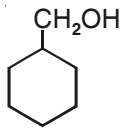
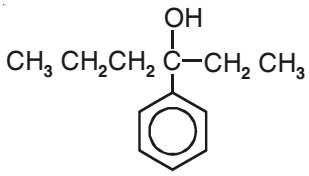
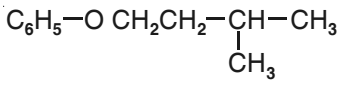
ALCOHOL PHENOLS AND ETHERS

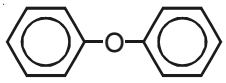
1. Write IUPAC names of the following compounds :

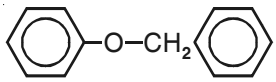
(i) 

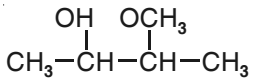
(ii) 

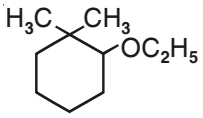
(iii) 

(iv) $C_3H—O\ CH_2\ CH_2—OCH_3$

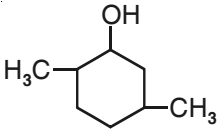
(v) 

(vi) 

(vii) 

(viii) 

(ix) $(CH_3)_3C—C=CH—C\equiv C—CH_2\ OH$

(x) 

2. Describe the following reactions giving an examples of each.

   (i) Riemer Tieman Reaction.

   (ii) Kolbe reaction.

   (iii) Williamson synthesis.

   (iv) Hydroboration oxidation of alkene.

3. Suggest the mechanism for the following reactions.

   (i) Acid catalysed dehydration of alcohols to form alkenes.

   (ii) Acid catalysed hydration of alkenes.

   (iii) Acid catalysed dehydration of ethanol to form ethers.

   (iv) Reaction of HI with ethers.

4. Suggest Chemical test to distinguish between the following pairs.

   (i) Primary, secondary and tertiary alcohols.

   (ii) Propan–1–ol and propan–2 ol.

   (iii) Ethanol and propan–2–ol.

   (iv) Ethanol and propan–1–ol.

   (v) Propan 2–ol and 2–methyl propan–2 ol.

   (vi) Ethanol and methanol.

   (vii) Ethanol and Phenol.

   (viii) Phenol and Benzyl alcohol.

   (ix) Propan–1–ol and 2–methyl propan–2ol.

5. Assign reason for the following :

   1. Phenol is acidic in nature.

   2. Whether *p*-nitrophenol is more or less acidic than phenol and why?

   3. Whether cresol is more or less acidic than phenol and why?

   4. Ortho-nitrophenol is steam volatile while para-nitro phenol is not.

   5. Boiling point of isomeric alcohols are Primary > Secondary > tertiary.

   6. Alcohols are comparatively more soluble in water than hydrocarbon of comparable molecular masses.

7. Boiling point of the ethers are lower than isomeric alcohols.

8. Symmetrical ethers have two similar alkyl groups but are still polar in nature.

9. Phenyl methyl ether reacts with HI to form phenol and iodomethane not iodo benzene and methanol.

10. Electrophilic substitution reactions like nitration or bromination are quicker in phenol then benzene.

11. During the preparation of unsymmetrical ethers, substituted alkyl group (secondary tertiary is taken as alkoxide and primary halides.

12. Ortho-nitrophenol is more acidic than ortho methoxy phenol.

13. Acid dehydration of secondary and tertiary alcohols do not form ethers.

14. The order of reactivity of halogen acid towards ether is HI > HBr > HCl.

6. Write the steps involved is the conversion of :

(i) Phenol to picric acid.

(ii) Phenol to 4-Bromo phenol.

(iii) Anisole to 4-bromo anisole.

(iv) Phenol to benzene.

(v) Anisole to *p*-methoxy acetophenone.

(vi) Benzene to phenol.

(vii) Propene to propan-2ol.

(viii) Toluene to benzyl alcohol.

(ix) Ethylmagnesium chloride to propan-1ol.

(x) Methyl magnesium bromide to propan-2ol.

(xi) Phenol to anisole.

(xii) Ethanol to propan-2ol.

(xiii) Propan-2ol to 2 methylpropan-2-ol.

(xiv) Ethanol to ethoxy ethane.

(xv) Propan-2ol to propan-1-ol.

(xvi) Phenol to aspirin.

(xvii) Aspirin to Salicyclic acid.

(xviii) Ethanol to ethane 1, 2-diol.

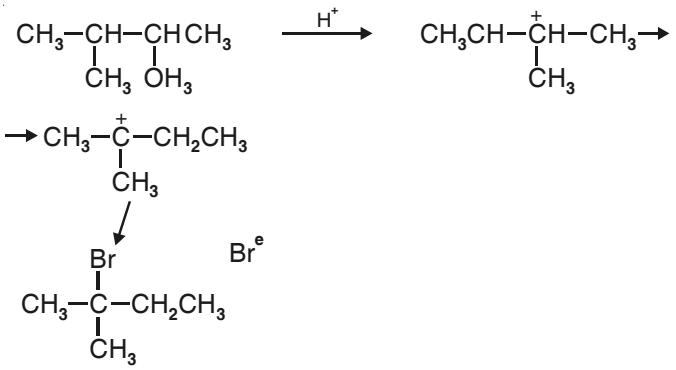
(xix) Anisole to orthonitro anisole.

(xx) Benzene to *m*-bromophenol.

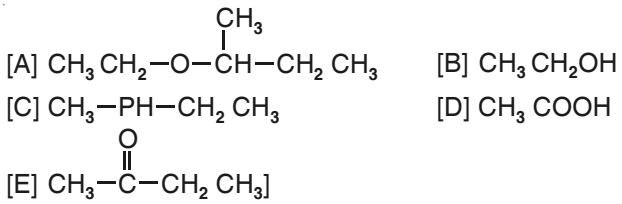
7. When 3-methylbuton-2ol is treated with H–Br the following reactions takes place.

Give a mechanism for this reaction.

[**Hint. :** The secondary carbocation formed in step II rearranges to a more stable tertiary carbocation by a hydride ion (H^+) shift from third carbon atom.



Hots* 8. An ether [A] $C_6H_{14}O$ when heated with excess of hot concentrated HI produced two alkyl halides, which on hydrolysis form compound [B] and [C]. Oxidation of [B] gave an acid [D] where as oxidation of [C] gave a ketone E. Deduce the structures of ketone. Deduce the structures of ABCD and E.

[**Ans. :** 

[A] $CH_3CH_2-O-CH(CH_3)-CH_2CH_3$ [B] CH_3CH_2OH

[C] $CH_3-PH-CH_2CH_3$ [D] CH_3COOH

[E] $CH_3-C(=O)-CH_2CH_3$]

Hots* 9. An alcohol (A) $C_4H_{10}O$ an oxidation with potassium dichromate gives a carboxylic acid (B) $C_4H_8O_2$. (A) is dehyderated with concentrated H_2SO_4 at 453K gives a compound (C) C_4H_8. Treatment of (C) with warm aqueous H_2SO_4 gives [D] $C_4H_{10}O$, an isomer of compound [A], compound [D] is resistant to oxidation. Identify compounds ABCD write the reactions.

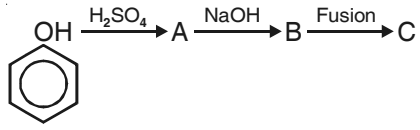
[**Ans. :** (A) 2-methylpropan-1-ol. (B) 2-methylpanoic acid. (C) 2-methyl propene. (D) 2-methyl propen-2-ol.

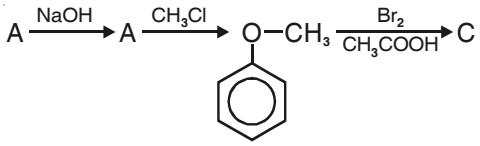
Hots* 10. A organic compound (A) having molecular formula C_6H_6O gives a characteristic colour with aqueous $FeCl_3$, solution. When A treated with carbondioxide and sodium hydroxide at 400k, under pressure, (B) is obtained. Compound (B) on acidification gives (C) which reacts with acetylchloride to from [D] which is a popular pain killer. Deduce the structure of A, B, C and D.

[A] = Phenol [B] = Sodium Salicylate

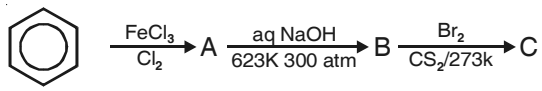
[C] = Salicyclic acid [D] = 2-acetoxy benzoic acid (aspirin)

11. Complete the following reactions :

(i) 

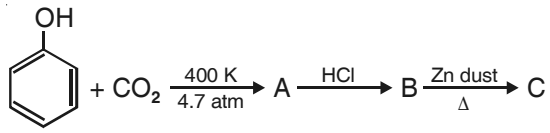
(ii) 

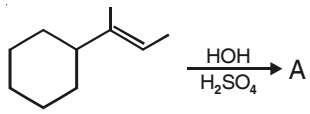
(iii) $CH_3CH_2OH \xrightarrow[573K]{hv} A \xrightarrow[H_2O]{CH_3MgBr} B \xrightarrow[573K]{CU} C$

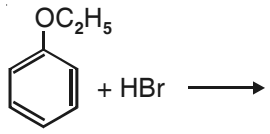
(iv) 

(v) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-O^-Na^+ + CH_3Cl \longrightarrow A + B$

(vi) $H_3C-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-Cl + Na^+ O^- CH_3 \longrightarrow A + B$

(vii) 

(viii) 

(ix) 

(x) $(CH_3)_3 - C - O\ C_2H_5 \xrightarrow{HI}$

12. Write the main products formed when :

(i) Phenol is heated with Zn dust.

(ii) Phenol is oxidised with alkaline potassium persulphate.

(iii) Methanol is heated with methyl magnesium Bromide.

(iv) Ethanol is heated with H_2SO_4 at 443K.

(v) Benzene is heated with propene in presence of H_3PO_4 followed by air oxidation and distillation with H_2SO_4.

(vi) Phenol is treated with aq. Br_2

(vii) Anisole is heated with conc. HNO_3 H_2 SO_4.

(viii) Anisole is heated with HI.

(ix) Propan-2 ol is passed over heated copper at 573K.

(x) Acetic acid is reduced with □i AlH_4 in ether.

13. Name the reagent used in the following reactions.

(i) Oxidation of ethanol to ethanoic acid.

(ii) Oxidation of ethanol to ethanol.

(iii) Bromination of phenol to 2, 4, 6 tri bromophenol.

(iv) Dehydration of propan-2 ol to propene.

(v) Penton-2 one to penton-2ol.

14. Write the structures of the compounds whose IUPAC names are as following.

(i) 3-methyl Pentan-2 ol.

(ii) 3, 5 dimethyl hexane 1, 3, 5 triol.

(iii) 2-ethoxy-2-methyl propane.

(iv) Cuclohexyl methanol.

(v) Cyclo pent-3 en-1 ol.

(vi) 1-phenyl butan-2-ol.

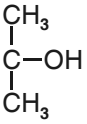
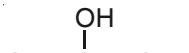
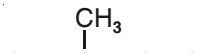
(vii) 2, 3 dimethyl phenol.

(viii) 2-ethoxy-3-methyl pentane.

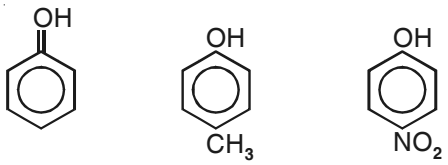
(ix) 3-cyclobutyl pentan-3ol.

(x) 3-chloromethyl pentan-1ol.

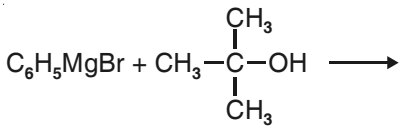
Hots* 15. Which of the following compound gives fastest reaction with HBr and why?

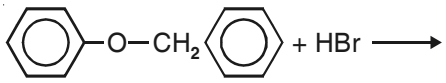
(a)  (b) $CH_3CH_2CH_2OH$ (c)  (d) 

16. Arrange the following compound in the decreasing order of acidic character.



17. Complete the following Reactions.

(i) 

(ii) 

(iii) $(CH_3)_2 - Cl\ CH_2CH_3 \xrightarrow[KOH]{\text{alcohol}}$

(iv) $C_6H_5CH_2-\underset{Br}{CH_2}\ CH_3 \xrightarrow[KOH]{C_2H_5OH}$ ..... $\xrightarrow{HBr}$