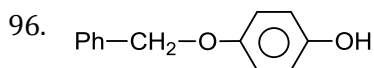
94. Dynamite is:

- a) Mixture of glyceryl nitrate and dinitrate adsorbed on Keiselguhr
 b) Mixture of glyceryl dinitrate and trinitrate adsorbed on Keiselguhr
 c) Mixture of glyceryl nitrate and trinitrate adsorbed on Keiselguhr
 d) All

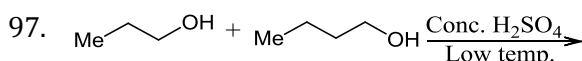
95. consider the reaction:



The leaving group is:



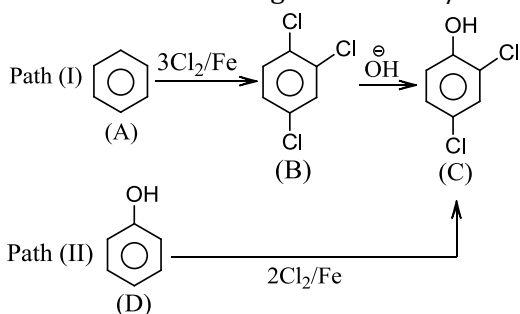
Multiple Correct Answers Type



- a) Butyl propyl ether
c) Dibutyl ether

- b) Dipropyl ether
d) Propene + But-2-ene (*cis* and *trans*) + Butene

98. Which of the following statement is/are correct about the following reactions?

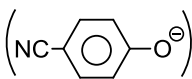


- a) Both paths I and II are feasible
b) Path I is feasible
c) Phenol cannot be chlorinated because the ring is susceptible to oxidation by Cl₂
d) The formation of (C) from (B) proceeds by ArSN reaction (addition- elimination)

99. Which of the following statements is/are correct?

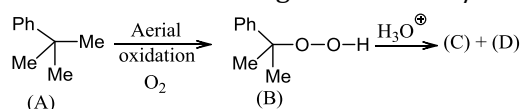
- a) The nitration of phenol is faster than phenyl acetate

The reaction of PhO[⊖] is faster than

- b)  with PhCH₂Cl

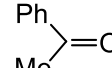
- c) Base-catalysed hydrolysis of *p*-nitrophenyl acetate is faster than phenyl acetate
d) Acid-catalysed esterification of PhOH is faster than *p*-nitrophenol with MeCOOH

100. Which of the following statements is/are correct about the following reaction?



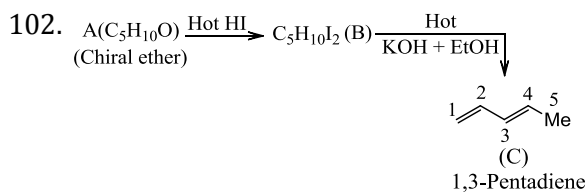
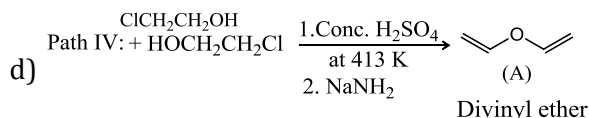
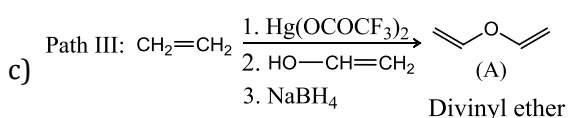
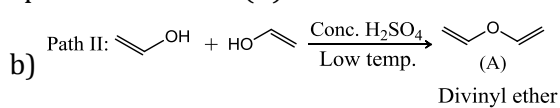
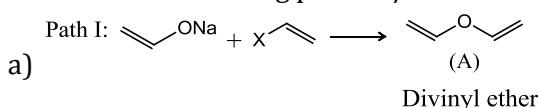
- a) The products (C) and (D), respectively, are PhOH + Me₂C = O

The products (C) and (D), respectively, are

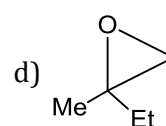
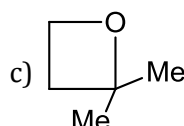
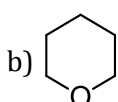
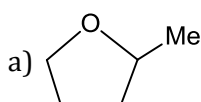
- b) MeOH + 

- c) Ph group is a better migrator than Me group
d) Me group is a better migrator than ph group

101. Which of the following paths is/are feasible for the preparation of ether (A)?

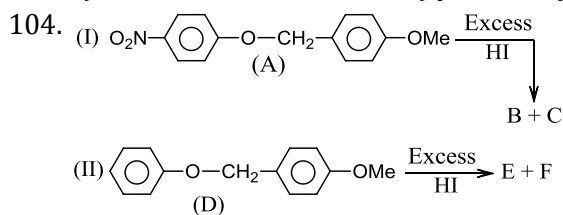


The structure of (A) is:



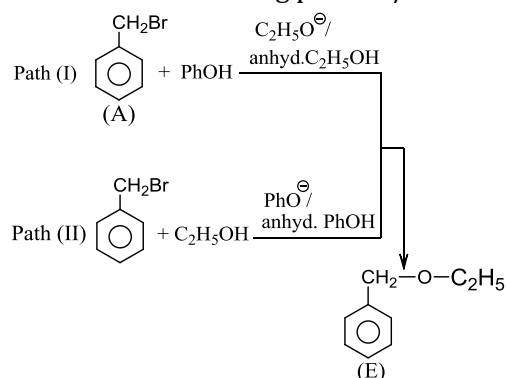
103. Phenol is less acidic than

104. a) Acetic acid b) *p*-Methoxyphenol c) *p*-Nitrophenol d) Ethanol

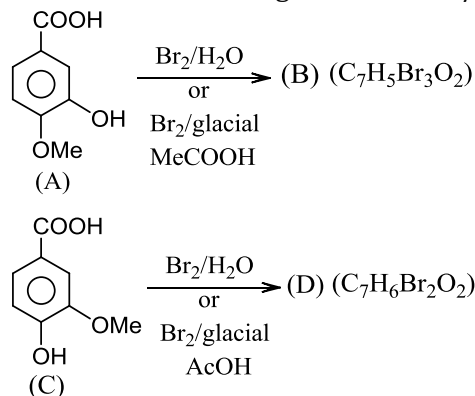


which of the following statements is/ are correct?

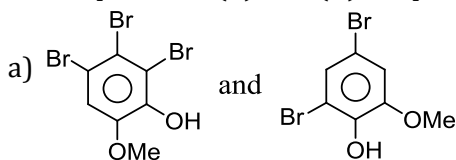
- a) Both reactions proceed by $\text{S}_{\text{N}}1$ mechanism
 b) Both reactions proceed by $\text{S}_{\text{N}}2$ mechanism
 c) Reaction (I) proceeds by $\text{S}_{\text{N}}1$ and reaction (II) by $\text{S}_{\text{N}}2$ mechanism
 d) Reaction (I) proceeds by $\text{S}_{\text{N}}2$ and reaction (II) by $\text{S}_{\text{N}}1$ mechanism
105. Which of the following paths is/are feasible for the preparation of ether (E)?



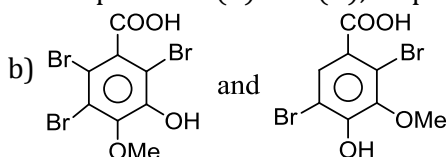
- a) Path I is feasible b) Path II is feasible
 c) Both paths are feasible d) None is feasible
106. Which of the following statements is/are correct about the given reaction



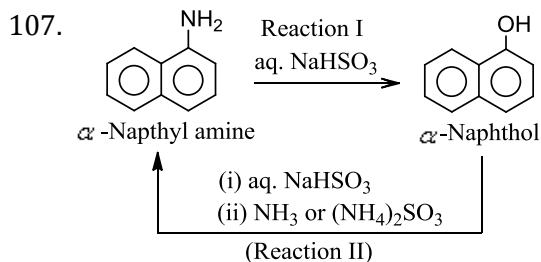
The products (B) and (D), respectively, are:



The products (B) and (D), respectively, are:

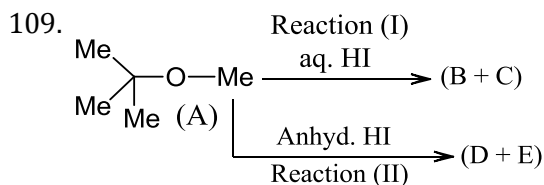


- c) In the formation of both products (B) and (D), one Br is obtained by ipso substitution while the other Br is obtained by SE reaction
 d) In the formation of (B) and (D), two Br atoms are obtained by ipso substitution, whereas the other Br is obtained by SE reaction



Reactions I and II are limited mainly to naphthalene compounds. These reactions are called, respectively:

- Bucherer reaction and its reversal
 - Bischler-Napieralski reaction and its reversal
 - Birnbaum-Simonini reaction and its reversal
 - Borodine-Hunsdiecker reaction and its reversal
108. Which of the following reactions is feasible for the preparation of 1-propoxy-2 methyl propane (I)?
- Williamson's synthesis of $(\text{Me}_2\text{CHCH}_2\text{ONa} + \text{MeCH}_2\text{CH}_2\text{Cl})$
 - Williamson's synthesis of $(\text{Me}_2\text{CHCH}_2\text{Cl} + \text{MeCH}_2\text{CH}_2\text{ONa})$
 - Alkoxy mercuration-demercuration of $(\text{Me}_2\text{CH} = \text{CH}_2 + \text{MeCH}_2\text{CH}_2\text{OH})$
 - Alkoxy mercuration demercuration of propene with $\text{Me}_2\text{CHCH}_2\text{OH}$

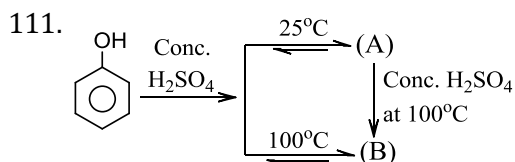


Which of the following statements is/are correct?

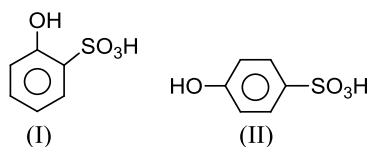
- The compounds (B) and (C), respectively, are $\text{Me}_3\text{C}-\text{I} + \text{MeOH}$ and reaction (I) proceeds by S_N^1 mechanism
 - The compounds (B) and (C) respectively, are $\text{Me}_3\text{C}-\text{OH} + \text{MeI}$ and reaction (I) proceeds by S_N^2 mechanism
 - The compounds (E) and (F), respectively, are $\text{Me}_3\text{C}-\text{I} + \text{MeOH}$ and reaction (II) proceeds by S_N^1 mechanism
 - The compounds (E) and (F), respectively, are $\text{Me}_3\text{C}-\text{OH} + \text{MeOH}$ and reaction (II) proceeds by S_N^2 mechanism
- 110.
-
- $\text{Ph-OH} \xrightarrow{\text{(i) OH}^-, \text{(ii) CH}_3\text{OSO}_2\text{OCH}_3}$ (B)
 $\text{Ph-OH} \xrightarrow{\text{(i) OH}^-, \text{(ii) CH}_3\text{I}}$ (C)

The product (B) and (C), respectively, are:

- Both (B) and (C) are PhOCH_3
- (B) is $\text{Ph}-\text{O}-\text{S}(=\text{O})_2-\text{OCH}_3$
- (B) is $\text{Ph}-\text{O}-\text{S}(=\text{O})_2-\text{CH}_3$
- (B) is both (b) and (c)

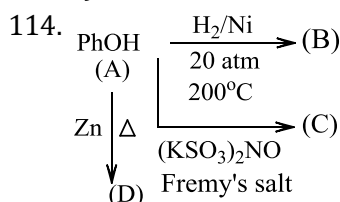


The compounds given are:



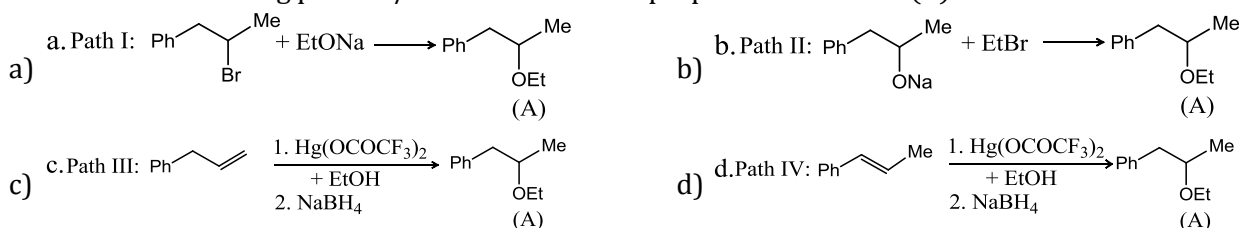
Which of the following statements is/ are correct?

- a) Compound (A) and (B) are (I) and (II), respectively
 b) Compound (I) is the major product at lower temperature when the reaction is under kinetic or rate control
 c) Compound (II) is the major product at high temperature when the reaction is under thermodynamical or equilibrium control
 d) Compound (II) is more stable
112. Grignard reagents give alkanes with
 a) Alcohol b) Water c) Phenol d) Ether
113. Esters on reaction with EtMgBr give:
 a) 1°alcohols b) 2°alcohols c) 3°alcohols d) Hydroxy ketone

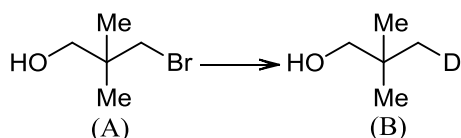


The compounds (B), (C), (D), respectively, are:

- a) Cyclohexanol, benzene, and *p*-quinone
 b) Benzene, cyclohexanol, and *p*-quinone
 c) *p*-Quinone, cyclohexanol, and benzene
 d) Cyclohexanol, *p*-quinone, and benzene
115. Which of the following paths is/are feasible for the preparation of ether (A)?

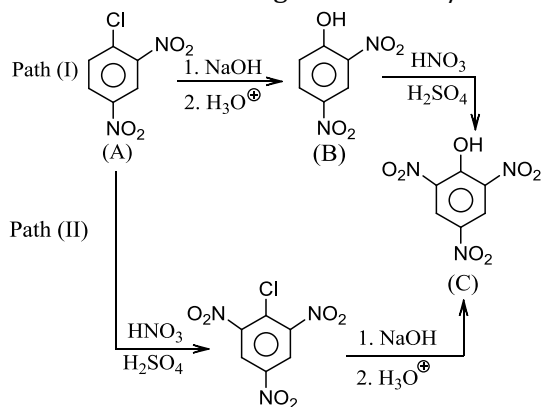


116. In the conversion of (A) to (B), the best method for the protection of (OH) group is silylation method because:



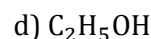
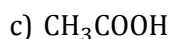
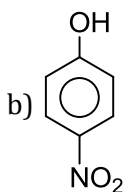
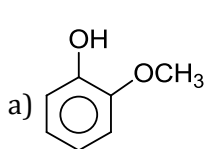
- a) Benzylation method is not effective as Ag_2O might react with Br group of the reactant to give an (OH) group
 b) ROTHP cannot be used because the alcohol is likely to rearrange under the acidic conditions of ether formation
 c) Silylation method is effective since (OH) group is not sterically hindered
 The reaction can be carried out without protecting (OH) group, as shown below:
 d) $(\text{A}) \xrightarrow[2. \text{D}_2\text{O}]{1. \text{Mg/ether}}$ (B)

117. Which of the following statement is/are correct about the following reactions?

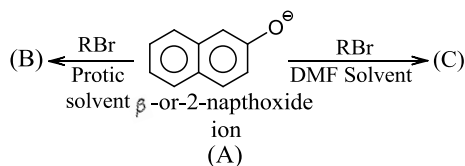


- Path I is feasible
- Path II is feasible
- PhCl cannot be trinitrated because Cl and two NO_2 atoms deactivate the ring towards further SE reaction
- 2,4-Dinitrophenol can be nitrated because the two deactivating NO_2 groups prevent ring oxidation

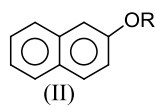
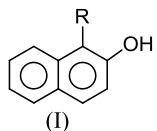
118. Phenol is more acidic than



119.



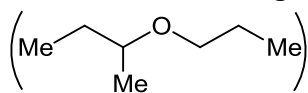
The compounds given are:



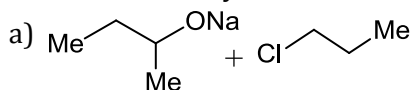
Which of the following statements is /are correct?

- The compound (B) is (I)
- The compound (B) is n(II)
- The compound (C) is (I)
- The compound (D) is II

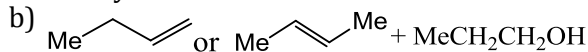
120. Which of the following reactions is feasible for the preparation of propyl *sec*-butyl ether (I)?



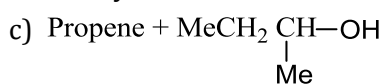
Williamson's synthesis with



Alkoxymercuration-demercuration of

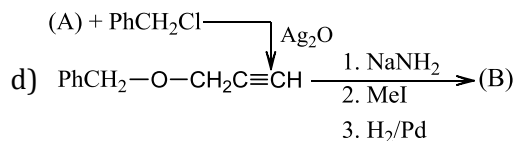
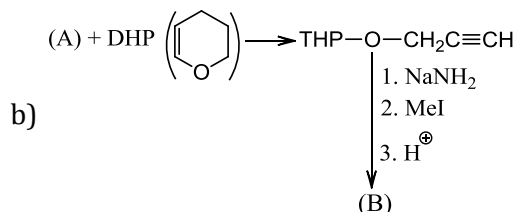
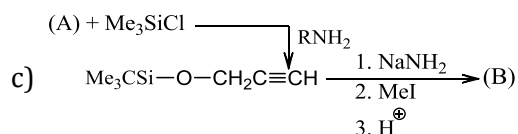
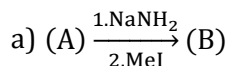


Alkoxymercuration-demercuration of



d) Intermolecular dehydration of $\text{MeCH}_2\text{CH}(\text{Me})\text{OH}$ and $\text{MeCH}_2\text{CH}_2\text{OH}$

121. In the conversion of (A) $\text{HOCH}_2\text{C}\equiv\text{CH}$ to (B) $\text{HOCH}_2\text{C}\equiv\text{C}-\text{Me}$, the best method is:



122. Which of the following statements is/ are correct?

- a) 4-Chlorophenol (I) will dissolve in NaOH but 4-chloro-1-methyl benzene (II) will not
 b) 4- Methyl benzoic (III) acid will dissolve in aq. NaHCO_3 but 4- methyl phenol (IV) will not
 c) 2,4,6- Trinitrophenol (V) will dissolve in aq- NaHCO_3 but 4-methyl phenol (VI) will not
 d) 4-Ethyl phenol (VII) will dissolve in aq. NaOH but ethyl phenyl ether (VII) will not

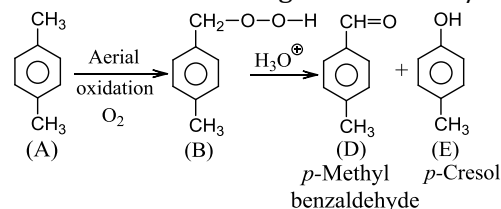
123. Which of the following is/are less acidic than *p*-nitrophenol

- a) *o*-Nitrophenol b) *m*-Nitrophenol c) Phenol d) *p*-Cresol

124. The (O – H) group in alcohols can be replaced by:

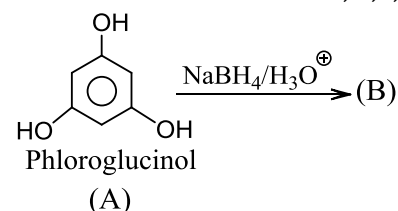
- a) SOCl_2 b) Cl_2 c) PCl_5 d) $\text{P} + \text{Cl}_2$

125. Which of the following statements is/are correct about the following reaction?



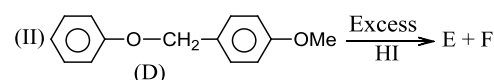
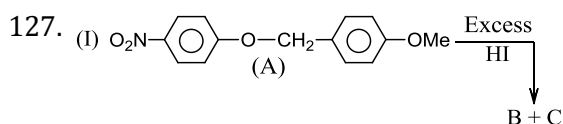
- a) Compound (D) is in major amount (68%) and (E) is in minor (32%)
 b) Compound (D) is in minor amount (32%) and (E) is in major (68%)
 c) The aldehyde (D) arises from migration of H, and cresol (E) comes from migration of *p*-tolyl
 d) H is a better migrator

126. Phenols are generally not changes with $\text{NaBH}_4/\text{H}_3\text{O}^\oplus$ 1,3- and 1,4-benzenediols are unchanged under these conditions. However, 1,3,5-benzenetriol (phloroglucinol) gives a high yield of product (B)



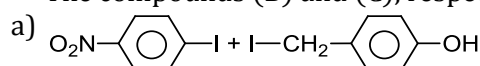
The Compound (B) is:

- a)
 b)
 c)
 d) Both (a) and (b)

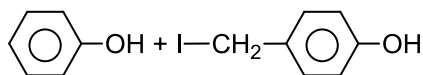


Which of the following statements is/are correct about the above reaction?

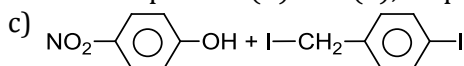
The compounds (B) and (C), respectively, are:



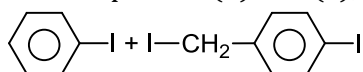
b) The compounds (E) and (F), respectively, are:



The compounds (B) and (C), respectively, are:



d) The compounds (E) and (F), respectively, are:



128. Phenol can be prepared by

- Hydrolysis of chlorobenzene with aqueous KOH solution
- Heating sodium salicylate with (NaOH+CaO)
- Reacting cumene hydroperoxide with dil.H₂SO₄
- Heating benzenediazonium chloride with dil.H₂SO₄

129. Which of the following will result in the formation of an ether?

- $\text{C}_6\text{H}_5\text{Br} + \text{CH}_3\text{O}^-\text{Na}^+ \rightarrow$
- $\text{C}_6\text{H}_5\text{O}^-\text{Na}^+ + \text{CH}_3\text{Br} \rightarrow$
- $(\text{CH}_3)_3\text{CO}^-\text{Na}^+ + \text{C}_2\text{H}_5\text{Br} \rightarrow$
- $(\text{CH}_3)_3\text{CBr} + \text{C}_2\text{H}_5\text{O}^-\text{Na}^+ \rightarrow$

130. Which of the following statements is/are wrong?

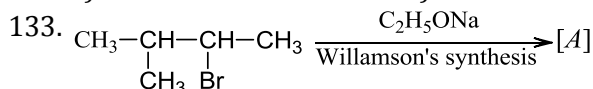
- THF (tetrahydrofuran) is a stronger Lewis base than diethyl ether
- Diisopropyl ether is a stronger Lewis base than diethyl ether
- THF is a stronger Lewis base than DHF (dihydrofuran)
- Furan is a stronger Lewis base than DHF

131. Which of the following compounds will give a yellow precipitate with iodine and alkali

- Acetophenone
- Methyl acetate
- Acetamide
- 2-Hydroxypropane

132. Alcohols may act as

- Bronsted acid
- Lewis base
- Oxidising agent
- Reducing agent



A is

- $\text{CH}_3-\underset{\text{OC}_2\text{H}_5}{\overset{\text{OC}_2\text{H}_5}{\text{C}}}-\text{CH}_2-\text{CH}_3$
- $\text{CH}_3-\underset{\text{CH}_3}{\text{CH}}-\underset{\text{OC}_2\text{H}_5}{\text{CH}}-\text{CH}_3$
- $\text{CH}_3-\underset{\text{CH}_3}{\overset{\text{OC}_2\text{H}_5}{\text{C}}}-\text{CH}_2-\text{CH}_3$
- None of these

134. The ether $\text{C}_6\text{H}_5\text{OCH}_2\text{C}_6\text{H}_5$ when treated with HI produces:

- $\text{C}_6\text{H}_5\text{CH}_2\text{I}$
- $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$
- $\text{C}_6\text{H}_5\text{I}$
- $\text{C}_6\text{H}_5\text{OH}$

135. Which of the following statements is /are correct?

- Pheny vinyl ether (I) will decolourise Br₂/CCl₄ solution but ether phenyl ether (II) will not
- 4-Fluorophenol (III) is a stronger acid than 4-methyl phenol (IV)
- 3-Nitrophenol (V) is a stronger acid than 4-nitrophenol (VI)
- 4-Chlorophenol (VII) is a stronger acid than 4-fluorophenol (VIII)

136. Which of the following acid-base reactions is/ are feasible?

- $\text{PhONa} + \text{CH}_3\text{CH}_2\text{OH} \rightarrow \text{PhOH} + \text{CH}_3\text{CH}_2\text{ONa}$
- $\text{PhOH} + \text{NaOH} \rightarrow \text{PhONa} + \text{H}_2\text{O}$
- $\text{PhONa} + \text{aq. HCl} \rightarrow \text{PhOH} + \text{NaCl}$
- $\text{PhONa} + \text{H}_2\text{O} + \text{CO}_2 \rightarrow \text{C}_6\text{H}_4(\text{OH})(\text{COONa})$

137. Which of the following statements is/are correct?

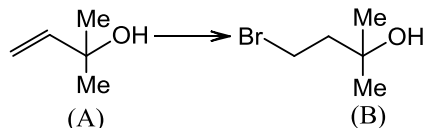
- PhOH has a higher boiling point than PhSH (benzenethiol)
- p*-Hydroquinone has a higher melting point than catechol
- o*-Nitrophenol has a lower boiling point than *m*- and *p*-isomers

d) *o*-Hydroxybenzaldehyde is more water soluble than *m*- and *p*-isomers

138. Which of the following statement is/are correct?

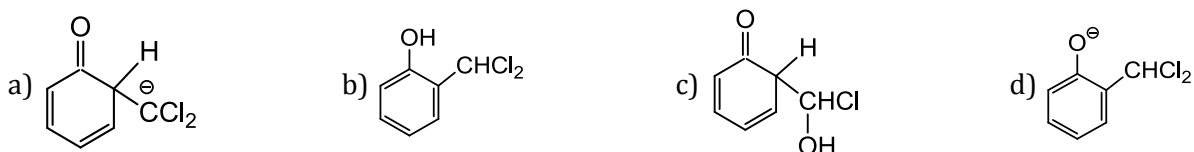
- a) Phenol is more easily oxidised than benzene
- b) Benzaldehyde and PhCl can distinguished by NaHSO₃
- c) *p*-Cresol and benzoic acid can be distinguished by NaOH
- d) Phenol and benzene acid can be distinguished by adding dry ice in aqueous NaOH solution

139. In the conversion of (A) to (B), the best method for the protection of (OH) group is:



- a) Benzoylation method
- b) Silylation method
- c) ROTHP method
- d) Both (a) and (b)

140. When phenol is reacted with CHCl₃ and NaOH followed by acidification, salicylaldehyde is obtained. Which of the following species are involved in the above mentioned reaction as intermediates?



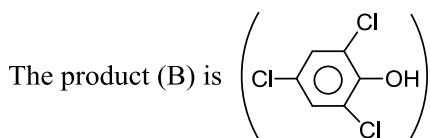
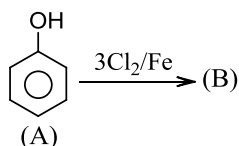
Assertion - Reasoning Type

This section contain(s) 0 questions numbered 141 to 140. Each question contains STATEMENT 1(Assertion) and STATEMENT 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

- a) Statement 1 is True, Statement 2 is True; Statement 2 **is** correct explanation for Statement 1
- b) Statement 1 is True, Statement 2 is True; Statement 2 **is not** correct explanation for Statement 1
- c) Statement 1 is True, Statement 2 is False
- d) Statement 1 is False, Statement 2 is True

141

Statement 1:



Statement 2: Phenol cannot be chlorinated because the ring is susceptible to oxidation by Cl₂

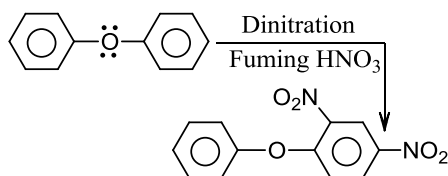
142

Statement 1: The solubility of *n*-alcohol in water decreases with an increase in molecular weight

Statement 2: The reactive proportion of the hydrocarbon part in alcohols increases with increasing molecular weight permits enhanced hydrogen bonding with water

143

Statement 1: Diphenyl ether (I) on dinitration gives the product (II)



Statement 2: The ring with first nitro group is deactivated by \bar{e} –withdrawing NO₂ group, so the second nitro group enters the other ring

144

Statement 1:

Dehydration of $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$ gives $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$ as the minor product and $\text{CH}_3\text{CH}=\text{CHCH}_3$ as the major product

Statement 2:

$\text{CH}_2=\text{CH}-\text{CH}(\text{OH})-\text{CH}_3$ can be dehydrated more readily than $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$

145

Statement 1: Ethers on reaction with air and light form hydroperoxides. These peroxides decompose violently at high temperature. Allyl *n*-propyl ether with O₂ in light gives mainly 1-hydroperoxide ally-*n*-propyl ether

Statement 2: The reaction proceeds *via* the formation of radical anion

146

Statement 1: Alcohols have higher boiling points than alkanes

Statement 2: O – H bond of alcohol is highly polarized

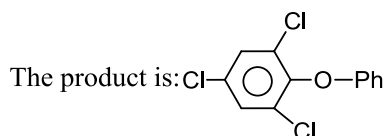
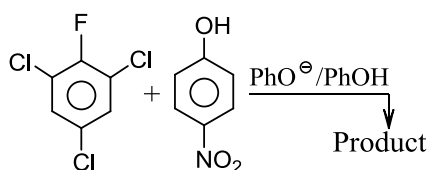
147

Statement 1: When glycerol is heated with hydrogen iodide, only allyl iodide is formed

Statement 2: With hydrogen iodide, glycerol forms three different compounds like propene, isopropyl iodide and allyl iodide

148

Statement 1:



Statement 2: *p*-NO₂-C₆H₄O[⊖] is a stronger nucleophile than PhO[⊖]

149

Statement 1: *p*-Nitrophenol is a stronger acid than *o*-nitrophenol

Statement 2: Intramolecular hydrogen bonding makes the *o*-isomer weaker than the *p*-isomer

150

Statement 1: Ether have low dipole moments and sp^3 hybridised oxygen atom

Statement 2: Ethers behaves as Lewis base

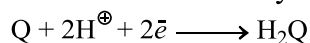
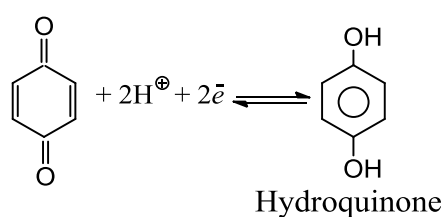
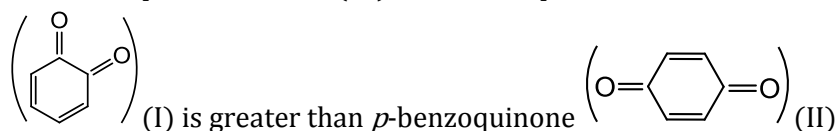
151

Statement 1: 2,6-Diamethyl-4-nitrophenol (I) is more acidic than 3,5-dimethyl-4-nitrophenol(II)

Statement 2: It is due to the steric inhibition of the resonance of ($-\text{NO}_2$)group with two (Me) groups in (II)

152

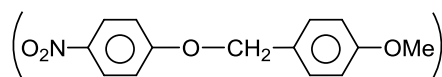
Statement 1: Reduction potential value (E°) of O-benzoquinone



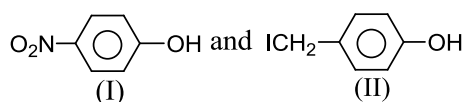
Statement 2: Two adjacent ($C = O$) groups in(I) destabilise (I) relative to (II)

153

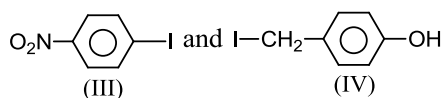
Statement 1: The major products formed by heating compound (A) in



with HI are:

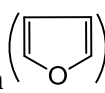
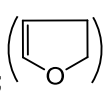


with excess HI are:



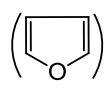
Statement 2: ArSN reaction takes place if the ring is activated by EW (e.g., ($-\text{NO}_2$) group), at *o*-, *p* -, and *m*-position

154

Statement 1: Furan () is more soluble than DHF (Dihydrofuran; ) in H_2O

Statement 2: Greater the \bar{e} density on the O atom stronger is the H-bonding and more soluble is the ether

155

Statement 1: The boiling point of diethyl ether is greater than furan ()

Statement 2: Furan is more compact and has less surface area

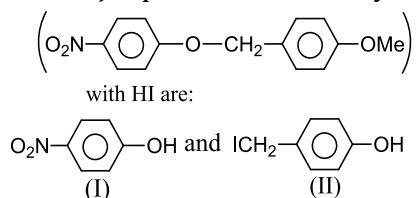
156

Statement 1: Benzoic acid is stronger acid than phenol

Statement 2: Resonating structures of phenoxide ion has negative charge on less electronegative carbon atom

157

Statement 1: The major products formed by heating



Statement 2: Benzyl carbocation is more stable

Matrix-Match Type

This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**.

158.

Column-I

- (A) BHA (Butylated hydroxy anisole)
 (B) BHT (Butylated hydroxy toluene)
 (C) PAS (*p*-Amino salicylic acid)
 (D) 2, 4-D(2,4-Dichlorophenoxy acetic acid)
 (E) Amidol (2, 4- Diaminophenol)

Column- II

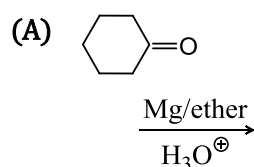
- (p) Broad leaf weed killer
 (q) Anti-oxidant
 (r) Food preservative
 (s) Anti-tuberculosis drug
 (t) Photographic developer

CODES :

	A	B	C	D	E
a)	d	e	c,d	b	e
b)	b,c	b,c	d	a	e
c)	a,b	c	d,e	a	e
d)	b,d	a,d	e	b	e

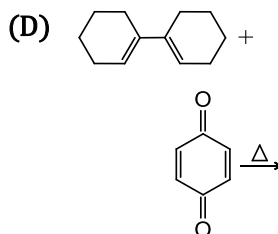
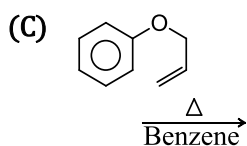
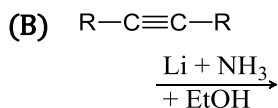
159.

Column-I



Column- II

- (p) Vinylic radical



(q) Radical anion

(r) *trans*-Vinyl anion

(s) Concerted mechanism

CODES :

	A	B	C	D
a)	a	d	c	d
b)	d	a,b,c	d	d
c)	t	r	s	q
d)	t	q	s	r

160. Match the following, choosing one item from column X and the appropriate item from column Y

Column-I

Column- II

(A) Williamson's synthesis

(p) *tert*-Alcohol

(B) Neutral $FeCl_3$ test

(q) Ether

(C) Lucas test

(r) Phenol

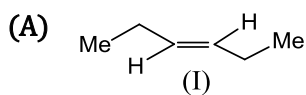
CODES :

	A	B	C	D
a)	b	c	a	
b)	c	a	b	
c)	b	a	c	
d)	a	b	c	

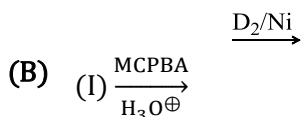
161.

Column-I

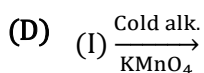
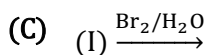
Column- II



(p) Overall *syn* addition



(q) Optically inactive due to external compensation



(r) Optically inactive due to internal compensation

(s) Product has two chiral centres

(t) Diastereomers will be formed

CODES :

	A	B	C	D
a)	A,c,d	b,d	e	a,c,d
b)	b	a,b,c	d	d
c)	e	c	d	b
d)	e	b	d	c

162. Match the list given below

Column-I

Column- II

(A) Phenolic esters on heating in presence of $AlCl_3$ (p) Claisen rearrangement

(B) Ary-allyl ethers are heated (q) Houben-Hoesch reaction

(C) Polyhydroxy phenol undergo acylation with $RNC + HCl$ (r) Fries rearrangement

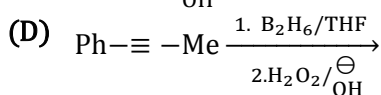
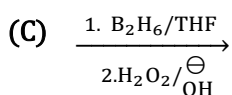
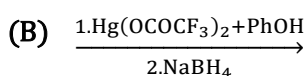
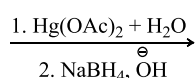
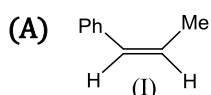
CODES :

	A	B	C	D
a)	a	b	c	
b)	c	b	a	
c)	b	c	a	
d)	c	a	b	

163.

Column-I

Column- II



(p) Syn-hydration with anti-Markovnikov's regioselectivity

(q) Anti-hydration with Markovnikov's regioselectivity

(r) Cyclic intermediate transition state

(s) Overall non-stereospecific

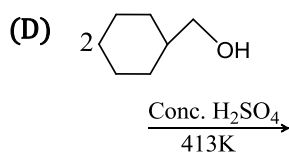
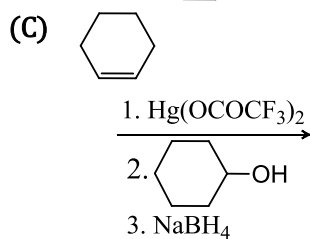
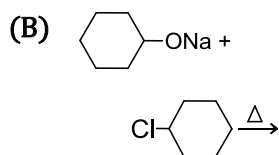
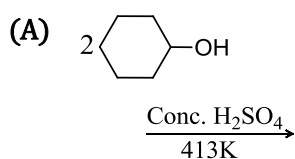
(t) Overall stereospecific

CODES :

	A	B	C	D
a)	b	a,b,c	d	d
b)	e	c	d	b
c)	d	b	d	c
d)	b,s	d,d	a,c,d	a,c,e

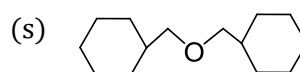
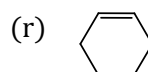
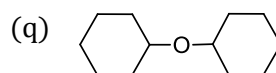
164.

Column-I



Column- II

(p) Alkoxy mercuration-demercuration

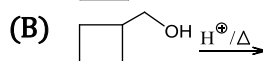
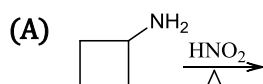


CODES :

	A	B	C	D
a)	c	e	b,d	e
b)	c	c	a,b	d
c)	b,d	e	c	c
d)	a	b,e	d	e

165.

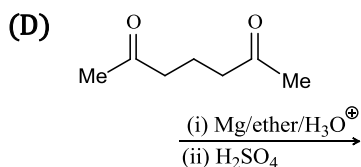
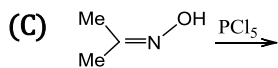
Column-I



Column- II

(p) Ring expansion

(q) Ring constraction



(r) Carbocation

(s) Rearrangement

(t) Radical anion

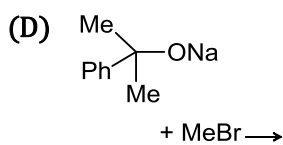
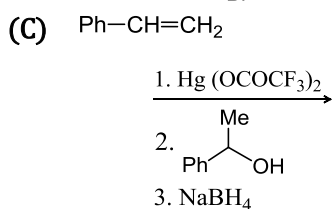
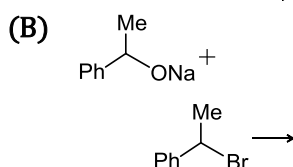
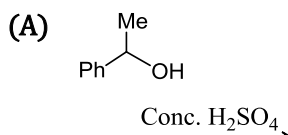
CODES :

	A	B	C	D
a)	B,c,d	a,c,d	d	c,d,e
b)	d,e	c	c	c,d
c)	b	c,d	c,e	a
d)	a,b	c	d,e	b

166.

Column-I

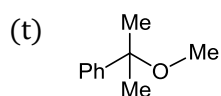
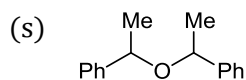
Column- II



(p) Williamson's synthesis

(q) Intramolecular dehydration

(r) Ph - CH = CH₂



CODES :

	A	B	C	D
a)	C,b	c	d,e	a,e
b)	c	d	e	b
c)	b,d	c,e	d	c
d)	d	e	a,b	c,d

Linked Comprehension Type

This section contain(s) 22 paragraph(s) and based upon each paragraph, multiple choice questions have to be answered. Each question has atleast 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

Paragraph for Question Nos. 167 to -167

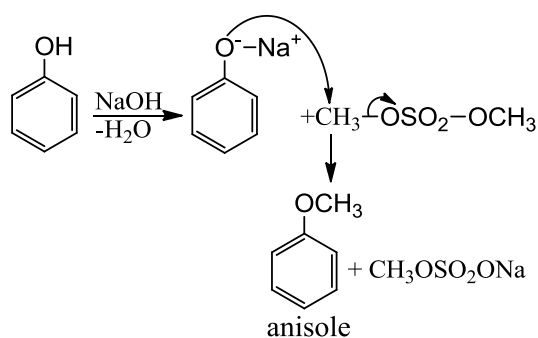
Chemical reaction of alcohols are mainly based on -OH group of alcohol. The oxygen atom of -OH group polarize both the C - O bond and the O - H bond of any alcohol. Polarization of the O - H bond makes the hydrogen partially positive and explain why alcohols are weak acids. Polarization of the C - O bond makes the carbon atoms partially positive. The polarization of C - O bond is responsible for the weak basic character of alcohols. On the basis of the above explanation, alcohols give two types of reactions

167. Which of the following alcohols is the strongest acid?

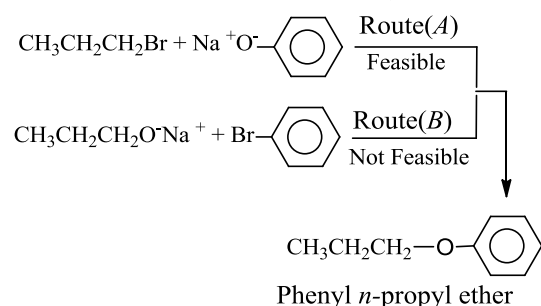
- a) $\text{CH}_3\text{CH}_2\text{OH}$ b) $(\text{CH}_3)_3\text{COH}$ c) CH_3OH d) $(\text{CH}_3)_2\text{CHCH}_2\text{OH}$

Paragraph for Question Nos. 168 to - 168

Phenols are converted into alkyl aryl ethers by reaction in alkaline solution with alkyl halides. For the preparation of aryl methyl ethers, dimethyl sulphate is frequently used instead of more expensive methyl halides.



The above reaction is familiar Williamson's synthesis which can even be used for the preparation of unsymmetrical ethers like alkyl aryl ethers. Aryl halides can't be used in the Williamsons synthesis because of their low reactivity towards nucleophilic substitution. For the preparation of any alkyl aryl ether, there can be two combinations of reactants, but one combination can usually be ruled out.

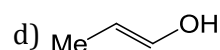
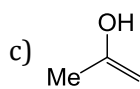
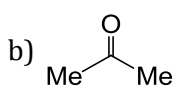
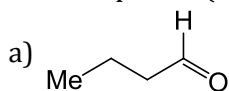


168. Ethyl bromide reacts with sodium methoxide to form ethyl methyl ether. It is an example of

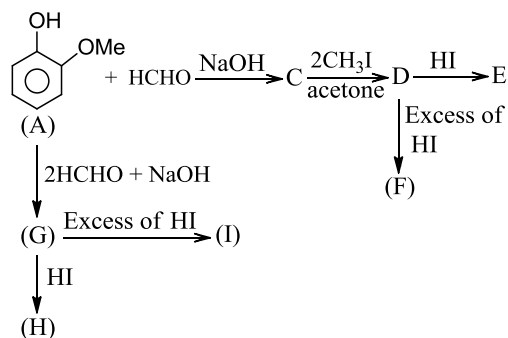
- a) $\text{S}_\text{N} 2$ reaction b) $\text{S}_\text{N} 1$ reaction c) $\text{S}_\text{N} 1$ reaction d) Elimination reaction

Paragraph for Question Nos. 169 to - 169

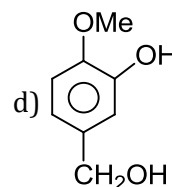
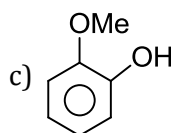
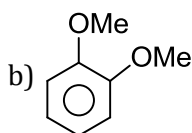
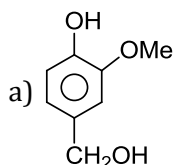
169. The compound (B) is:



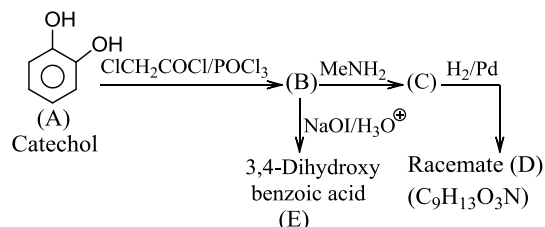
Paragraph for Question Nos. 170 to - 170



170. The compound (C) is:



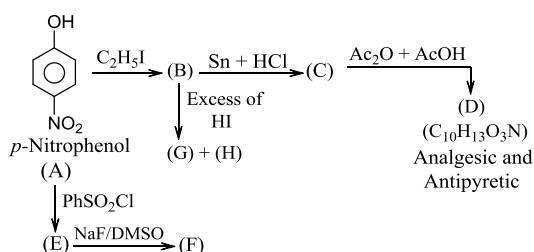
Paragraph for Question Nos. 171 to - 171



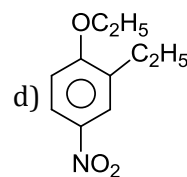
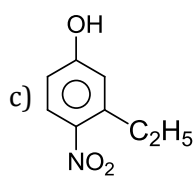
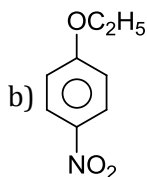
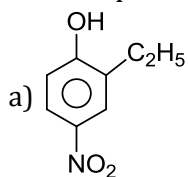
171. Which statement is **wrong** about the compound (B)?

- (B) is obtained from (A) by acylation of activated ring at *para*-position to one of the (OH) groups
- (B) is obtained from (A) by esterification of one of the (OH) groups
- (B) is obtained from (A) by alkylation in the activated ring at *para*-position to one of (OH) groups
- (B) is obtained from (A) by esterification of both (OH) groups

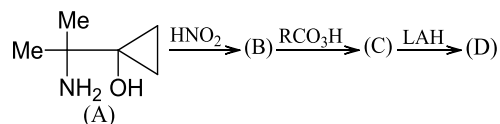
Paragraph for Question Nos. 172 to - 172



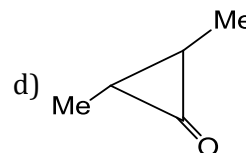
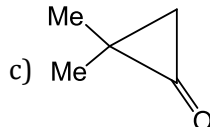
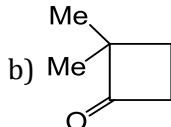
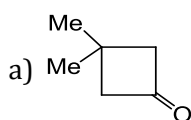
172. The compound (B) is:



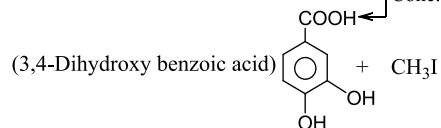
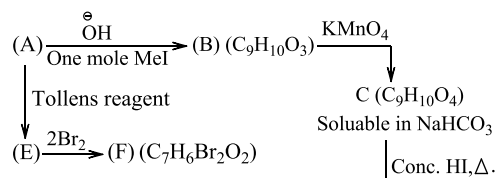
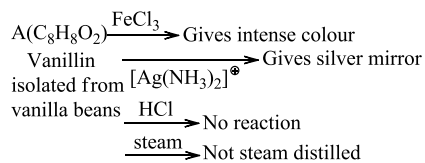
Paragraph for Question Nos. 173 to - 173



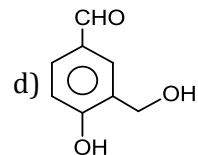
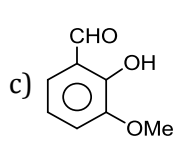
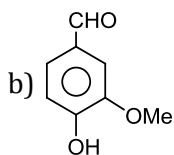
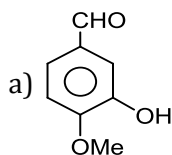
173. The compound (B) is:



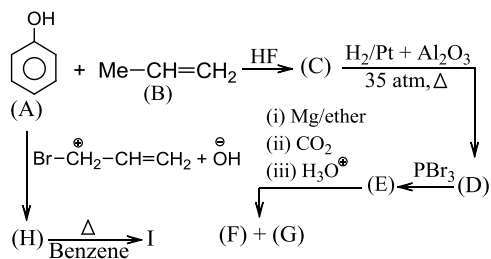
Paragraph for Question Nos. 174 to - 174



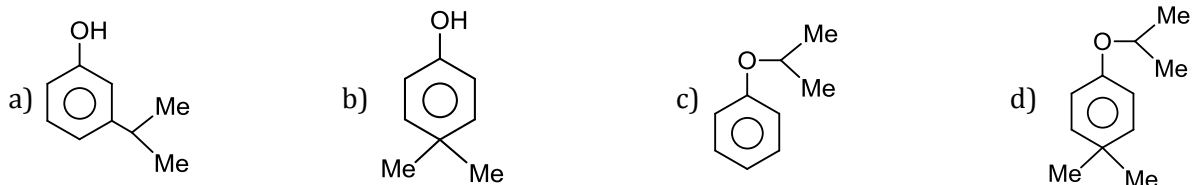
174. The compound (A) is:



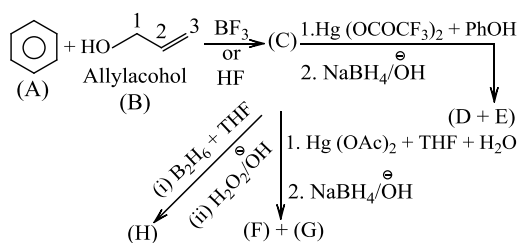
Paragraph for Question Nos. 175 to - 175



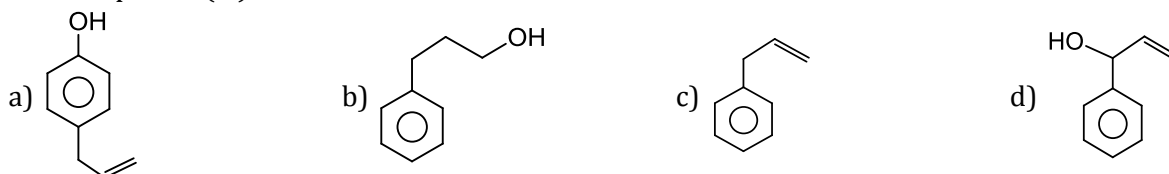
175. The compound (C) is:



Paragraph for Question Nos. 176 to - 176

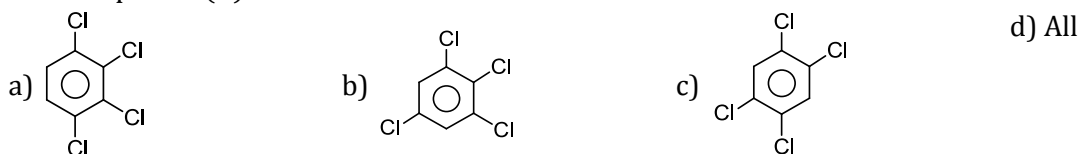


176. The compound (C) is:

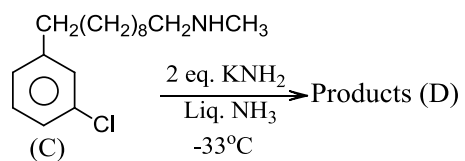
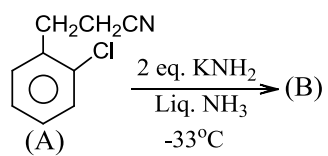


Paragraph for Question Nos. 177 to - 177

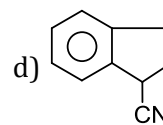
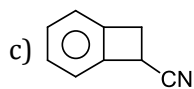
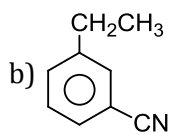
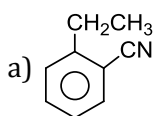
177. The compound (B) is:



Paragraph for Question Nos. 178 to - 178



178. The compound (B) is:



11.ALCOHOLS, PHENOLS AND ETHERS

: ANSWER KEY :

1) a	2) c	3) c	4) c	13) a,d	14) a	15) a,b,c,d	16)
5) b	6) d	7) b	8) d	a,b,c			
9) a	10) b	11) c	12) c	17) b,c	18) d	19) b,d	20)
13) b	14) d	15) b	16) a	a,b,c			
17) b	18) c	19) a	20) c	21) a,c,d	22) a,d	23) a,d	24)
21) c	22) d	23) a	24) a	a,b			
25) c	26) c	27) d	28) d	25) b,c	26) a,b,c,d	27) a,b,c,d	28)
29) c	30) a	31) c	32) c	a,c,d			
33) a	34) a	35) c	36) d	29) a, c, d	30) c	31) a,b	32)
37) c	38) b	39) b	40) a	b,c,d			
41) a	42) c	43) a	44) c	33) b,c	34) b,d	35) a,d	36)
45) b	46) b	47) c	48) d	a,b			
49) b	50) d	51) c	52) d	37) b,c	38) a,d	39) a,b,d	40)
53) c	54) b	55) d	56) d	b,c,d			
57) c	58) b	59) a	60) b	41) a,b,c	42) a,b,d	43) a	44)
61) c	62) b	63) c	64) a	a,d			
65) d	66) b	67) c	68) c	1) d	2) c	3) d	4) b
69) a	70) a	71) b	72) b	5) c	6) a	7) d	8) c
73) b	74) b	75) b	76) a	9) a	10) b	11) a	12) a
77) c	78) a	79) b	80) c	13) c	14) d	15) a	16) a
81) b	82) a	83) b	84) d	17) a	1) b	2) b	3) a
85) d	86) a	87) c	88) d	4) a			
89) b	90) a	91) c	92) b	5) d	6) d	7) b	8) a
93) a	94) b	95) a	96) b	9) a	1) c	2) a	3) b
1) a,b,c	2) b,c,d	3) a,b,c,d	4)	4) a			
a,c				5) d	6) b	7) b	8) b
5) d	6) a	7) a,c	8) a	9) b	10) c	11) c	12) c
9) c	10) a,c	11) a	12)				
a,b							

: HINTS AND SOLUTIONS :

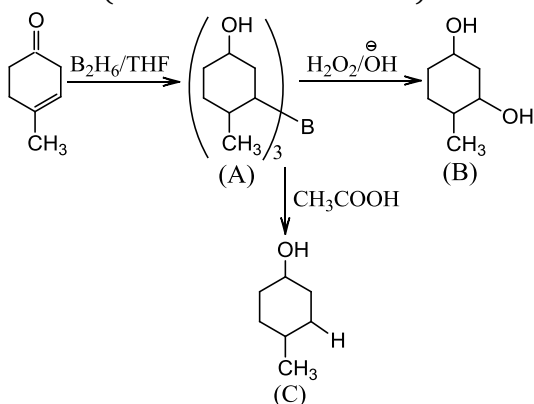
1 (a)
Reactivity of alcohol with HBr is $3^\circ > 2^\circ > 1^\circ$; (a) is 3° alcohol

6 (d)
 $IV > III > I > II$
In (IV), $(-\text{NO}_2)$ at *para* exerts more \bar{e} -withdrawing effect due to $-R$ and $-I$ effects, but in (III), $(-\text{NO}_2)$ at *m*-position exert only $-I$ effect. So, (IV) is stronger than (III).

Phenol (I) is stronger than (II) in which (Me) group exerts \bar{e} -donating effect due to $(+I$ and $H.C.)$. Hence, the order of acidic character is as given above

8 (d)
Reactivity of alcohol with Lucas reagent is $3^\circ > 2^\circ > 1^\circ$. Further, (d) is a 3° alcohol

9 (a)
 $\text{B}_2\text{H}_6/\text{THF}$ also reduces $(\text{C}=\text{O})$ group to $(-\text{CHOH})$ group and $(-\text{COOH})$ group to (CH_2OH) , along with reaction at $(\text{C}=\text{C})$ bond to form alcohol (anti-Markovnikov's rule)



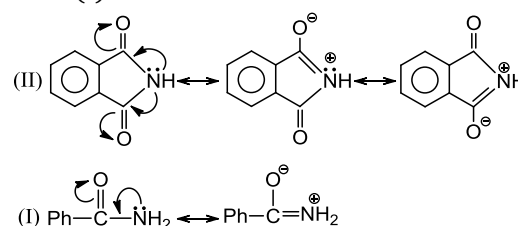
11 (c)
All are alcohols and form H-Bonding. Options (b), (c) and (d) have four C atoms. Only (C) is a straight chain alcohol having a larger surface area, and thus high boiling point

14 (d)
Six types of ethers cannot be prepared by Williamson's synthesis

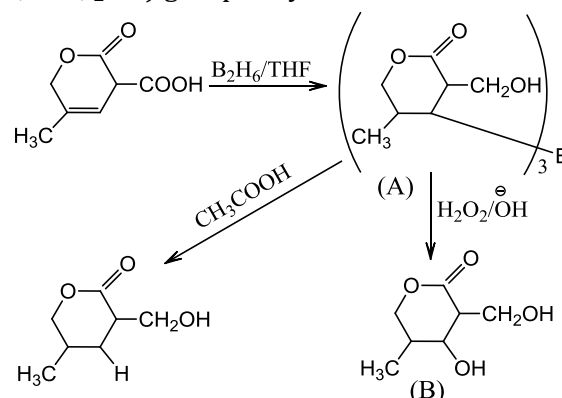
	RX	RONa
1.	2°C	2°
2.	2°C 3°C	3° 2°
3.	3°C	3°
4.	Ar	Ar
5.	Vinyl	Vinyl
6.	Neopentyl	Neopentyl

a. Not feasible, $\text{RX} = 3^\circ$, $\text{RONa} = 3^\circ$
b. Not feasible, $\text{RX} = 2^\circ$, $\text{RONa} = 2^\circ$
c. Not feasible, ArX, ArONa
d. Feasible, $\text{RX} = 1^\circ$, ArONa

16 (a)
Due to two \bar{e} -withdrawing $(\text{C}=\text{O})$ groups in (II), it is more acidic than (I) (one EW $(\text{C}=\text{O})$ group). Moreover, (II) is much more resonance stabilised than (I)



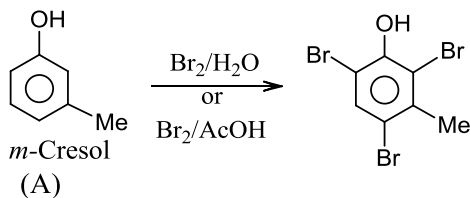
18 (c)
 $\text{B}_2\text{H}_6/\text{THF}$ besides reacting at $(\text{C}=\text{C})$ also selectively reduces only $(-\text{COOH})$ group to $(-\text{CH}_2\text{OH})$ group in cyclic ester



19 (a)
Picric acid is the strongest acid due to the presence of three (NO_2) group ($-R$ and $-I$ effect)

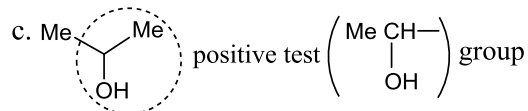
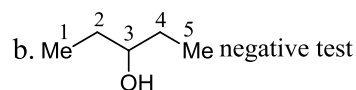
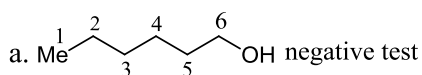
20 (c)
Phenol does not react with NaHCO_3 or Na_2CO_3 . Although picric acid is a phenolic compound (2,4,6-trinitrophenol), due to the presence of 3 NO_2 group (EWG), it is highly acidic and reacts with NaHCO_3 or Na_2CO_3

21 (c)
Four DU in A and $(\text{C}:\text{H} \approx 1:1)$ suggest benzene ring with one extra C atom. Reactivity with NaOH and FeCl_3 suggests (A) to be a phenol. The formation of a tribromo product suggests that *o*- and *p*-positions are vacant. So methyl group should be present at *m*-position. Hence, (A) is *m*-cresol



- 25 (c) A positive Fehling's solution test suggests the presence of ($-\text{CHO}$) group. (A) would be ($\text{C}_2\text{Cl}_3\text{OH} - \text{CHO}$) = $\text{Cl}_3\text{C} - \text{CHO}$ (chloral)
- $$\text{CH}_3 - \text{CH}_2\text{OH} \xrightarrow{\text{Cl}_2} \text{Cl}_3\text{C} - \text{CHO} \xrightarrow{[\text{O}]} \text{Cl}_3\text{C} - \text{COOH}$$
- (A) Chloral (B)

- 26 (c) Alcohols having ($\text{CH}_3 - \underset{|}{\text{CH}} - \text{OH}$) group give Iodofone test

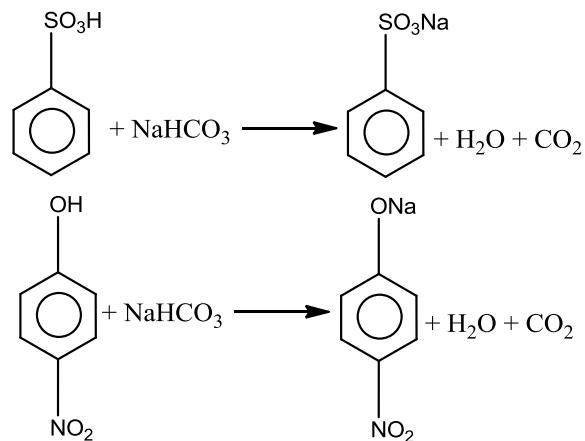


- 29 (c) Lucas reagent (anhyd. $\text{ZnCl}_2 + \text{conc. HCl}$ = 1:1); reactivity is $3^\circ > 2^\circ > 1^\circ$ alcohol; (c) is a 3° alcohol

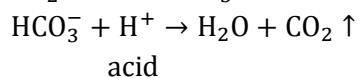
- 32 (c) Ethers are Lewis bases due to the presence of 2LP $\bar{e}'s$

- 34 (a) The positive charge that develops on benzylic C in this SN^1 reaction is most effectively delocalised by (OMe) group (+R and -I). The ($p - \text{NO}_2$) group withdraws \bar{e} density from the ring by -I and -R($p\text{-Cl}$) group withdraws $\bar{e}s'$ from the ring by -I only. More EDG (e.g. -OMe) stabilises positive charge on the benzyl C atom, whereas EWG (e.g. $-\text{NO}_2, -\text{Cl}$) destabilises the positive charge. Hence, the reactivity order is: I > II > III > IV

- 36 (d) Benzene sulphonic acid and p -nitro phenol react with NaHCO_3 and evolve CO_2 gas.



Because benzene sulphonic acid p -nitrophenol are stronger acids, so they are capable to evolve CO_2 with NaHCO_3 .



- 39 (b) The best method to prepare cyclohexene from cyclohexanol is by conc. H_3PO_4 because in given options dehydrating agent is conc. H_3PO_4 .

- 40 (a) H-bonding is maximum in ethanol because H is bounded to high EN element, i.e., O atom

- 47 (c) EDG favours SN^1 reactivity with HBr (The positive charge that develops on benzylic C in this SN^1 reaction is most effectively delocalised by (OMe) group (+R and -I). The ($p - \text{NO}_2$) group withdraws \bar{e} density from the ring by -I and -R($p\text{-Cl}$) group withdraws $\bar{e}s'$ from the ring by -I only. More EDG (e.g. -OMe) stabilises positive charge on the benzyl C atom, whereas EWG (e.g. $-\text{NO}_2, -\text{Cl}$) destabilises the positive charge. Hence, the reactivity order is: I > II > III > IV). EWG retards SN^1 reactivity with HBr. ED effect of (-OMe) (+R, -I) is greater than (Me) group (+I and H.C.). So, reactivity of III > II. In (IV), (-OMe) group is at m -position and exerts only -I effect and so reactivity of (IV) is less than (I) So the reactivity order is: III > II > I > IV

- 48 (d) Reaction of alcohol with Na indicates that (O - H) bond is most readily broken ($2\text{ROH} + 2\text{Na} \rightarrow 2\text{RONa} + \text{H}_2$)

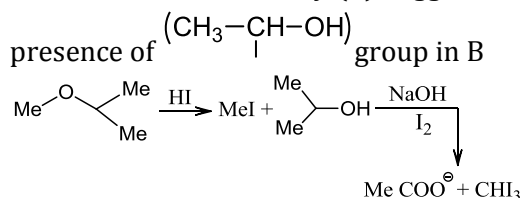
- 49 (b) Salol is phenyl salicylate

- 50 (d) Method (c) would give rearranged product also. It would give a mixture of 2-bromo and 3-bromo pentane. In methods (a) and (b), no

rearrangement occurs and it gives (B) exclusively. The tosyl group, a good leaving group, is then easily displaced by reaction with Br^- in an S_N^2 reaction

51 (c)

Zero DU in compound (A) suggests alcohol or ether. Non- reactivity with Na suggests (A) to be an ether Iodoform test by (B) suggests the



53 (c)

2.68 gm of (A) gives 14.08 gm of AgI
 134 gm of (A) gives $\frac{14.08 \times 134}{2.68} = 704$ gm of AgI
 $= \frac{704}{235} \text{ mol of AgI}$
 $= 3(\text{OMe})$ groups

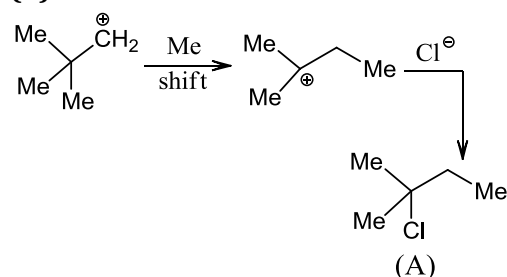
55 (d)

Intermolecular dehydration of two different 1° alcohols gives a mixture of ethers, ROR, ROR', and R'OR'

57 (c)

a. Not feasible, $\text{RX} = \text{NeopentylRONa} = \text{Neopentyl}$
 b. Not feasible, $\text{RX} = \text{Vinyl halide}, \text{RONa} = \text{Vinyl}$
 c. Not feasible, $\text{RX} = 1^\circ \text{RONa} = 3^\circ$
 d. Not Feasible, $\text{ArX}, \text{AONa} = 1^\circ$

58 (b)

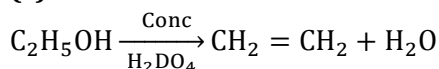


The formation of (B) does not involve carbocation formation and rearrangement, so the product (B) is $\text{Me}_3\text{CH}_2\text{Cl}$

60 (b)

Only the acidic ArOH is converted first to its conjugate base then to Me ether

63 (c)



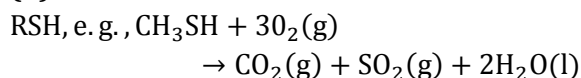
69 (a)

The cleavage of (C - OH) bond is feasible rather than cleavage of (Ar - OH) bond because of resonance stabilisation in ArOH

70 (a)

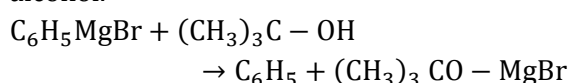
Reactivity with HBr is $3^\circ > 2^\circ > 1^\circ$ alcohol; (a) is a 3° alcohol. Phenol does not react with HBr. (Ar - O) bond is not broken unless the ring is activated by the presence of EWG (e.g., NO_2) at *o*- and *p*-positions

75 (b)



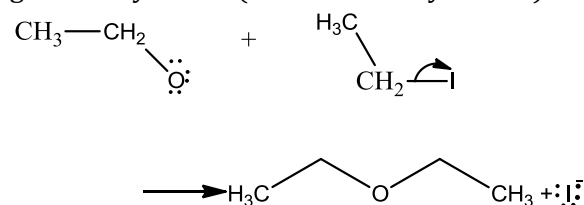
76 (a)

Phenyl magnesium bromide reacts with *t*-butanol to produce benzene because phenyl group (electronegative group) is associated with active hydrogen of alcohol, i.e., -H of -OH group of alcohol.



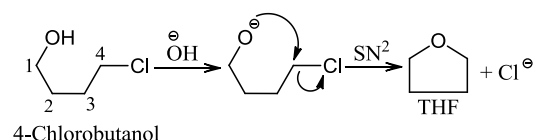
79 (b)

$\text{C}_2\text{H}_5\text{O}^-$ will attract the proton from phenol converting the later into phenoxide ion. This would then make nucleophilic attack on the methylene carbon of alkyl iodide, but $\text{C}_2\text{H}_5\text{O}^-$ is in excess $\text{C}_2\text{H}_5\text{O}^-$ is better nucleophile than $\text{C}_6\text{H}_5\text{O}^-$ (phenoxide) ion since while in the former the negative charge is localised over oxygen and in the later it is delocalised over the whole molecular frame work. So, it is $\text{C}_2\text{H}_5\text{O}^-$ ion that would make nucleophilic attack at ethyl iodide to give diethyl ether (Williamson's synthesis).



81 (b)

This is an example of intermolecular S_N^2 Williamson's reaction



84 (d)

Phenol (hydroxyl benzene) is more acidic than alcohols

90 (a)

$\text{ii} > \text{iv} > \text{iii} > \text{i}$ (allyl chloride $>$ 1° RBr $>$ 1° RCl $>$ neopentyl bromide. (R - Br) bond is weaker than (R - Cl) bond S_N^2 reaction is faster with (R - Br) than with (R - Cl)

91 (c)

Acid (IV) > Phenol (II) > Alcohols (I) > Alkyne (III)

92 (b)

Acid (II) > Ester (III) > Alcohol (I) > Ketone (IV)

97 (a, b, c)

A non-symmetrical ether is not usually prepared by heating a mixture of ROH and R'OH in acid. A mixture of three ether R-O-R, R-O-R, and R'-O-R' is obtained. So the products are:

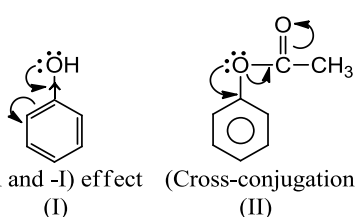
Pr-OH + n-BuOH

→ PrOBu(a) + PrOPr(b)

+ BuOBu(c)

99 (a, b, c, d)

1. Correct. SE reaction if favoured by EDG; less favoured by EWG

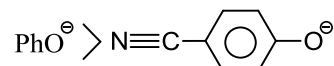


(+R and -I) effect (I) (Cross-conjugation) (II)

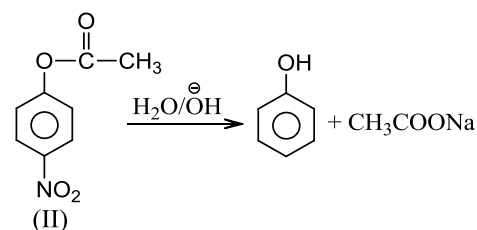
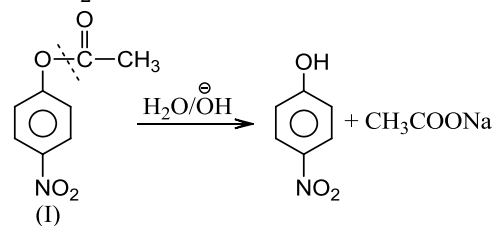
Due to cross-conjugation in (II), \bar{e} -donating power of oxygen to the ring decreases and hence it is less reactive than (I)

b. Acidic character: $\text{N}\equiv\text{C}-\text{C}_6\text{H}_4-\text{OH} > \text{PhOH}$
Due to EW (CN) group

Basic and nucleophilic character:



Since, PhO^- is a stronger nucleophile than $p-\text{NC}-\text{C}_6\text{H}_4\text{O}^-$. Hence, it reacts faster with PhCH_2Cl



As we know, (I) is faster than (II). The \bar{e} -withdrawing effect of ($p-\text{NO}_2$) group ($-R$ and $-I$), from O makes $p-\text{NO}_2-\text{C}_6\text{H}_4-\text{O}^-$ a weaker base and better leaving group
d. Esterification of PhOH is faster than p -nitrophenol phenol, a less acidic compound (or

more basic) is more reactive in acidic conditions.

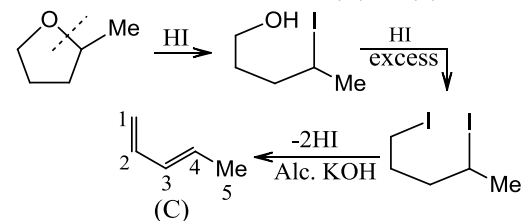
With its \bar{e} -withdrawing ($p-\text{NO}_2$) group, p -nitrophenol is less basic and less reactive

100 (a, c)

Even in the presence of two (Me) groups, (Ph) group a better migrator than (Me) group

102 (a)

One DU in (A) and formation of (B) with two I atoms suggest that (A) is a ring. The formation of (C) (five C atoms) suggest that (A) is a five-membered ring ether. So (A) is (a)



103 (a, c)

Acids are more acidic than phenol and phenols are more acidic than alcohols. p -Nitrophenol is a stronger acid than phenol due to $-R$ and $-I$ effects
 p -Methoxyphenol is weaker than phenol due to ($+R$ and $-I$) effects. So, phenol is less acidic than acetic acid and p -nitrophenol

111 (a, b, c, d)

All statements are self-explanatory

112 (a, b, c)

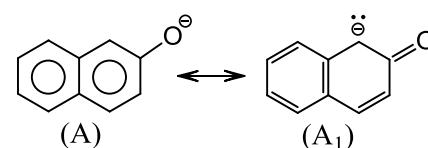
Ether has no hydrogen atom attached to oxygen and hence, does not react with Grignard reagent to form alkanes

118 (a, d)

Due to powerful electron withdrawing mesomeric effect of the phenyl group, the O-H bond in phenols is strongly polarised than O-H bond in saturated alcohols. Hence, phenols are more acidic than alcohols. The acidity of phenols also decreases if an electron repelling group are attached in benzene ring

119 (a, d)

The resonance structure of 2-naphthoxide ion (A) is:



(A) is an ambident nucleophile and a better nucleophile than (A_1) because negative charge is on more EN oxygen atom. In the presence of polar non-protic solvent (DMF, dimethyl formamide), O-alkylation is favoured to give product II (C)
In the presence of protic solvent, hydrogen

bonding with the O atom occurs, thus reducing the nucleophilicity of oxygen. Therefore, C-alkylation is favoured to give product I (B)

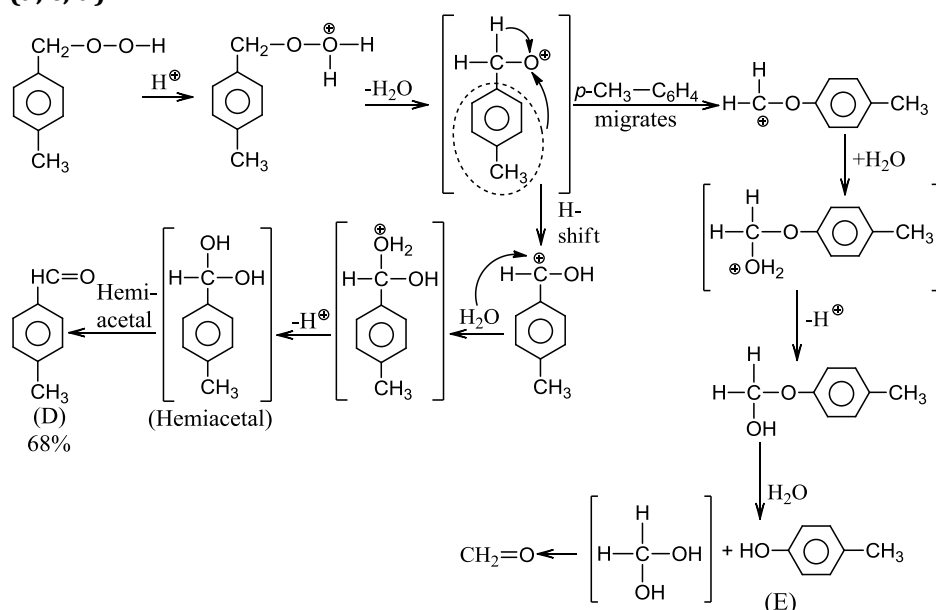
122 (a,b,c,d)

- Due to -I effect of Cl, 4-chlorophenol is acidic and dissolves in NaOH, (II) is an aryl halide and does not dissolve
- (III) is an acid and dissolves in NaHCO₃ but (IV) is a phenol and does not dissolve
- Although (V) is a phenol, because of the presence of (3NO₂) group, it is exceptionally acidic (pK_a = 0.38). So it dissolves in NaHCO₃, but (VI) is a phenol (pK_a = 10.17) and will not dissolve
- (VII) is a phenol and dissolves in NaOH, but (VIII) is an ether; and does not dissolve

123 (a,b,c,d)

- Although *o*-nitrophenol should be more acidic than *p*-nitrophenol, but due to intramolecular H-bonding it is less acidic

125 (a, c, d)



The yield of (D) is greater than (E) because H is a better migrator than the Ar-group. Moreover, there are 2H and one Ar-group, so statistically the yield of (D) is about twice that of (E)

128 (b,c,d)

Reaction (a) is not feasible since the ring is not activated by EWG (e.g., (NO₂) group). So, ArSN reaction is not feasible

129 (b,c)

Tertiary halide and aromatic halide do not give Williamson's ether synthesis

132 (a,b)

In presence of acids, alcohols act as Lewis base but in presence of base, they act as Bronsted acid, *ie*,

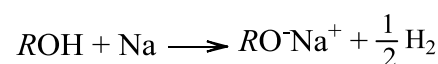
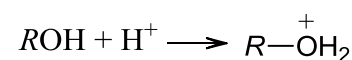
ii. There is only -I effect of (NO₂) group at *m*-position, so (b) is less acidic than (I) (-R and -I at *para*)

iii. Phenol is less acidic than (I) (-R and -I)

iv. *p*-Cresol is less acidic (+I and H.C. effects) of (Me)group than (-R and -I)

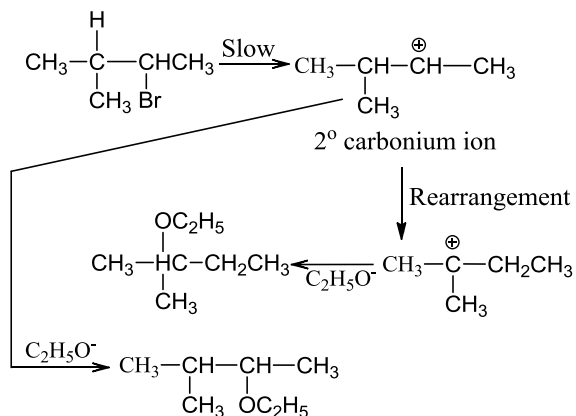
124 (a,c,d)

Cl₂ oxidises alcohols to aldehyde and ketones but does not convert them into RCl



133 (b,c)

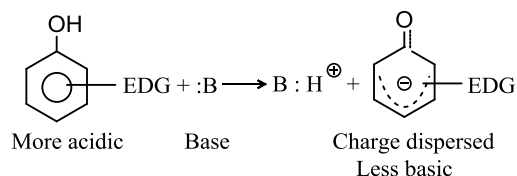
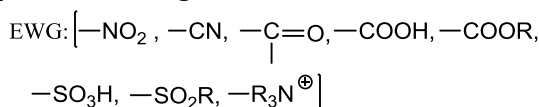
In S_N1 reaction, leaving group leaves first and then attack of nucleophile occurs



135 (a,b,d)

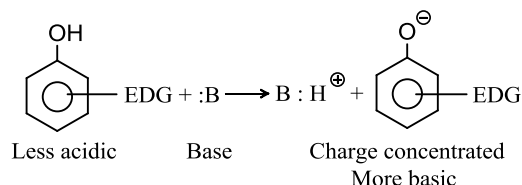
Ph-O-C=C (I), due to the presence of (C = C) bond, reacts with Br₂ by addition (thus, decolourise Br₂ solution) but II does not
 b. Due to -I effect of F in (III), it is a stronger acid than (IV) (+I effect of (Me) group)
 c. Wrong statement
 d. Effect of electron-donating and electron-withdrawing substituent on the acidity of phenols:

i. \bar{e} -withdrawing substituents disperse negative charges, making ArO[⊖] a weaker base and the phenol a stronger acid



ii. \bar{e} -donating substituents concentrate negative charges making ArO[⊖] a stronger base and the phenol a weaker acid

EDG: (R - OR, NH₂, NR₂)



136 (b,c,d)

In (a), the reverse reaction is feasible since phenol is a stronger acid than ethanol

137 (a,b,c)

a. PhOH has higher boiling point due to H-bonding
 b. Molecules of *p*-benzoquinone can fit closer in solid state causing it to have higher melting point
 c and d
 Intramolecular H-bonding (chelation) in the *o*-

isomers inhibits the intermolecular attraction, lowers the boiling point, reduces H-bonding with H₂O, and decreases water solubilities.
 Intramolecular chelation does not occur in *m*- and *p*-isomers

138 (a,b,d)

a. The \bar{e} -donating effect of (OH) makes the ring of phenol very \bar{e} -rich, enabling it to readily donate \bar{e} 's to oxidising agents
 b. Benzaldehyde reacts with NaHSO₃ but PhCl does not
 c. Both react with NaOH to form sodium salts
 d. Dry ice (CO₂) reacts with aq. NaOH to form NaHCO₃, which reacts with acid to form PhCOONa + CO₂ + H₂O

142 (c)

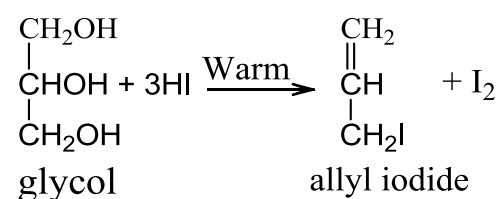
As the molecular weight increases, non-polar part increases and solubility decreases. So, statement I is correct. Statement II is incorrect because hydrogen bonding is not affected by an increase in the non-polar part

146 (a)

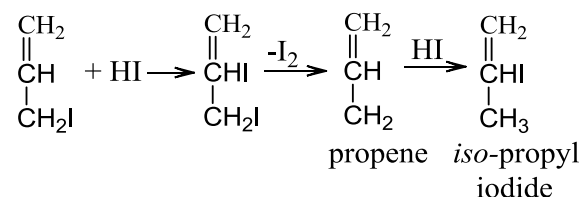
The high polarisation of O - H bond in alcohols gives rise to intramolecular hydrogen bonding, *ie*, molecules are brought nearer to each other and held together by attractive forces. No such hydrogen bonding exists in alkanes

147 (d)

When glycerol is heated with a small amount of HI, allyl iodide is formed



When glycerol is heated with a large amount of HI, the allyl iodide first formed is reduced to propene, which in presence of excess of HI forms isopropyl iodide



150 (b)

Due to the presence of lone pairs of electrons on

the oxygen atom, ethers behave as Lewis bases. They dissolve in acids like conc H_2SO_4 and conc HCl to form oxonium salts



153 (c)

(A) is true but (R) is false. ArSN reaction takes place if the ring is activated by EW (e. g., $-\text{NO}_2$) group only at *o* - and *p* - positions and not at *m*- position

156 (a)

In phenoxide ion all the resonating structures except one have negative charge on less electronegative carbon atom while in benzoate ion, both the resonating forms have negative charge on more electronegative oxygen atom

157 (a)

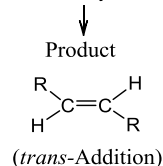
Both (A) and (R) are correct

159 (b)

a. It is pinacol formation which proceeds by radical anion

b. It is Birch reduction which proceeds by the formation

of radical anion \rightarrow vinylic radical \rightarrow *trans* vinylic anion



c. It is an example of claisen rearrangement reaction and proceeds by concerted mechanism
d. It is an example of Diels-Alder reaction and proceeds by concerted mechanism

160 (a)

a. Williamson's synthesis is used for the preparation of ether

b. Phenol gives distinct colour with neutral FeCl_3 solution

c. Lucas test is used for distinction between 1° , 2° , and 3° alcohols

162 (d)

In Fries rearrangement phenolic esters are heated in presence of AlCl_3

Claisen rearrangement-Ary-allyl ethers are heated.

Houben-Hoesch reaction- Polyhydroxy phenol undergo acylation with $\text{RNC} + \text{HCl}$

163 (d)

a. It is a mercuration-demercuration reaction;

formation of alcohol takes place according to Mark-ovnikov's rule. The first step of this reaction,

addition of electrophile AcO^+Hg^+ to $(\text{C} = \text{C})$ bond to form mercurinium ion, is stereospecific, but the second step, addition of H^- from NaBH_4 , is not clearly stereospecific. So, overall the reaction is non-stereospecific

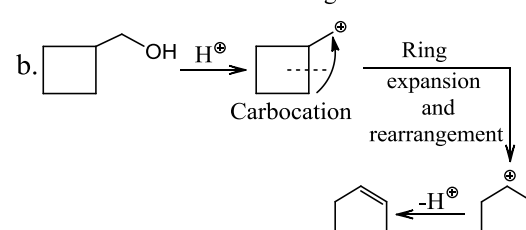
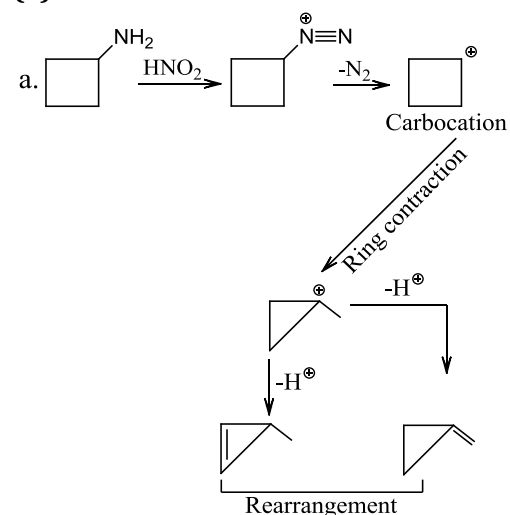
b. It is an alkoxy mercuration-demercuration reaction, which proceeds with a similar mechanism as in (a)

c. It is hydroboration oxidation (HBO) reaction.

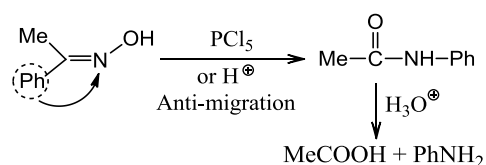
The formation of alcohol takes place with anti-Markovnikov's rule with syn-addition. The overall reaction is stereospecific

d. It is also an HBO reaction involving the formation of *cis*-alkene and proceeds with the similar mechanism as in (c)

165 (a)



c. It is an example of Beckmann rearrangement reaction.



d. It is an example of bimolecular reduction (formation of pinacol) followed by acid-catalysed rearrangement reaction to form pinacolone. The formation of pinacol proceeds by the formation of a radical anion intermediate

167 (c)

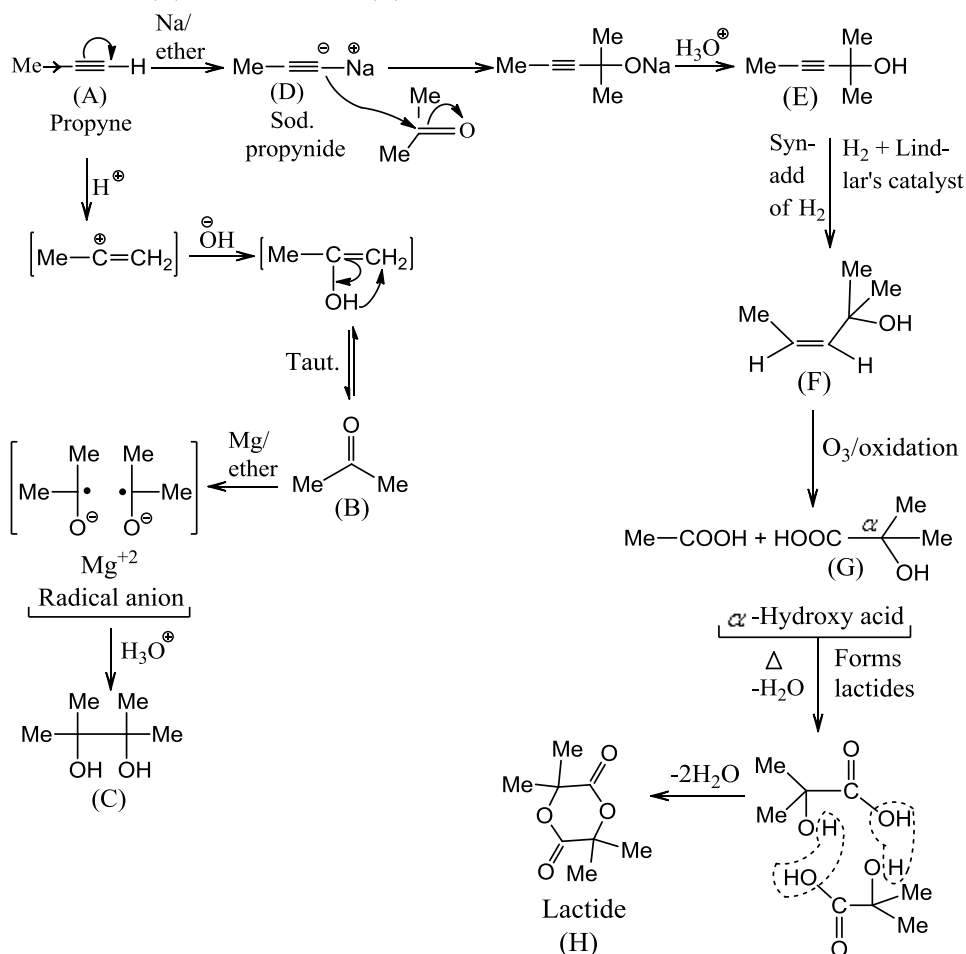
Of all the alcohols, methanol is the strongest acid

168 (a)

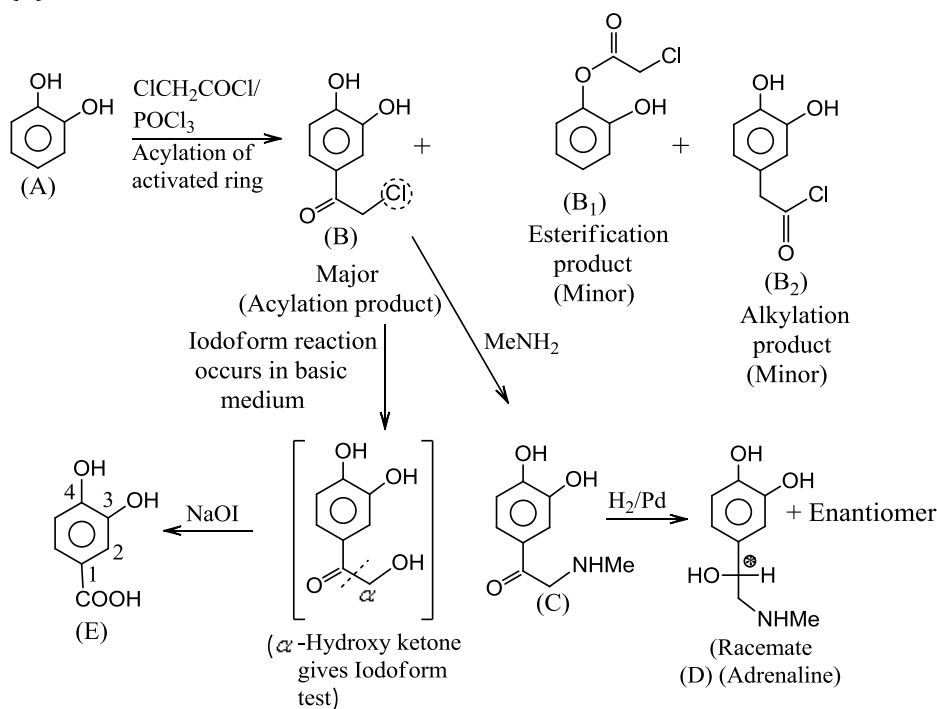
$\text{CH}_3\text{CH}_2\text{Br} + \text{CH}_3\text{ONa} \rightarrow \text{CH}_3\text{CH}_2\text{OCH}_3$ is an example of $\text{S}_{\text{N}}2$ reaction

169 (b)

Two DU in (A) suggests that (A) is propyne



171 (d)



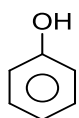
Esterification of both (OH) is

not feasible due to steric hindrance

174 (b)

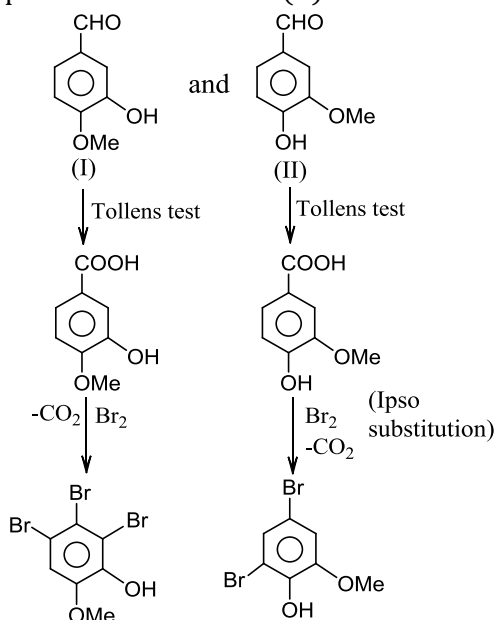
i. (A) gives colour with FeCl_3 , suggesting group

- ii. (A) gives positive Tollens reagent test, suggesting (-CHO) group
- iii. (A) contains only one (-OH) group, since it reacts with 1 mol of CH₃I to form mono methyl ether
- iv. (A) is not steam distilled, which suggests that (-OH) and (-CHO) groups are not in *ortho*-position
- v. Total C atom 0 atom, 6C (benzene) + (-CHO) + (-OH) group
- vi. Formula of (A) = C₈H₈O₃
- vii. To count for one additional C atom and one additional O atom, (-OCH₃) group must be present in (A)
- viii. A must contain



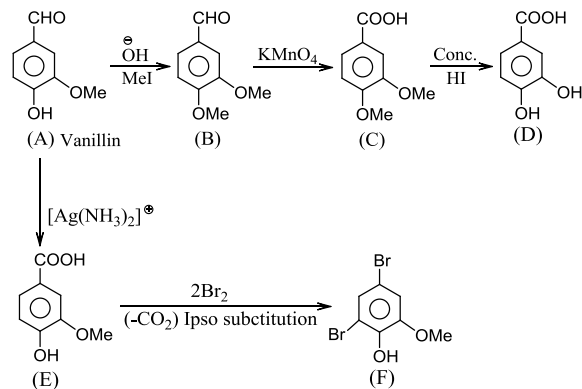
+ (-CHO group) +
 (+OMe group) and (-OH) and (-CHO) not in *ortho*-position

ix. Formation of (D), ; suggests two possible structures of (A):



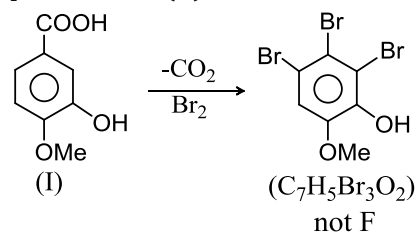
But the compound F (C₁₁H₆Br₂O₂) contains Br₂, which is only possible with compound (II). Therefore, structure (A) is (II)

Reactions:

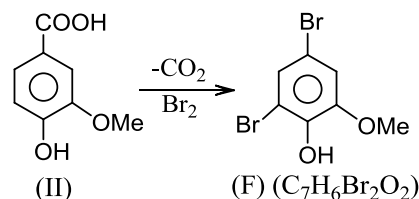


Alternative method of solving the problem

Start from (D) and proceed reverse to (C). (D) is obtained from (C) by HI, so two structure are possible for (A)



(or)



So, (A) is II and then proceed to find out other products