

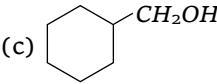
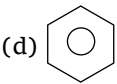
Ordinary Thinking

Objective Questions

General introduction of alcohol, Phenol & Ethers

- Butane-2-ol is [CPMT 1977, 89]
 - Primary alcohol
 - Secondary alcohol
 - Tertiary alcohol
 - Aldehyde
- Picric acid is [CPMT 1971, 80, 81; DPMT 1983; MP PMT 1990; BHU 1996]
 - Trinitroaniline
 - Trinitrotoluene
 - A volatile liquid
 - 2, 4, 6 trinitrophenol
- 3-pentanol is a [RPET 2002]
 - Primary alcohol
 - Secondary alcohol
 - Tertiary alcohol
 - None of these
- Glycerol is a [DPMT 1984, 2000; MP PET 2001; J & K 2005]
 - Primary alcohol
 - Monohydric alcohol
 - Secondary alcohol
 - Trihydric alcohol
- Cresols are
 - Hydroxy toluenes
 - Dihydric phenols
 - Trihydric phenols
 - Trihydric alcohols
- Carbon percentage is maximum in [BHU 1998]
 - Pyrene
 - Gammexane
 - Ethylene glycol
 - PVC
- Ortho-dihydroxy benzene is
 - Carvacrol
 - Resorcinol
 - Catechol
 - Orcinol
- Glycerine has [MP PMT/PET 1988; MP PMT 1989, 91; AIIMS 1997]
 - One primary and two secondary $-OH$ groups
 - One secondary and two primary $-OH$ groups
 - Three primary $-OH$ groups
 - Three secondary $-OH$ groups
- Which of the following is tertiary alcohol [DPMT 2000]

$\begin{array}{c} CH_2 - OH \\ \\ CH - OH \\ \\ CH_2 - OH \end{array}$	$\begin{array}{c} CH_2 \\ \\ CH_3 - CH_2 - CH_2OH \\ \\ CH_2 \\ \\ CH_3 \end{array}$
$\begin{array}{c} CH_3 \\ \\ CH_3 - C - OH \\ \\ CH_3 \end{array}$	$CH_3 - CH_2 - OH$
- Which is primary alcohol [CPMT 1980]
 - Butane-2-ol
 - Butane-1-ol
 - Propane-2-ol
 - Isopropyl alcohol
- Carbinol is [RPMT 2000]
 - C_2H_5OH
 - CH_3OH
- General formula of primary alcohol is [CPMT 1975]
 - $>CHOH$
 - $\rightarrow C - OH$
 - $-CH_2OH$
 - $=C \begin{array}{l} / OH \\ \backslash OH \end{array}$
- Which of following is phenolic [J & K 2005]
 - Phthalic acid
 - Phosphoric acid
 - Picric acid
 - Phenylacetic acid
- 1, 2, 3-trihydroxybenzene is also known as
 - Pyrogallol
 - Phloroglucinol
 - Resorcinol
 - Quinol
- Butanal is an example of [MP PET 1991]
 - Primary alcohol
 - Secondary alcohol
 - Aliphatic aldehyde
 - Aliphatic ketone
- Cyclohexanol is a
 - Primary alcohol
 - Secondary alcohol
 - Tertiary alcohol
 - Phenol
- The characteristic grouping of secondary alcohols is [DPMT 1984]
 - $-CH_2OH$
 - $>CHOH$
 - $\begin{array}{c} | \\ -C - OH \\ | \end{array}$
 - $\begin{array}{c} / OH \\ >C \\ \backslash OH \end{array}$
- Which of the following are isomers [AFMC 2005; BCECE 2005]
 - Methyl alcohol and dimethyl ether
 - Ethyl alcohol and dimethyl ether
 - Acetone and acetaldehyde
 - Propionic acid and propanone
- The compound $HOCH_2 - CH_2OH$ is
 - Ethane glycol
 - Ethylene glycol
 - Ethylidene alcohol
 - Dimethyl alcohol
- Methylated spirit is
 - Methanol
 - Methanol + ethanol
 - Methanoic acid
 - Methanamide
- The structural formula of cyclohexanol is [Bihar CEE 1995]

$\begin{array}{c} CH_2 \\ / \quad \backslash \\ H_2C \quad \quad \quad CHOH \\ \quad \quad \quad \\ H_2C \quad \quad \quad CH_2 \\ \backslash \quad / \\ \quad \quad \quad CH_2 \end{array}$	$\begin{array}{c} CH_2 \\ // \quad \backslash \\ H_2C \quad \quad \quad CHOH \\ \quad \quad \quad \\ H_2C \quad \quad \quad CH_2 \\ \backslash \quad / \\ \quad \quad \quad CH_2 \end{array}$
	



1218 Alcohol, Phenol and Ethers

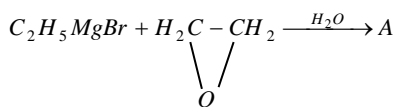
22. Molecular formula of amyl alcohol is
(a) $C_7H_{14}O$ (b) $C_6H_{13}O$
(c) $C_5H_{12}O$ (d) $C_5H_{10}O$
23. Carboic acid is [MP PET/PMT 1998; RPET 1999; KCET (Engg./Med.) 1999; BHU 2000; MP PET 2003]
(a) Phenol (b) Phenyl benzoate
(c) Phenyl acetate (d) Salol
24. Absolute alcohol is [RPMT 1997]
(a) 100% pure ethanol
(b) 95% alcohol + 5% H_2O
(c) Ethanol + water + phenol
(d) 95% ethanol + 5% methanol
25. Which of the following is dihydric alcohol [DCE 2004]
(a) Glycerol (b) Ethylene glycol
(c) Catechol (d) Resorcinol
26. Wood spirit is known as [AFMC 2004]
(a) Methanol (b) Ethanol
(c) Acetone (d) Benzene
27. Oxygen atom in ether is [MP PMT/PET 1988]
(a) Very active (b) Replaceable
(c) Comparatively inert (d) Active
28. Which of the following is a simple ether [AFMC 1997]
(a) CH_3OCH_3 (b) $C_2H_5OCH_3$
(c) $C_6H_5OCH_3$ (d) $C_6H_5OC_2H_5$
29. An example of a compound with the functional group '-O-' is [CPMT 1983]
(a) Acetic acid (b) Methyl alcohol
(c) Diethyl ether (d) Acetone
30. Which of the following do not contain an acyl group
(a) Acid chloride (b) Amide
(c) Ester (d) Ether
31. Name of $(CH_3)_2HC-O-CH_2-CH_2-CH_3$ is [MP PMT 1992]
(a) Isopropyl propyl ether (b) Dipropyl ether
(c) Di-isopropyl ether (d) Isopropyl propyl ketone
32. Acetals are [BVP 2003]
(a) Ketones (b) Diethers
(c) Aldehyde (d) Hydroxy aldehydes
33. In ethers, the C - O - C bond angle is
(a) 180° (b) 90°
(c) 110° (d) 160°
34. According to Lewis concept of acids and bases, ether is [CPMT 1994]
(a) Acidic (b) Basic
(c) Neutral (d) Amphoteric
35. The compound which is not isomeric with diethyl ether is [IIT 1981; CPMT 1989; Bihar MEE 1995; MP PET 2001]
(a) *n*-propylmethyl ether (b) Butan-1-ol
(c) 2-methylpropan-2-ol (d) Butanone
36. Structure of diethyl ether is confirmed by [DPMT 1985]
(a) Kolbe's synthesis (b) Frankland's synthesis
(c) Wurtz's synthesis (d) Williamson's synthesis
37. Fermentation is an [CPMT 1977; RPMT 1999]
(a) Endothermic reaction (b) Exothermic reaction
(c) Reversible reaction (d) None of these
38. Nitroglycerine is
(a) An ester (b) An alcohol
(c) A nitro compound (d) An acid
39. Which of the following are known as mercaptans [Pb. PMT 2002]
(a) Thio-alcohols (b) Thio-ethers
(c) Thio-acids (d) Thio-aldehydes

Preparation of alcohol, Phenol and Ethers

1. Ethanol is prepared industrially by [MP PMT 1989]
(a) Hydration of ethylene (b) Fermentation of sugars
(c) Both the above (d) None of these
2. Ethyl alcohol is industrially prepared from ethylene by [CPMT 1985]
(a) Permanganate oxidation
(b) Catalytic reduction
(c) Absorbing in H_2SO_4 followed by hydrolysis
(d) Fermentation
3. Propene, $CH_3-CH=CH_2$ can be converted to 1-propanol by oxidation. Which set of reagents among the following is ideal to effect the conversion [CBSE PMT 1999]
(a) Alkaline $KMnO_4$
(b) B_2H_6 and alkaline H_2O_2
(c) O_3/Zn dust
(d) $OsO_4/CH_4, Cl_2$
4. Which one of the following will produce a primary alcohol by reacting with CH_3MgI [MP PET 1991]
(a) Acetone (b) Methyl cyanide
(c) Ethylene oxide (d) Ethyl acetate
5. The fermentation of starch to give alcohol occurs mainly with the help of [CPMT 1971; MH CET 1999; RPMT 2000]
(a) O_2 (b) Air
(c) CO_2 (d) Enzymes
6. Coconut oil upon alkaline hydrolysis gives [MP PET 1991; AFMC 2000; KCET 2001; BCECE 2005]
(a) Glycol (b) Alcohol
(c) Glycerol (d) Ethylene oxide
7. Which enzyme converts glucose and fructose both into ethanol [MP PMT 1989, 90, 96; CPMT 1983, 84, 86, 94;

- KCET 1989; MNR 1978; MP PET 1994, 99]**
- (a) Diastase (b) Invertase
(c) Zymase (d) Maltase
8. Chlorination of toluene in the presence of light and heat followed by treatment with aqueous NaOH gives **[IIT-JEE 1990]**
- (a) *o*-cresol (b) *p*-cresol
(c) 2, 4-dihydroxy toluene (d) Benzyl alcohol
9. In the commercial manufacture of ethyl alcohol from starchy substances by fermentation method, which enzymes stepwise complete the fermentation reaction **[BIT 1992]**
- (a) Diastase, maltase and zymase
(b) Maltase, zymase and invertase
(c) Diastase, zymase and lactase
(d) Diastase, invertase and zymase
10. Primary alcohols can be obtained from the reaction of the $RMgX$ with **[Pb. PMT 2001]**
- (a) CO_2 (b) $HCHO$
(c) CH_3CHO (d) H_2O
11. On heating aqueous solution of benzene diazonium chloride, which is formed **[CPMT 1988; BHU 1980]**
- (a) Benzene (b) Chlorobenzene
(c) Phenol (d) Aniline
12. $LiAlH_4$ converts acetic acid into **[CPMT 1977; MP PMT 1990, 92]**
- (a) Acetaldehyde (b) Methane
(c) Ethyl alcohol (d) Methyl alcohol
13. Formaldehyde gives an additive product with methyl magnesium iodide which on aqueous hydrolysis gives **[MP PMT/PET 1988]**
- (a) Isopropyl alcohol (b) Ethyl alcohol
(c) Methyl alcohol (d) Propyl alcohol
14. Benzyl alcohol is obtained from benzaldehyde by **[CPMT 1983; MNR 1993]**
- (a) Fittig's reaction (b) Cannizaro's reaction
(c) Kolbe's reaction (d) Wurtz's reaction
15. Benzene diazonium chloride on boiling with dilute sulphuric acid gives **[MP PMT 1983]**
- (a) Toluene (b) Benzoic acid
(c) Benzene (d) Phenol
16. The reaction given below is known as **[CPMT 1990; KCET 1990; MH CET 2003; Pb. CET 2002]**
- $$C_2H_5ONa + IC_2H_5 \longrightarrow C_2H_5OC_2H_5 + NaI$$
- (a) Kolbe's synthesis (b) Wurtz's synthesis
(c) Williamson's synthesis (d) Grignard's synthesis
17. Salicylaldehyde can be prepared from **[CPMT 1983]**
- (a) Phenol and chloroform
(b) Phenol, chloroform and sodium hydroxide
(c) Phenol, carbon tetrachloride and NaOH
(d) None of these
18. If formaldehyde and potassium hydroxide are heated, then we get **[CPMT 1989, 90; KCET 2000]**
- (a) Acetylene (b) Methane
(c) Methyl alcohol (d) Ethyl formate
19. An organic compound dissolved in dry benzene evolved hydrogen on treatment with sodium. It is **[NCERT 1981; SCRA 1990]**
- (a) A ketone (b) An aldehyde
(c) A tertiary amine (d) An alcohol
20. $A \xrightarrow[\text{dil. } H_2SO_4]{K_2Cr_2O_7} B \xrightarrow[H_2O]{CH_3MgI} CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{OH}{|}}{C}} - CH_3$. The reactant A is **[MH CET 2002, 03; AFMC 2004; MP PMT/PET 1990; EAMCET 1989; CPMT 1988; MP PET 2000]**
- (a) $CH_3CHOHCH_3$ (b) CH_3COCH_3
(c) C_2H_5OH (d) CH_3COOH
21. The reaction, water gas $(CO + H_2) + H_2$ 673 K, 300 atmosphere in presence of the catalyst Cr_2O_3 / ZnO is used for the manufacture of **[MP PMT 1989]**
- (a) $HCHO$ (b) $HCOOH$
(c) CH_3OH (d) CH_3COOH
22. $CH_2 = CH_2 + B_2H_6 \xrightarrow[H_2SO_4]{NaOH}$ Product. Product in above reaction is
- (a) CH_3CH_2CHO (b) CH_3CH_2OH
(c) CH_3CHO (d) None of these
23. Phenolphthalein is obtained by heating phthalic anhydride with conc. H_2SO_4 and **[BHU 1996]**
- (a) Benzyl alcohol (b) Benzene
(c) Phenol (d) Benzoic acid
24. Maltose on hydrolysis gives **[BHU 1996; CPMT 2001]**
- (a) Mannose + glucose (b) Galactose + glucose
(c) Glucose (d) Mannose + fructose
25. Absolute alcohol can be obtained from rectified spirit **[KCET 1985]**
- (a) By removing the water in it using concentrated sulphuric acid
(b) By removing the water using phosphorus pentoxide
(c) By distilling with the appropriate amount of benzene
(d) By distilling over plenty of quick lime
26. Grignard reagent reacts with compounds containing which of the following groups **[MNR 1987]**
- (a) $>C=O$ (b) $-C \equiv N$
(c) $>C=S$ (d) All of these
27. $Oil + NaOH_{(aq)} \xrightarrow{\Delta}$ Glycerol + Soap Above reaction is called **[UPSEAT 2001]**
- (a) Saponification (b) Esterification
(c) Hydrogenation (d) None of these
28. Acetone on treatment with $CH_3 - Mg - I$ and on further hydrolysis gives **[UPSEAT 2000]**
- (a) Isopropyl alcohol (b) Primary alcohol
(c) Acetic acid (d) 2-methyl 2-propanol
29. In the following reaction 'A' is

1220 Alcohol, Phenol and Ethers



[MP PET 1994; CBSE PMT 1998]

- (a) $C_2H_5CH_2CHO$ (b) $C_2H_5CH_2CH_2OH$
 (c) $C_2H_5CH_2OH$ (d) C_2H_5CHO
30. Sodium benzene sulphonate reacts with $NaOH$ and then on acidic hydrolysis, it gives [Roorkee 1995; KCET 1998]
 (a) Phenol (b) Benzoic acid
 (c) Benzene (d) Disodium
- benzaldehyde
31. Phenol is obtained by heating aqueous solution of [MP PMT 1995]
 (a) Aniline
 (b) Benzene diazonium chloride
 (c) Benzoic acid
 (d) None of these
32. C_2H_5MgI reacts with $HCHO$ to form last product [MP PMT 1991]
 (a) CH_3CHO (b) C_3H_7OH
 (c) CH_3COCH_3 (d) CH_3COOCH_3
33. Which one is not synthesized by Grignard reagent [MP PET 1991]
 (a) Primary alcohol (b) Secondary alcohol
 (c) A ketone (d) An ester
34. Reaction of aqueous sodium hydroxide on (i) ethyl bromide and (ii) chlorobenzene gives
 (a) (i) Ethene and (ii) *o*-chlorophenol
 (b) (i) Ethyl alcohol and (ii) *o*-chlorophenol
 (c) (i) Ethyl alcohol and (ii) phenol
 (d) (i) Ethyl alcohol and (ii) no reaction
35. $RMgBr$ on reaction with an excess of oxygen followed by hydrolysis gives [Roorkee Qualifying 1998]
 (a) RH (b) $ROOR$
 (c) $ROOH$ (d) ROH
36. The reaction between an ester and excess of Grignard reagent shall finally result in a [UPSEAT 2000]
 (a) Primary alcohol (b) Secondary alcohol
 (c) Tertiary alcohol (d) Ketone
37. The compound that will react most readily with $NaOH$ to form methanol is [IIT-JEE (Screening) 2001]
 (a) $(CH_3)_4N^+I^-$ (b) CH_3OCH_3
 (c) $(CH_3)_3S^+I^-$ (d) $(CH_3)_3Cl$
38. When 2-ethylanthraquinol dissolved in a mixture of benzene and cyclohexanol is oxidised, the product is [JIPMER 1999]
 (a) Ethanol (b) Hydrogen peroxide
 (c) Anthracene (d) None of these
39. Which gas is eliminated in fermentation [RPMT 1997]
 (a) O_2 (b) CO_2
 (c) N_2 (d) H_2
40. Action of nitrous acid with ethylamine produces [BHU 2000]
 (a) Ethane (b) Ammonia
 (c) Ethyl alcohol (d) Nitroethane
41. The product of reduction of benzaldehyde is
 (a) Benzoic acid (b) Benzyl alcohol
 (c) Benzene (d) Catechol
42. Commercially methanol is prepared by [IIT 1984; MP PMT 1990; KCET 1992]
 (a) Reduction of CO in presence of $ZnO.Cr_2O_3$
 (b) Methane reacts with water vapours at $900^\circ C$ in presence of Ni catalyst
 (c) Reduction of $HCHO$ by $LiAlH_4$
 (d) Reduction of $HCHO$ by aqueous $NaOH$
43. Action of water in the presence of sulphuric acid with the following alkenes
 (i) $CH_3 - CH = C \begin{matrix} \swarrow CH_3 \\ \searrow CH_3 \end{matrix}$ and
 (ii) $CH_3 - CH = CH_2$ gives
 (a) $CH_3 - CH_2 - C \begin{matrix} \swarrow CH_3 \\ \searrow CH_3 \\ | OH \end{matrix}$ and (ii) $CH_3 - CH - CH_3$
| OH
- (b) (i) $CH_3 - CH = CH \begin{matrix} \swarrow CH_3 \\ \searrow CH_3 \end{matrix}$ and
| OH (ii) $CH_3 - CH_2 - CH_2OH$
- (c) (i) $CH_3 - CH - CH \begin{matrix} \swarrow CH_3 \\ \searrow CH_3 \\ | OH \end{matrix}$ and (ii)
| OH $CH_3 - CH - CH_3$
- (d) (i) $CH_3 - CH_2 - C \begin{matrix} \swarrow CH_3 \\ \searrow CH_3 \\ | OH \end{matrix}$ and
 (ii) $CH_3 - CH_2 - CH_2OH$
44. From Williamson's synthesis preparation of which of following is possible
 (a) Only symmetrical ethers (b) Only asymmetrical ethers
 (c) Both types (d) None of these
45. In the reaction $Ar - OH + Rx \xrightarrow{alkali} A$, A is [MP PET 1994]
 (a) An aldehyde (b) An aryl chloride
 (c) An ether (d) A ketone
46. Williamson's synthesis is used to prepare [DPMT 1976, 81, 82, 83, 84; CPMT 1976, 82]
 (a) Acetone (b) Diethyl ether
 (c) P.V.C. (d) Bakelite
47. When an alkyl halide is allowed to react with a sodium alkoxide the product most likely is [MP PMT 1996; EAMCET 1998]
 (a) An aldehyde (b) A ketone
 (c) An ether (d) A carboxylic acid
48. In Williamson's synthesis, ethoxyethane is prepared by [MP PMT 1995; BHU 2005]
 (a) Passing ethanol over heated alumina
 (b) Sodium ethoxide with ethyl bromide
 (c) Ethyl alcohol with sulphuric acid
 (d) Ethyl iodide and dry silver oxide
49. Formation of diethyl ether from ethanol is based on a

- (a) Dehydration reaction
 (b) Dehydrogenation reaction
 (c) Hydrogenation reaction
 (d) Heterolytic fission reaction
50. The compound formed when ethyl bromide is heated with dry silver oxide is [MP PET/PMT 1988]
 (a) Dimethyl ether (b) Diethyl ether
 (c) Methyl alcohol (d) Ethyl alcohol
51. The reagent used for the preparation of higher ether from halogenated ethers is [Tamil Nadu CET 2001]
 (a) conc. H_2SO_4 (b) Sodium alkoxide
 (c) Dry silver oxide (d) Grignard reagent
52. Acetyl bromide reacts with excess of CH_3MgI followed by treatment with a saturated solution of NH_4Cl gives [AIEEE 2004]
 (a) 2-methyl-2-propanol (b) Acetamide
 (c) Acetone (d) Acetyl iodide
53. What is obtained when chlorine is passed in boiling toluene and product is hydrolysed [DCE 2004]
 (a) *o*-Cresol (b) *p*-Cresol
 (c) 2, 4-Dihydroxytoluene (d) Benzyl alcohol
54. Which of the following is formed when benzaldehyde reacts with sodium hydroxide [Pb. CET 2002]
 (a) Benzyl alcohol (b) Benzoic acid
 (c) Glucose (d) Acetic acid
55. When ethanal reacts with CH_3MgBr and C_2H_5OH / dry HCl the product formed are [DCE 2003]
 (a) Ethyl alcohol and 2-propanol
 (b) Ethane and hemi-acetal
 (c) 2-propanol and acetal
 (d) Propane and methyl acetate
56. Which of the following is industrially prepared by passing ethylene into hypochlorous acid [BHU 2004]
 (a) Ethylene glycol (b) Ethylene oxide
 (c) Ethylene dinitrate (d) Ethane
57. In which case methyl-*t*-butyl ether is formed [Orissa JEE 2004]
 (a) $(C_2H_5)_3CONa + CH_3Cl$
 (b) $(CH_3)_3CONa + CH_3Cl$
 (c) $(CH_3)_3CONa + C_2H_5Cl$
 (d) $(CH_3)_3CONa + CH_3Cl$
58. Which of the following combinations can be used to synthesize ethanol [KCET 2004]
 (a) CH_3MgI and CH_3COCH_3
 (b) CH_3MgI and C_2H_5OH
 (c) CH_3MgI and $CH_3COOC_2H_5$
 (d) CH_3MgI and $HCOOC_2H_5$
59. $C_6H_5 - CH = CHCHO \xrightarrow{X} C_6H_5CH = CHCH_2OH$. In the above sequence X can be [DCE 2004]
 (a) H_2 / Ni (b) $NaBH_4$
 (c) $K_2Cr_2O_7 / H^+$ (d) Both (a) and (b)
60. Alkenes convert into alcohols by [MP PET 1991]
 (a) Hydrolysis by dil. H_2SO_4
 (b) Hydration of alkene by alkaline $KMnO_4$
 (c) Hydrolysis by water vapours and conc. H_2SO_4
 (d) Hydration of alkene by aqueous KOH
61. Acetic acid and CH_3OH are obtained on large scale by destructive distillation of
 (a) Wood (b) Coal
 (c) Turpentine (d) Crude oil
62. Which is formed when benzaldehyde reacts with nitrous acid [KCET (Med.) 2001]
 (a) C_6H_5OH (b) C_6H_5ON
 (c) $C_2H_5N_2OH$ (d) $C_6H_5CH_2OH$
63. Acid catalyzed hydration of alkenes except ethene leads to the formation of [AIEEE 2005]
 (a) Primary alcohol
 (b) Secondary or tertiary alcohol
 (c) Mixture of primary and secondary alcohols
 (d) Mixture of secondary and tertiary alcohols
64. Methylphenyl ether can be obtained by reacting [J & K 2005]
 (a) Phenolate ions and methyl iodide
 (b) Methoxide ions and bromobenzene
 (c) Methanol and phenol
 (d) Bromo benzene and methyl bromide

Properties of alcohol, Phenol and Ethers

1. Which compound is formed when CH_3OH reacts with $CH_3 - Mg - X$ [CPMT 1977, 89]
 (a) Acetone (b) Alcohol
 (c) Methane (d) Ethane
2. A compound X of formula C_3H_8O yields a compound C_3H_6O , on oxidation. To which of the following classes of compounds could X belong [Pb. PMT 2000]
 (a) Secondary alcohol (b) Alkene
 (c) Aldehyde (d) Tertiary alcohol
3. The boiling point of alcohol are than corresponding thiols [Pb. PMT 2000]
 (a) More (b) Same



1222 Alcohol, Phenol and Ethers

- (c) Either of these (d) Less
4. Methyl alcohol can be distinguished from ethyl alcohol using
[KCET 1984; BHU 2000]
(a) Fehling solution
(b) Schiff's reagent
(c) Sodium hydroxide and iodine
(d) Phthalein fusion test
5. A compound X with molecular formula C_3H_8O can be oxidised to a compound Y with the molecular formula $C_3H_6O_2$. X is most likely to be [MP PMT 1991]
(a) Primary alcohol (b) Secondary alcohol
(c) Aldehyde (d) Ketone
6. An alcohol on oxidation is found to give CH_3COOH and CH_3CH_2COOH . The structure of the alcohol is [BIT 1990]
(a) $CH_3CH_2CH_2OH$
(b) $(CH_3)_2C(OH)CH_2CH_3$
(c) $CH_3CH_2CHOHCH_3$
(d) $CH_3CH(OH)CH_2CH_2CH_3$
7. An organic liquid A containing C, H and O has a pleasant odour with a boiling point of $78^\circ C$. On boiling A with conc. H_2SO_4 a colourless gas is produced which decolourises bromine water and alkaline $KMnO_4$. One mole of this gas also takes one mole of H_2 . The organic liquid A is [KCET 1993]
(a) C_2H_5Cl (b) C_2H_5CHO
(c) C_2H_6 (d) C_2H_5OH
8. An aromatic amine (A) was treated with alcoholic potash and another compound (Y) when foul smelling gas was formed with formula C_6H_5NC . Y was formed by reacting a compound (Z) with Cl_2 in the presence of slaked lime. The compound (Z) is [CBSE PMT 1990]
(a) $C_6H_5NH_2$ (b) C_2H_5OH
(c) CH_3OCH_3 (d) $CHCl_3$
9. Rectified spirit obtained by fermentation contains 4.5% of water. So in order to remove it, rectified spirit is mixed with suitable quantity of benzene and heated. Benzene helps because [KCET 1987]
(a) It is dehydrating agent and so removes water
(b) It forms the lower layer which retains all the water so that alcohol can be distilled off
(c) It forms an azeotropic mixture having high boiling point and thus allows the alcohol to distill over
(d) It forms low boiling azeotropic mixtures which distill over, leaving behind pure alcohol which can then be distilled
10. $C_6H_5OH + ClCOCH_3 \xrightarrow{aq. NaOH} C_6H_5OCOCH_3$
is an example of [BHU 1984]
(a) Dow's reaction
(b) Reimer-Tiemann reaction
(c) Schotten-Baumann reaction
(d) Kolbe's reaction
11. Ortho-nitrophenol is steam volatile whereas para-nitrophenol is not. This is due to [CBSE PMT 1989]
(a) Intramolecular hydrogen bonding present in ortho-nitrophenol
(b) Intermolecular hydrogen bonding
(c) Intramolecular hydrogen bonding present in para-nitrophenol
(d) None of these
12. Reaction of phenol with dil. HNO_3 gives [KCET 1993; RPMT 1997]
(a) p and m -nitrophenols (b) o - and p -nitrophenols
(c) Picric acid (d) o - and m -nitrophenols
13. Phenol is less acidic than [IIT-JEE 1986; UPSEAT 2003; Orissa JEE 2004]
(a) Acetic acid (b) p -nitrophenol
(c) Both (a) and (b) (d) None of these
14. The strongest acid among the following aromatic compounds is [NCERT 1978]
(a) ortho-nitrophenol (b) para-chlorophenol
(c) para-nitrophenol (d) meta-nitrophenol
15. Diazo-coupling is useful to prepare some [CBSE PMT 1994]
(a) Pesticides (b) Proteins
(c) Dyes (d) Vitamins
16. Glycerol reacts with $P_4 + I_2$ to form [CBSE PMT 1991]
(a) Aldehyde (b) Allyl iodide
(c) Allyl alcohol (d) Acetylene
17. When glycerine is added to a litre of water which of the following behaviour is observed [NCERT 1977; BHU 1984]
(a) Water evaporates more easily
(b) The temperature of water is increased
(c) The freezing point of water is lowered
(d) The viscosity of water is lowered
18. Final product formed on reduction of glycerol by hydroiodic acid is [CPMT 1987]
(a) Propane (b) Propanoic acid
(c) Propene (d) Propyne
19. Glycerol was distilled with oxalic acid crystals and the products were led into Fehling solution and warmed. Cuprous oxide was precipitated. It is due to [KCET 1987]
(a) CO (b) $HCHO$
(c) CH_3CHO (d) $HCOOH$
20. Kolbe-Schmidt reaction is used for [CBSE PMT 1991]
(a) Salicylic acid (b) Salicylaldehyde
(c) Phenol (d) Hydrocarbon
21. Which of the following explains the viscous nature of glycerol [JIPMER 1997]
(a) Covalent bonds (b) Hydrogen bonds
(c) Vander Wall's forces (d) Ionic forces

22. On heating glycerol with conc. H_2SO_4 , a compound is obtained which has a bad odour. The compound is
 [CPMT 1974; CBSE PMT 1994]
 (a) Glycerol sulphate (b) Acrolein
 (c) Formic acid (d) Allyl alcohol
23. Isopropyl alcohol on oxidation forms
 [CPMT 1971, 81, 94; RPMT 2002]
 (a) Acetone (b) Ether
 (c) Ethylene (d) Acetaldehyde
24. Benzenediazonium chloride on reaction with phenol in weakly basic medium gives [IIT-JEE 1998]
 (a) Diphenyl ether (b) *p*-hydroxyazobenzene
 (c) Chlorobenzene (d) Benzene
25. The alcohol that produces turbidity immediately with $ZnCl_2$ + conc. HCl at room temperature
 [EAMCET 1997; MP PMT 1989, 99; IIT JEE 1981, 86; CBSE PMT 1989; CPMT 1989; MP PET 1997; JIPMER 1999]
 (a) 1-hydroxybutane
 (b) 2-hydroxybutane
 (c) 2-hydroxy-2-methylpropane
 (d) 1-hydroxy-2-methylpropane
26. The reagent which easily reacts with ethanol and propanol is
 [MP PET 1989]
 (a) Fehling solution (b) Grignard reagent
 (c) Schiff's reagent (d) Tollen's reagent
27. Propene is the product obtained by dehydrogenation of
 [KCET (Engg.) 2001]
 (a) 2-propanol (b) 1-propanol
 (c) Propanal (d) *n*-propyl alcohol
28. Which of the following statements is correct [BHU 1997]
 (a) Phenol is less acidic than ethyl alcohol
 (b) Phenol is more acidic than ethyl alcohol
 (c) Phenol is more acidic than carboxylic acid
 (d) Phenol is more acidic than carbonic acid
29. Boiling point of alcohol is comparatively higher than that corresponding alkane due to [MH CET 2002]
 (a) Intermolecular hydrogen bonding
 (b) Intramolecular hydrogen bonding
 (c) Volatile nature
 (d) None of these
30. When Phenol is heated with phthalic anhydride in concentrated sulphuric acid and the hot reaction mixture is poured into a dilute solution of sodium hydroxide, the product formed is [MP PET 1997, 2003; RPMT 1999; KCET (Med.) 2000; CPMT 1981; CBSE PMT 1988]
 (a) Alizarin (b) Methyl orange
 (c) Fluorescein (d) Phenolphthalein
31. $CH_3 - CH = CH - CH(OH) - CH_3 \xrightarrow[\text{reagent}]{\text{Jones'}}$ X ,
 Product X is [RPET 2000]
 (a) $CH_3CH_2CH_2CH(OH)CH_3$
 (b) $CH_3CH = CHCOCH_3$
 (c) Both (a) and (b) are correct
 (d) $CH_3CH_2CH_2COCH_3$
32. Reaction : $CH_3OH + O_2 \xrightarrow[\text{Ag}]{600^\circ C}$ product
 The product is [RPET 2000]
 (a) $CH_2 = C = O$ (b) $H_2C = O$
 (c) C_2H_4 (d) C_2H_2
33. Ethylene glycol, on oxidation with per-iodic acid, gives
 [NCERT 1983; CPMT 1983]
 (a) Oxalic acid (b) Glycol
 (c) Formaldehyde (d) Glycollic acid
34. An unknown compound 'D', first oxidised to aldehyde and then acetic acid by a dilute solution of $K_2Cr_2O_7$ and H_2SO_4 . The unknown compound 'D' is
 [BHU 2000]
 (a) CH_3CHO (b) CH_2CH_3OH
 (c) CH_3CH_2OH (d) $CH_3CH_2CH_3$
35. The reaction of ethylene glycol with PI_3 gives
 [MP PMT 2000]
 (a) ICH_2CH_2I (b) $CH_2 = CH_2$
 (c) $CH_2 = CHI$ (d) $ICH = CHI$
36. The compound 'A' when treated with ceric ammonium nitrate solution gives yellow ppt. The compound 'A' is
 [MP PET 2002]
 (a) Alcohol (b) Aldehyde
 (c) Acid (d) Alkane
37. Which of the following product is formed, when ether is exposed to air [AIIMS 2000; RPMT 2002]
 (a) Oxide (b) Alkanes
 (c) Alkenes (d) Peroxide of diethyl ether
38. During dehydration of alcohols to alkenes by heating with conc. H_2SO_4 the initiation step is [AIEEE 2003]
 (a) Protonation of alcohol molecule
 (b) Formation of carbocation
 (c) Elimination of water
 (d) Formation of an ester
39. Phenol is less acidic than [MNR 1995]
 (a) Ethanol (b) Methanol
 (c) *o*-nitrophenol (d) *p*-methylphenol
40. The compound which gives the most stable carbonium on dehydration is [MNR 1995]
 (a) $CH_3 - \underset{\text{CH}_3}{\text{CH}} - CH_2OH$

1224 Alcohol, Phenol and Ethers

- (b) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{OH} \\ | \\ \text{CH}_3 \end{array}$
- (c) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2\text{OH}$
- (d) $\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_3 \\ | \\ \text{OH} \end{array}$
41. At higher temperature, iodoform reaction is given by
[AIIMS 2003]
- (a) $\text{CH}_3\text{CO}_2\text{CH}_3$ (b) $\text{CH}_3\text{CO}_2\text{C}_2\text{H}_5$
(c) $\text{C}_6\text{H}_5\text{CO}_2\text{CH}_3$ (d) $\text{CH}_3\text{CO}_2\text{C}_6\text{H}_5$
42. Cresol has [CPMT 2003]
- (a) Alcoholic - OH (b) Phenolic - OH
(c) - COOH (d) - CHO
43. In $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow[350^\circ\text{C}]{\text{X}} \text{CH}_2 = \text{CH}_2 + \text{H}_2\text{O}$;
'X' is
- (a) NaCl (b) CaCl₂
(c) P₂O₅ (d) Al₂O₃
44. Sodium phenoxide reacts with CO₂ at 400 K and 4-7 atm pressure to give [MP PET 1996]
- (a) Sodium salicylate (b) Salicylaldehyde
(c) Catechol (d) Benzoic acid
45. The reaction of C₂H₅OH with H₂SO₄ does not give
[MP PET 1996]
- (a) Ethylene (b) Diethyl ether
(c) Acetylene (d) Ethyl hydrogen sulphate
46. The order of stability of carbonium ions is [MP PET 1996]
- (a) Methyl > ethyl > iso-propyl > tert-butyl
(b) Tert-butyl > iso-propyl > ethyl > methyl
(c) Iso-propyl > tert-butyl > ethyl > methyl
(d) Tert-butyl > ethyl > iso-propyl > methyl
47. Which statement is not correct about alcohol [AFMC 1997]
- (a) Alcohol is lighter than water
(b) Alcohol evaporates quickly
(c) Alcohol of less no. of carbon atoms is less soluble in water than alcohol of high no. of carbon atoms
(d) All of these
48. An organic compound A reacts with sodium metal and forms B. On heating with conc. H₂SO₄, A gives diethyl ether. A and B are [AFMC 1998]
- (a) C₂H₅OH and C₂H₅ONa
(b) C₃H₇OH and CH₃ONa
(c) CH₃OH and CH₃ONa
(d) C₄H₉OH and C₄H₉ONa
49. In the Liebermann's nitroso reaction, sequential changes in the colour of phenol occurs as [AFMC 1998; BHU 1999]
- (a) Brown or red → green → red → deep blue
(b) Red → deep blue → green
(c) Red → green → white
(d) White → red → green
50. Which one of the following reactions does not yield an alkyl halide [EAMCET 1998]
- (a) Diethyl ether + Cl₂
(b) Diethyl ether + HI
(c) Diethyl ether and PCl₅
(d) Diethyl ether $\xrightarrow{\text{Reduction}} \text{X} \xrightarrow{\text{SO}_2\text{Cl}_2}$
51. Compound A reacts with PCl₅ to give B which on treatment with KCN followed by hydrolysis gave propionic acid. What is A and B respectively [EAMCET 1998]
- (a) C₃H₈ and C₃H₇Cl
(b) C₂H₆ and C₂H₅Cl
(c) C₂H₅Cl and C₂H₅Cl
(d) C₂H₅OH and C₂H₅Cl
52. The increasing order of acidity among phenol, p-methylphenol, m-nitrophenol and p-nitrophenol is [CBSE PMT 1995; RPMT 2002]
- (a) m-nitrophenol, p-nitrophenol, phenol, p-methylphenol
(b) p-methylphenol, m-nitrophenol, phenol, p-nitrophenol
(c) p-methylphenol, phenol, m-nitrophenol, p-nitrophenol
(d) Phenol, p-methylphenol, p-nitrophenol, m-nitrophenol
53. Which of the following is not characteristic of alcohols [AFMC 1992]
- (a) Lower alcohols are stronger and have bitter taste
(b) Higher alcohols are stronger and have bitter taste
(c) The boiling points of alcohols increase with increasing molecular mass
(d) The lower alcohols are soluble in water
54. In reaction of alcohols with alkali metal, acid etc. which of the following alcohol will react fastest [BHU 1984]
- (a) Secondary (b) Tertiary
(c) Primary (d) All equal
55. Order of reactivity of alcohols towards sodium metal is [Pb. CET 1985]
- (a) Pri > Sec > Ter (b) Pri > Sec < Ter
(c) Pri < Sec > Ter (d) Pri < Sec < Ter
56. 23 g of Na will react with methyl alcohol to give

[NCERT 1972]

 (a) One mole of oxygen (b) One mole of H_2

 (c) $\frac{1}{2}$ mole of H_2 (d) None of these

57. Which reagent is useful in converting 1-butanol to 1-bromobutane [EAMCET 1989]

 (a) $CHBr_3$ (b) Br_2

 (c) CH_3Br (d) PBr_3

 58. The $-OH$ group of methyl alcohol cannot be replaced by chlorine by the action of [KCET 1989]

- (a) Chlorine
 (b) Hydrogen chloride
 (c) Phosphorus trichloride
 (d) Phosphorus pentachloride

59. Which of the following gives ketone on oxidation

[EAMCET 1987; BIT 1992]

 (a) $(CH_3)_3COH$ (b) $CH_3CH_2CH_2OH$

 (c) $(CH_3)_2CHCH_2OH$ (d) $CH_3CHOHCH_3$

60. Phenol is treated with bromine water and shaken well. The white precipitate formed during the process is [KCET (Med.) 2001; BIT 1992; AIIMS 1996; KCET 2001]

- (a) *m*-bromophenol
 (b) 2, 4-dibromophenol
 (c) 2, 4, 6-tribromophenol
 (d) A mixture of *o*- and *p*-bromophenols

61. Which compound has the highest boiling point

[MP PET 2003]

- (a) Acetone (b) Diethyl ether
 (c) Methanol (d) Ethanol

62. When vapour of ethanol are passed over platinised asbestos in excess of air, the compound formed is [CPMT 1983]

 (a) CH_3CHO (b) CH_3COCH_3

 (c) C_2H_2 (d) CH_3COOH

63. Dehydration of ethanol gives [CPMT 1985; BHU 1989]

- (a) Acetic acid (b) Ethane
 (c) Ethylene (d) Acetylene

64. Which of the following compound will give positive iodoform test [MP PMT 1986, 99; SCRA 1991; CPMT 1994]

(a) CH_3OH (b) $CH_3-\overset{H}{\underset{CH_3}{|}{C}}-OH$

(c) $CH_3-\overset{CH_3}{\underset{CH_3}{|}{C}}-OH$ (d) $CH_3CH_2CH_2OH$

65. Absolute ethanol cannot be obtained by simple fraction of a solution of ethanol and water because

[KCET 1984; MP PMT 1987]

- (a) Their B.P.'s are very nearer

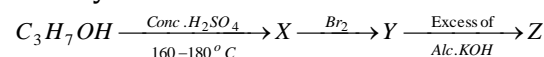
- (b) Ethanol remains dissolved in water
 (c) They form a constant boiling mixture
 (d) Ethanol molecules are solvated

 66. The alcohol which easily reacts with conc. HCl is

[MP PMT 1985]

- (a) $CH_3-CHOH-CH_2-CH_3$
 (b) $(CH_3)_3C-OH$
 (c) $CH_3-CH_2-CH_2-CH_2-OH$
 (d) $(CH_3)_3C-CH-CH_2OH$

67. In the following series of chemical reactions, identify Z



[Manipal MEE 1995]

- (a) $CH_3-\underset{NH_2}{|}{CH}-\underset{NH_2}{|}{CH_2}$ (b) $CH_3-\underset{OH}{|}{CH}-\underset{OH}{|}{CH_2}$
 (c) $CH_3-\underset{OH}{|}{C} = CH_2$ (d) $CH_3C \equiv CH$

68. Alcohols of low molecular weight are

[CPMT 1976, 89; Pb. PMT 2000]

- (a) Soluble in water
 (b) Soluble in all solvents
 (c) Insoluble in all solvents
 (d) Soluble in water on heating

69. Which of the following compounds is oxidised to prepare methyl ethyl ketone [DCE 2001]

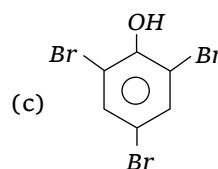
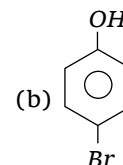
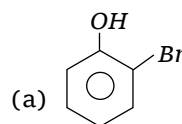
- (a) 2-propanol (b) 1-butanol
 (c) 2-butanol (d) Tert-butyl alcohol

70. Which of the following is acidic

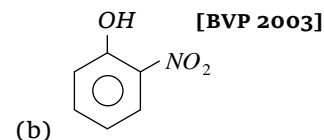
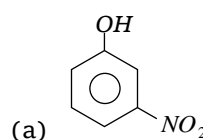
[CBSE PMT 2001; MH CET 2001]

- (a) CH_3OH (b) C_6H_5OH
 (c) $(CH_3)_2CHOH$ (d) CH_3CH_2OH

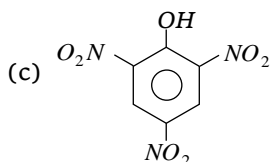
71. With excess bromine, phenol reacts to form



(d) Mixture of (a) and (b)

 72. Which is obtained on treating phenol, with dilute HNO_3


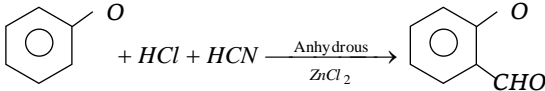
1226 Alcohol, Phenol and Ethers



(d) None of these

73. Primary alcohols on dehydration give [NCERT 1986]
 (a) Alkenes (b) Alkanes
 (c) Both (a) and (b) (d) None of these
74. Primary and secondary alcohols on action of reduced copper give [CPMT 1982; MP PMT 1985; EAMCET 1987, 93; MP PET 1995]
 (a) Aldehydes and ketones respectively
 (b) Ketones and aldehydes respectively
 (c) Only aldehydes
 (d) Only ketones
75. Methyl alcohol on oxidation with acidified $K_2Cr_2O_7$ gives [MNR 1987]
 (a) CH_3COCH_3 (b) CH_3CHO
 (c) $HCOOH$ (d) CH_3COOH
76. Ethyl alcohol on oxidation with $K_2Cr_2O_7$ gives [MNR 1987; Bihar CEE 1995; UPSEAT 2000]
 (a) Acetic acid (b) Acetaldehyde
 (c) Formaldehyde (d) Formic acid
77. Lucas test is used for [CBSE PMT 1990; AIIMS 2002; AFMC 2005]
 (a) Alcohols (b) Amines
 (c) Diethyl ether (d) Glacial acetic acid
78. When phenol reacts with ammonia in presence of $ZnCl_2$ at $300^\circ C$, it gives [AFMC 2001]
 (a) Primary amine (b) Secondary amine
 (c) Tertiary amine (d) Both (b) and (c)
79. Azo-dyes are prepared from [CPMT 2001]
 (a) Aniline (b) Benzaldehyde
 (c) Benzoic acid (d) Phenol
80. A compound that easily undergoes bromination is [KCET (Engg.) 2002]
 (a) Phenol (b) Toluene
 (c) Benzene (d) Benzoic acid
81. Which of the following has lowest boiling point [MH CET 1999]
 (a) *p*-nitrophenol (b) *m*-nitrophenol
 (c) *o*-nitrophenol (d) phenol
82. In esterification, the reactivity of alcohols is [DPMT 2000]
 (a) $1^\circ > 2^\circ > 3^\circ$ (b) $3^\circ > 2^\circ > 1^\circ$
 (c) Same in all cases (d) None of these
83. The role of conc. H_2SO_4 in the esterification process is [RPMT 1999]
 (a) Catalyst
 (b) Dehydrating agent
 (c) Hydrolysing agent
 (d) Dehydrating agent and catalyst
84. Methanol and ethanol are distinguished by the [MP PET 1999]
 (a) Action of HCl (b) Iodoform test
 (c) Solubility in water (d) Sodium
85. For phenol, which of the following statements is correct [MP PMT 1995]
 (a) It is insoluble in water
 (b) It has lower melting point compared to aromatic hydrocarbons of comparable molecular weight
 (c) It has higher boiling point than toluene
 (d) It does not show acidic property
86. The reaction of Lucas reagent is fast with [MP PMT 2000]
 (a) $(CH_3)_3COH$ (b) $(CH_3)_2CHOH$
 (c) $CH_3(CH_2)_2OH$ (d) CH_3CH_2OH
87. Which of the following reagents convert the propene to 1-propanol [CBSE PMT 2000]
 (a) H_2O, H_2SO_4
 (b) Aqueous KOH
 (c) $MgSO_4, NaBH_4 / H_2O$
 (d) B_2H_6, H_2O_2, OH^-
88. Compound 'A' reacts with PCl_5 to give 'B' which on treatment with KCN followed by hydrolysis gave propanoic acid as the product. What is 'A' [CBSE PMT 2000]
 (a) Ethane (b) Propane
 (c) Ethyl chloride (d) Ethyl alcohol
89. Which reagent can convert acetic acid into ethanol [BVP 2003]
 (a) $Na + alcohol$ (b) $LiAlH_4 + ether$
 (c) $H_2 + Pt$ (d) $Sn + HCl$
90. Which of the following would undergo dehydration most readily [UPSEAT 2000]
 (a) 1-phenyl-1butanol (b) 2-phenyl-2-butanol
 (c) 1-phenyl-2-butanol (d) 2-phenyl-1-butanol
91. Phenol and benzoic acid is distinguished by [BHU 2003]
 (a) $NaOH$ (b) $NaHCO_3$
 (c) Na_2CO_3 (d) H_2SO_4
92. Electrophilic substitution reaction in phenol take place at [RPMT 2002]
 (a) *p*- position (b) *m*- position
 (c) *o*- position (d) *o*- and *p*- position
93. Liebermann's test is answered by [KCET 1998]

- (a) Aniline (b) Methylamine
(c) Ethyl benzoate (d) Phenol
94. In the sequence of the following reactions [MP PMT 2001, 1994]

$$CH_3CH_2OH \xrightarrow[\text{Chromic Acid}]{[O]} X \xrightarrow[\text{Chromic Acid}]{[O]} CH_3COOH$$
 X is
 (a) CH_3COCH_3 (b) CH_3CHO
 (c) CH_3OCH_3 (d) CH_3CH_2COOH
95. The boiling point of glycerol is more than propanol because of [CPMT 1997, 2002]
 (a) Hydrogen bonding (b) Hybridisation
 (c) Resonance (d) All the above
96. Which of the following produces violet colour with $FeCl_3$ solution
 (a) Enols (b) Ethanol
 (c) Ethanal (d) Alkyl halides
97. When heated with NH_3 under pressure alone or in presence of zinc chloride phenols are converted into [RPMT 1997]
 (a) Aminophenols (b) Aniline
 (c) Nitrobenzene (d) Phenyl hydroxylamine
98. Because of resonance the oxygen atom of $-OH$ group of phenol
 (a) Acquires positive charge (b) Acquires negative charge
 (c) Remains unaffected (d) Liberates
99. When glycerol is heated with $KHSO_4$ it gives [CPMT 1974, 85; MP PMT 1988, 90, 91, 92, 94; MP PET 1988, 92]
 (a) $CH_2 = CH - CH_3$ (b) $CH_2 = CH - CH_2OH$
 (c) $CH_2 = CH - CHO$ (d) $CH_2 = C = CH_2$
100. An organic compound X on treatment with acidified $K_2Cr_2O_7$ gives a compound Y which reacts with I_2 and sodium carbonate to form triodomethane. The compound X is [KCET 1996]
 (a) CH_3OH (b) $CH_3 - CO - CH_3$
 (c) CH_3CHO (d) $CH_3CH(OH)CH_3$
101. The reaction of conc. HNO_3 and phenol forms [MP PMT/PET 1988; BHU 1988; MP PMT 1999; Pb. PMT 2000]
 (a) Benzoic acid (b) Salicylic acid
 (c) *o*- and *p*-nitrophenol (d) Picric acid
102. Phenol is [MP PMT 1990; UPSEAT 1999]
 (a) A weaker base than NH_3
 (b) Stronger than carbonic acid
 (c) Weaker than carbonic acid
 (d) A neutral compound
103. Phenol at $25^\circ C$ is
 (a) A white crystalline solid (b) A transparent liquid
 (c) A gas (d) Yellow solution
- At low temperature phenol reacts with Br_2 in CS_2 to form [MP PET 1991; CPMT 1981; MP PMT 1990; IIT 1982; RPMT 2000]
 (a) *m*-bromophenol (b) *o*- and *p*-bromophenol
 (c) *p*-bromophenol (d) 2, 4, 6-tribromophenol
105. Oxidation of ethanol by chromic acid forms [MP PET 1992]
 (a) Ethanol (b) Methanol
 (c) 2-propanone (d) Ethanoic acid
106. Which of the following not gives effervescence with $NaHCO_3$ [MP PET 1992]
 (a) Phenol (b) Benzoic acid
 (c) 2, 4-dinitrophenol (d) 2, 4, 6-trinitrophenol
107. Conc. H_2SO_4 reacts with C_2H_5OH at $170^\circ C$ to form [MP PMT 1991; MP PET 1991; IIT-JEE 1981; EAMCET 1979; KCET 2001]
 (a) CH_3COCH_3 (b) CH_3COOH
 (c) CH_3CHO (d) C_2H_4
108. Which compound has hydrogen bonding [MP PMT 1992; MP PET 1991]
 (a) Toluene (b) Phenol
 (c) Chlorobenzene (d) Nitrobenzene
109. Which statement is true [MP PMT 1991]
 (a) C_6H_5OH is more acidic than C_2H_5OH
 (b) C_6H_5OH is less acidic than C_2H_5OH
 (c) C_6H_5OH react with $NaHCO_3$
 (d) C_6H_5OH gives oxime with NH_2OH and HCl
110. Read the following statements carefully :
 (A) A secondary alcohol on oxidation gives a ketone
 (B) Ethanol reacts with conc. H_2SO_4 at $180^\circ C$ to yield ethylene
 (C) Methanol reacts with iodine and sodium hydroxide to give a yellow precipitate of iodoform
 (D) Hydrogen gas is liberated when sodium is added to alcohol. Select the correct statements from the above set:
 (a) A, B (b) C, D
 (c) A, B, D (d) A, C, D
111. The following reaction :

 is known as [MP PET 1997]

1228 Alcohol, Phenol and Ethers

- (a) Perkin reaction
 (b) Gattermann reaction
 (c) Kolbe reaction
 (d) Gattermann-Koch reaction
- 112.** Carbylamine test is done by heating alcoholic *KOH* with
 [IIT-JEE 1984; BIT 1992; CBSE PMT 1992]
 (a) Chloroform and silver powder
 (b) Trihalogen methane and primary amine
 (c) Alkyl halide and primary amine
 (d) Alkyl cyanide and primary amine
- 113.** Isopropyl alcohol heated at 300°C with copper catalyst to form [AFMC 1990; MP PMT 1986, 89, 92; JIPMER 2000]
 (a) Acetone (b) Dimethyl ether
 (c) Acetaldehyde (d) Ethane
- 114.** Dehydrogenation of $\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_3$ gives
 [MP PMT 2002]
 (a) Acetone (b) Acetaldehyde
 (c) Acetic acid (d) Acetylene
- 115.** In the sequence of the following reactions
 $\text{CH}_3\text{OH} \xrightarrow{\text{HI}} \text{CH}_3\text{I} \xrightarrow{\text{KCN}}$
 $\text{CH}_3\text{CN} \xrightarrow{\text{reduction}} \text{X} \xrightarrow{\text{HNO}_3} \text{Y}$
 X and Y are respectively [MP PMT 2002]
 (a) $\text{CH}_3\text{CH}_2\text{NH}_2$ and $\text{CH}_3\text{CH}_2\text{OH}$
 (b) $\text{CH}_3\text{CH}_2\text{NH}_2$ and CH_3COOH
 (c) $\text{CH}_3\text{CH}_2\text{OH}$ and CH_3CHO
 (d) CH_3OCH_3 and CH_3CHO
- 116.** Alcohols (i) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$, (ii) $\text{CH}_3 - \text{CHOH} - \text{CH}_3$ and (iii) $\text{CH}_3 - \text{C}(\text{CH}_3)(\text{OH}) - \text{CH}_3$ were treated with Lucas reagent (Conc. $\text{HCl} + \text{ZnCl}_2$). What results do you expect at room temperature
 (a) (ii) and (iii) react immediately and (i) in about 5 minutes
 (b) (iii) reacts immediately, (ii) reacts in about 5 minutes and (i) not at all
 (c) (i) reacts immediately, (ii) reacts in about 5 minutes and (iii) not at all
 (d) (i) reacts in about 5 minutes, (ii) reacts in about 15 minutes and (iii) not at all
- 117.** Ethylene may be obtained by dehydration of which of the following with concentrated H_2SO_4 at $160 - 170^{\circ}\text{C}$
 [DPMT 2000; MP PET 2001]
 (a) $\text{C}_2\text{H}_5\text{OH}$ (b) CH_3OH
 (c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ (d) $(\text{CH}_3)_2\text{CHCH}_2\text{OH}$
- 118.** The final product of the oxidation of ethyl alcohol is
 [KCET (Med.) 1999]
 (a) Ethane (b) Acetone
 (c) Acetaldehyde (d) Acetic acid
- 119.** The compound obtained by heating salicylic acid with phenol in the presence of phosphorus oxychloride is
 [KCET (Med.) 1999]
 (a) Salol (b) Aspirin
 (c) Oil of wintergreen (d) *o*-chlorobenzoyl chloride
- 120.** When phenol is allowed to react with Br_2 in (i) CS_2 solution and (ii) in aqueous solution, the resulting compounds are
 (a) (i) 2, 4, 6-tribromophenol and (ii) *o*- and *p*-bromophenol
 (b) (i) *m*-bromophenol and (ii) 2, 3, 4-tribromophenol
 (c) (i) *o*- and *p*-bromophenol and (ii) 2, 4, 6-tribromophenol
 (d) (i) *o*- and *m*-bromophenol and (ii) 2, 3, 4-tribromophenol
- 121.** Which of the following is not true in case of reaction with heated copper at 300°C [CPMT 1999]
 (a) Phenol \rightarrow Benzyl alcohol
 (b) Primary alcohol \rightarrow Aldehyde
 (c) Secondary alcohol \rightarrow Ketone
 (d) Tertiary alcohol \rightarrow Olefin
- 122.** Which of the following is the most suitable method for removing the traces of water from ethanol [CPMT 1999]
 (a) Heating with *Na* metal
 (b) Passing dry *HCl* through it
 (c) Distilling it
 (d) Reacting with *Mg*
- 123.** With oxalic acid, glycerol at 260°C gives [BHU 1996]
 (a) Allyl alcohol (b) Glyceryl mono-oxalate
 (c) Formic acid (d) Glyceraldehyde
- 124.** Absolute alcohol cannot be prepared by fractional distillation of rectified spirit since
 (a) It forms azeotropic mixture
 (b) It is used as power alcohol
 (c) It is used in wines
 (d) None of the above
- 125.** The reagent used for the dehydration of an alcohol is
 [MP PET/PMT 1998]

- (a) Phosphorus pentachloride
 (b) Calcium chloride
 (c) Aluminium oxide
 (d) Sodium chloride
126. Which one of the following compounds gives a positive iodoform test [MP PMT 1997]
 (a) Pentanal (b) 1-phenyl ethanol
 (c) 2-phenyl ethanol (d) 3-pentanol
127. What amount of bromine will be required to convert 2 g of phenol into 2, 4, 6-tribromophenol [MP PET/PMET 1998]
 (a) 4.00 (b) 6.00
 (c) 10.22 (d) 20.44
128. Ethyl alcohol exhibits acidic character on reacting with [MP PMT 1995]
 (a) Acetic acid
 (b) Sodium metal
 (c) Hydrogen iodide
 (d) Acidic potassium dichromate
129. The mixture of ethanol and water cannot be separated by distillation because [KCET 1984]
 (a) They form a constant boiling mixture
 (b) Alcohol molecules are solvated
 (c) Their boiling points are very near
 (d) Alcohol remains dissolved in water
130. The reaction between an alcohol and an acid with the elimination of water molecule is called [MH CET 1999]
 (a) Esterification (b) Saponification
 (c) Etherification (d) Elimination
131. The compound with the highest boiling point is [MNR 1985]
 (a) CH_4 (b) CH_3OH
 (c) CH_3Cl (d) CH_3Br
132. The boiling point of ethyl alcohol should be less than that of [Pb. CET 1985]
 (a) Propane (b) Formic acid
 (c) Dimethyl ether (d) None of these
133. Which of the following is not characteristic of alcohols [AIIMS 1980]
 (a) They are lighter than water
 (b) Their boiling points rise fairly uniformly with increasing molecular weight
 (c) Lower members are insoluble in water and organic solvents but solubility regularly increases with molecular weight
 (d) Lower members have pleasant smell and burning taste, while higher members are odourless and tasteless
134. At room temperature the alcohol that do not reacts with Lucas reagent is
 (a) Primary alcohol (b) Secondary alcohol
 (c) Tertiary alcohol (d) All these three
135. By means of calcium chloride which of following can be dried
 (a) Methanol (b) Ethanol
 (c) Both (a) and (b) (d) None of these
136. Lucas test is used to distinguish between [MP PET 1994]
 (a) $1^\circ, 2^\circ$ and 3° alcohols (b) $1^\circ, 2^\circ$ and 3° amines
 (c) Aldehydes and ketones (d) Alkenes and alkynes
137. Among the following, the compound that undergoes nitration readily is [NCERT 1984]
 (a) Benzoic acid (b) Toluene
 (c) Phenol (d) Nitrobenzene
138. Phenol $\xrightarrow[\text{Distillation}]{Zn} A \xrightarrow[\text{Conc. } HNO_3]{\text{Conc. } H_2SO_4} B \xrightarrow[\text{NaOH}]{Zn} C$
 In the above reaction A, B and C are the following compounds [MP PMT/PET 1988]
 (a) $C_6H_6, C_6H_5NO_2$ and aniline
 (b) C_6H_6 , dinitrobenzene and metanitroaniline
 (c) Toluene, metanitrobenzene and metatoluedine
 (d) $C_6H_6, C_6H_5NO_2$ and hydrazobenzene
139. $CH_3 - O - C_3H_7$ and $C_2H_5 - O - C_2H_5$ exhibit which type of isomerism
 (a) Metamerism (b) Position
 (c) Chain (d) Functional
140. Phenol reacts with CCl_4 in presence of aqueous alkali and forms a product which on hydrolysis gives [MP PMT 1990]
 (a) Salicylaldehyde (b) Salicylic acid
 (c) Benzaldehyde (d) Benzoic acid
141. In fermentation by zymase, alcohol and CO_2 are obtained from the following sugar [MP PMT/PET 1988]
 (a) Glucose (b) Invert sugar
 (c) Fructose (d) All of these
142. The order of melting point of *ortho*, *para*, *meta*-nitrophenol is [Orissa JEE 2003]
 (a) $o > m > p$ (b) $p > m > o$
 (c) $m > p > o$ (d) $p > o > m$
143. The alcohol which does not give a stable compound on dehydration is [MP PET 1997]
 (a) Ethyl alcohol (b) Methyl alcohol
 (c) *n*-propyl alcohol (d) *n*-butyl alcohol

1230 Alcohol, Phenol and Ethers

144. When ethyl alcohol (C_2H_5OH) is mixed with ammonia and passed over heated alumina, the compound formed is

[DPMT 1981; CBSE PMT 1989]

- (a) $C_2H_5NH_2$ (b) C_2H_4
(c) $C_2H_5OC_2H_5$ (d) CH_3OCH_3

145. A mixture of methanol vapours and air is passed over heated copper. The products are [KCET 1988]

- (a) Carbon monoxide and hydrogen
(b) Formaldehyde and water vapour
(c) Formic acid and water vapour
(d) Carbon monoxide and water vapour

146. In the esterification reaction of alcohols [Bihar CEE 1995]

- (a) OH^- is replaced by CH_3COO group
(b) OH^- is replaced by chlorine
(c) H^- is replaced by sodium metal
(d) OH^- is replaced by C_2H_5OH

147. A compound A on oxidation gave acetaldehyde, then again on oxidation gave acid. After first oxidation it was reacted with ammoniacal $AgNO_3$

- then silver mirror was produced. A is likely to be [DPMT 1996]
(a) Primary alcohol (b) Tertiary alcohol
(c) Acetaldehyde (d) Acetone

148. Phenol $\xrightarrow[H^+]{CHCl_3/NaOH}$ Salicyldehyde

The above reaction is known as

- (a) Riemer Tiemann reaction
(b) Bucherer reaction
(c) Gattermann synthesis
(d) Perkin reaction

149. Alcohol which gives red colour with Victor Meyer test is

[RPMT 2003]

- (a) C_2H_5OH (b) $CH_3-CH(OH)-CH_3$
(c) $C(CH_3)_3OH$ (d) None of these

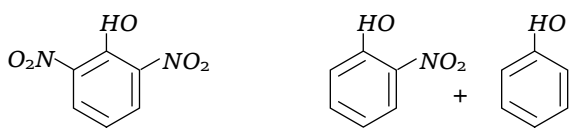
150. Conc. H_2SO_4 heated with excess of C_2H_5OH at $140^\circ C$ to form [MP PMT 1990; RPMT 2000; AFMC 2002]

- (a) $CH_3CH_2-O-CH_3$
(b) $CH_3CH_2-O-CH_2CH_3$
(c) $CH_3-O-CH_2-CH_2-CH_3$
(d) $CH_2=CH_2$

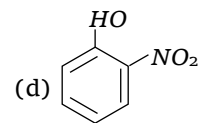
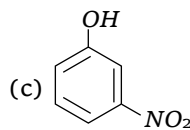
151. Rate of substitution reaction in phenol is [MP PMT 1989]

- (a) Slower than the rate of benzene
(b) Faster than the rate of benzene
(c) Equal to the rate of benzene
(d) None of these

152. Phenol reacts with dilute HNO_3 at normal temperature to form [MP PMT 1989]



- (a) (b)



153. One mole of phenol reacts with bromine to form tribromophenol. How much bromine is used [MP PMT 1989]

- (a) 1.5 mol (b) 3 mol
(c) 4.5 mol (d) 6 mol

154. In presence of $NaOH$, phenol react with $CHCl_3$ to form o-hydroxy benzaldehyde. This reaction is called

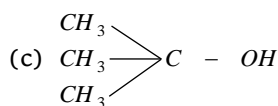
[BIT 1992; MP PMT 1990, 2002; AIIMS 1992; MP PET 1994; JIPMER 1999]

- (a) Riemer-Tiemann's reaction
(b) Sandmeyer's reaction
(c) Hoffmann's degradation reaction
(d) Gattermann's aldehyde synthesis

155. Which of the following vapours passed over heated copper to form acetone [BIT 1992]

- (a) $H_3C-CH_2-CH_2OH$
(b) $CH_3-CH-CH_3$

[Pb. PMT 2002]

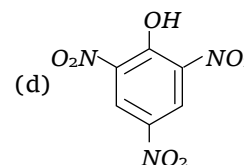
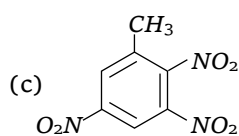
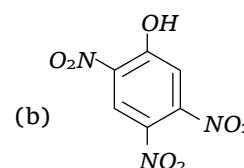
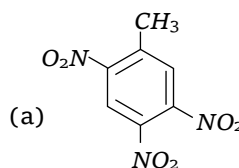


- (d) $CH_2=CH-CH_2OH$

156. Methyl alcohol (methanol), ethyl alcohol (ethanol) and acetone (propanone) were treated with iodine and sodium hydroxide solutions. Which substances will give iodoform test

- (a) Only ethyl alcohol
(b) Only methyl alcohol and ethyl alcohol
(c) Only ethyl alcohol and acetone
(d) Only acetone

157. TNT has the structure [UPSEAT 2000]



158. The vapour pressure of aqueous solution of methanal is

[UPSEAT 2000]

- (a) Equal to water (b) Equal to methanal
(c) More than water (d) Less than water

159. Glycerol reacts with conc. HNO_3 and conc. H_2SO_4 to form

[CPMT 1983; MP PMT/PET 1988]

- (a) Glycerol mononitrate (b) Glycerol dinitrate
(c) Glycerol trinitrate (d) Acrolein

160. Glycerol heated with oxalic acid at $110^\circ C$ to form

[CPMT 1986, 90, 91, 97; JIPMER 1997]

- (a) Formic acid (b) Oxalic acid
(c) Allyl alcohol (d) Glycerol trioxalate

161. Dimethyl ether and ethyl alcohol are

[CPMT 1986; Manipal MEE 1995]

- (a) Branched isomer (b) Position isomer
(c) Functional isomer (d) Tautomer

162. The process of manufacture of absolute alcohol from rectified spirit is

[CPMT 1986, 87; Kurukshetra CEE 2002]

- (a) Fractional distillation (b) Steam distillation
(c) Azeotropic distillation (d) Vacuum distillation

163. When ethyl alcohol reacts with acetic acid, the products formed are

[CPMT 1989]

- (a) Sodium ethoxide + hydrogen
(b) Ethyl acetate + water
(c) Ethyl acetate + soap
(d) Ethyl alcohol + water

164. Picric acid is (at $25^\circ C$)

- (a) A white solid (b) A colourless liquid
(c) A gas (d) A bright yellow solid

165. Phenol on distillation with zinc dust gives

[MP PET 1991; CPMT 1997; MP PMT 1999, 2001;

Pb. PMT 2000]

- (a) C_6H_6 (b) C_6H_{12}
(c) $C_6H_5OC_6H_5$ (d) $C_6H_5 - C_6H_5$

166. Methanol and ethanol are miscible in water due to

[MP PET/PMT 1988; CPMT 1989; CBSE PMT 1991]

- (a) Covalent character
(b) Hydrogen bonding character
(c) Oxygen bonding character
(d) None of these

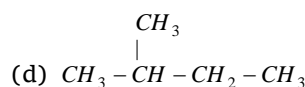
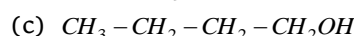
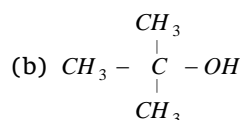
167. By distilling glycol with fuming sulphuric acid, which of following is obtained

- (a) Glycerol (b) Pinacol
(c) Dioxan (d) Ethylene oxide

168. The compound which gives the most stable carbonium ion on dehydration is

[DCE 2000]

- (a) $CH_3 - \underset{\substack{| \\ CH_3}}{CH} - CH_2OH$



169. In CH_3CH_2OH which bond dissociates heterolytically

[IIT-JEE 1988; CPMT 1996]

- (a) C - C (b) C - O
(c) C - H (d) O - H

170. Which compound is soluble in water

[IIT-JEE 1980; CPMT 1993; RPET 1999]

- (a) CS_2 (b) C_2H_5OH
(c) CCl_4 (d) $CHCl_3$

171. Which of the following is most soluble in water

[MP PMT 1995]

- (a) Normal butyl alcohol (b) Isobutyl alcohol
(c) Tertiary butyl alcohol (d) Secondary butyl alcohol

172. Which of the following gives negative iodoform test

- (a) CH_3CH_2OH (b) $CH_3CH_2CH_2OH$
(c) $C_6H_5 - \underset{\substack{| \\ OH}}{CH} - CH_3$ (d) $CH_3 - \underset{\substack{| \\ OH}}{CH} - CH_3$

173. If ethanol dissolves in water, then which of the following would be done

[MP PET 1989]

- (a) Absorption of heat and contraction in volume
(b) Emission of heat and contraction in volume
(c) Absorption of heat and increase in volume
(d) Emission of heat and increase in volume

174. A migration of hydrogen with a pair of electrons is called

- (a) Alkyl shift (b) Hydride shift
(c) Hydrogen ion formation (d) Dehydrogenation

175. When rectified spirit and benzene are distilled together, the first fraction obtained is

- (a) A ternary azeotrope (b) Absolute alcohol
(c) A binary azeotrope (d) Denatured spirit

176. Alcohols react with Grignard reagent to form

[DPMT 1986]

- (a) Alkanes (b) Alkenes
(c) Alkynes (d) All of these

177. Action of diazomethane on phenol liberates

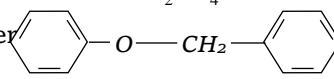
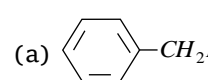
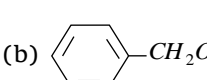
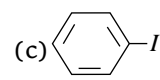
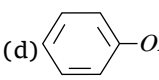
- (a) O_2 (b) H_2
(c) N_2 (d) CO_2

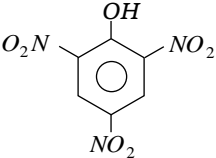
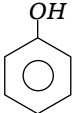
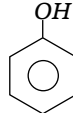
178. The ring deuteration of phenol

- (a) Lowers the acidity
(b) Increases the acidity
(c) Imparts no effect



1232 Alcohol, Phenol and Ethers

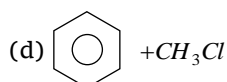
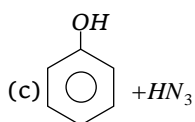
- (d) Causes amphoteric nature
179. In esterification of an acid, the other reagent is [CPMT 1988]
 (a) Aldehyde (b) Alcohol
 (c) Amine (d) Water
180. Maximum solubility of alcohol in water is due to [MP PMT/ PET 1988; MP PMT 1989]
 (a) Covalent bond (b) Ionic bond
 (c) H-bond with H_2O (d) None of the above
181. Alcohols can be distinguished from alkenes by
 (a) Dissolving in cold concentrated H_2SO_4
 (b) Decolourizing with bromine in CCl_4
 (c) Oxidizing with neutral permanganate solution
 (d) None of the above
182. At $25^\circ C$ Ethylene glycol is a
 (a) Solid compound (b) Liquid
 (c) Gas (d) Brown solid
183. When primary alcohol is oxidised with chlorine, it produces [AFMC 1999]
 (a) $HCHO$ (b) CH_3CHO
 (c) CCl_3CHO (d) C_3H_7CHO
184. Alcohols combine with acetylene in the presence of mercury compounds as catalyst to form
 (a) Acetals (b) Xanthates
 (c) Vinyl ethers (d) None of the above
185. The compound which will give negative iodoform test is [CPMT 1993, 99]
 (a) CH_3CHO (b) CH_3CH_2OH
 (c) Isopropyl alcohol (d) Benzyl alcohol
186. Which of the following is most acidic [CPMT 1999]
 (a) Phenol (b) Benzyl alcohol
 (c) *m*-chlorophenol (d) Cyclohexanol
187. Number of metamers represented by molecular formula $C_4H_{10}O$ is [Tamil Nadu CET 2001]
 (a) 4 (b) 3
 (c) 2 (d) 1
188. When ether is exposed in air for sometime an explosive substance produced is [RPMT 2002]
 (a) Peroxide (b) TNT
 (c) Oxide (d) Superoxide
189. Ether which is liquid at room temperature is [BVP 2002]
 (a) $C_2H_5OCH_3$ (b) CH_3OCH_3
 (c) $C_2H_5OC_2H_5$ (d) None of these
190. In the following reaction
 $C_2H_5OC_2H_5 + 4[H] \xrightarrow{\text{Red P+HI}} 2X + H_2O$, X is [MP PMT 2002]
 (a) Ethane (b) Ethylene
 (c) Butane (d) Propane
191. Diethyl ether absorbs oxygen to form [DPMT 1984]
 (a) Red coloured sweet smelling compound
 (b) Acetic acid
 (c) Ether suboxide
 (d) Ether peroxide
192. Diethyl ether can be decomposed by heating with [CPMT 1980, 81, 89]
 (a) HI (b) $NaOH$
 (c) Water (d) $KMnO_4$
193. On boiling with concentrated hydrobromic acid, phenyl ethyl ether will yield [AIIMS 1992]
 (a) Phenol and ethyl bromide
 (b) Phenol and ethane
 (c) Bromobenzene and ethanol
 (d) Bromobenzene and ethane
194. Ether is formed when ethyl alcohol is heated with conc. H_2SO_4 . The conditions are [KCET 1984]
 (a) Excess of H_2SO_4 and $170^\circ C$
 (b) Excess of C_2H_5OH and $140^\circ C$
 (c) Excess of C_2H_5OH and $180^\circ C$
 (d) Excess of conc. H_2SO_4 and $100^\circ C$
195. The ether  when treated with HI produces
 (a)  (b) 
 (c)  (d) 
196. Addition of alcohols to aldehydes in presence of anhydrous acids yield [CET Pune 1998]
 (a) Carboxylic acids (b) Ethers
 (c) Cyclic ethers (d) Acetals
197. In which of the following reaction, phenol or sodium phenoxide is not formed [CPMT 1996]
 (a) $C_6H_5N_2Cl + aq. KOH \rightarrow$
 (b) $C_6H_5OCl + NaOH \rightarrow$
 (c) $C_6H_5N_2Cl + aq. NaOH \rightarrow$
 (d) $C_6H_5NNCl \xrightarrow[\Delta]{H_2O}$
198. Dimethyl ether when heated with excess HI gives [CPMT 1996]
 (a) CH_3I and CH_3OH
 (b) CH_3I and H_2O
 (c) $C_2H_6 + CH_3I$ and CH_3OH
 (d) CH_3I and $HCHO$

199. The ether that undergoes electrophilic substitution reactions is [JIPMER 2001]
 (a) $CH_3OC_2H_5$ (b) $C_6H_5OCH_3$
 (c) CH_3OCH_3 (d) $C_2H_5OC_2H_5$
200. Acetyl chloride does not react with [MNR 1995]
 (a) Diethyl ether (b) Aniline
 (c) Phenol (d) Ethanol
201. The products formed in the following reaction
 $C_6H_5 - O - CH_3 + HI \xrightarrow{\text{heat}}$ are [IIT 1995]
 (a) $C_6H_5 - I$ and $CH_3 - OH$
 (b) $C_6H_5 - OH$ and $CH_3 - I$
 (c) $C_6H_5 - CH_3$ and HOI
 (d) C_6H_6 and CH_3OI
202. Etherates are
 (a) Ethers
 (b) Solution in ether
 (c) Complexes of ethers with Lewis acid
 (d) Complexes of ethers with Lewis base
203. An ether is more volatile than an alcohol having the same molecular formula. This is due to [AIIEEE 2003]
 (a) Dipolar character of ethers
 (b) Alcohols having resonance structures
 (c) Inter-molecular hydrogen bonding in ethers
 (d) Inter-molecular hydrogen bonding in alcohols
204. When ether is reacted with O_2 , it undergoes explosion due to [CPMT 1996]
 (a) Peroxide (b) Acid
 (c) Ketone (d) TNT
205. The compound which does not react with sodium is [CBSE PMT 1994]
 (a) C_2H_5OH (b) $CH_3 - O - CH_3$
 (c) CH_3COOH (d) $CH_3 - CHO - CH_3$
206. Methyl-terbutyl ether on heating with HI of one molar concentration gives [MP PET 1997]
 (a) $CH_3I + (CH_3)_3COH$ (b) $CH_3OH + (CH_3)_3Cl$
 (c) $CH_3I + (CH_3)_3Cl$ (d) None of the above
207. A substance $C_4H_{10}O$ yields on oxidation a compound C_4H_8O which gives an oxime and a positive iodoform test. The original substance on treatment with conc. H_2SO_4 gives C_4H_8 . The structure of the compound is [SCRA 2000]
 (a) $CH_3CH_2CH_2CH_2OH$
 (b) $CH_3CH(OH)CH_2CH_3$
 (c) $(CH_3)_3COH$
 (d) $CH_3CH_2 - O - CH_2CH_3$
208. Ethylene glycol reacts with excess of PCl_5 to give
 (a) 1, 1-dichloroethane
 (b) 1, 2-dichloroethane
 (c) 1, 1, 1-trichloroethane
 (d) 1, 1, 2, 2-tetrachloroethane
 (e) 2, 2-dichloroethane
209. Which of the following will not react with $NaOH$ [CPMT 2004]
 (a)  (b) C_2H_5OH
 (c) CH_3CONH_2 (d) $CH(CN)_3$
210. The boiling point of methanol is greater than that of methyl thiol because [Kerala PMT 2004]
 (a) There is intramolecular hydrogen bonding in methanol and intermolecular hydrogen bonding in methyl thiol
 (b) There is intermolecular hydrogen bonding in methanol and no hydrogen bonding in methyl thiol
 (c) There is no hydrogen bonding in methanol and intermolecular hydrogen bonding in methyl thiol
 (d) There is intramolecular hydrogen bonding in methanol and no hydrogen bonding in methyl thiol
 (e) There is no hydrogen bonding in methanol and intramolecular hydrogen bonding in methyl thiol
211. In the reaction $\begin{matrix} CH_2OH \\ | \\ CHOH \\ | \\ CH_2OH \end{matrix} + \begin{matrix} COOH \\ | \\ COOH \end{matrix} \xrightarrow{110^\circ C} (A)$ product (A) will be [Pb . CET 2001]
 (a) Glycerol monoformate
 (b) Allyl alcohol
 (c) Formaldehyde
 (d) Acetic acid
212. Which of the following will not form a yellow precipitate on heating with an alkaline solution of iodine [CBSE PMT 2004]
 (a) CH_3OH
 (b) CH_3CH_2OH
 (c) $CH_3CH(OH)CH_3$
 (d) $CH_3CH_2CH(OH)CH_3$
213. In Friedal-Crafts acylation, besides $AlCl_3$, the other reactants are [DPMT 2004]
 



1234 Alcohol, Phenol and Ethers

- (a) $+CH_3Cl$ (b) $+CH_3COCl$



214. Which of the following reagents will produce salicylaldehyde on reaction with phenol [DPMT 2004]

- (a) $CHCl_3 / NaOH$ (b) $CCl_4 / NaOH$
(c) $CH_2Cl_2 / NaOH$ (d) $CH_3Cl / NaOH$

215. At 530 K, glycerol reacts with oxalic acid to produce

[Pb. CET 2002]

- (a) Allyl alcohol (b) Formic acid
(c) Glyceraldehyde (d) Glycerol

monooxalate

216. With anhydrous zinc chloride, ethylene glycol gives

[MP PMT 2004]

- (a) Formaldehyde (b) Acetylene
(c) Acetaldehyde (d) Acetone

217. Which of the following compound give yellow precipitate with I_2 and $NaOH$ [Pb. CET 2003]

- (a) CH_3OH (b) $CH_3CH_2CH_2OH$
(c) $C_2H_5OC_2H_5$ (d) CH_3CH_2OH

218. Amongst the following, HBr reacts fastest with

[IIT-JEE 1986; JIPMER 2000; DCE 2003]

- (a) Propane-1-ol (b) Propane-2-ol
(c) 2-methyl propane-1-ol (d) 2-methyl propane-2-ol

219. Which of the following react with benzoic acid to form ethyl benzoate [Pb. CET 2001]

- (a) Ethyl alcohol (b) Cinnamic acid
(c) Sodium ethoxide (d) Ethyl chloride

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

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

221. Which of the following is used as catalyst for preparing Grignard reagent [Pb. CET 2002]

- (a) Iron powder (b) Dry ether
(c) Activated charcoal (d) MnO_2

222. Ethyl alcohol is heated with conc. H_2SO_4 . The product formed is [DCE 2004]

- (a) $CH_3 - \overset{O}{\parallel} C - OC_2H_5$ (b) C_2H_6
(c) C_2H_4 (d) C_2H_2

223. Dehydration of 2-butanol yield [Pb. CET 2004]

- (a) 1-butene (b) 2-butene
(c) 2-butyne (d) Both (a) and (b)

224. Fats, on alkaline hydrolysis, gives [MH CET 2003]

- (a) Oils (b) Soaps
(c) Detergents (d) Glycol + acid

225. When vapours of an alcohol are passed over hot reduced copper, alcohol is converted into alkene quickly, the alcohol is [CPMT 1985]

- (a) Primary (b) Secondary
(c) Tertiary (d) None of these

226. The adduct of the compound 'A' obtained by the reaction with excess of isopropyl magnesium iodide, upon hydrolysis gives a tertiary alcohol. The compound 'A' is

[MP PET 1985]

- (a) An ester (b) A secondary alcohol
(c) A primary alcohol (d) An aldehyde

227. If there be a compound of the formula $CH_3C(OH)_3$, which one of the following compounds would be obtained from it without reaction with any reagent [CPMT 1983]

- (a) CH_3OH (b) C_2H_5OH
(c) CH_3COOH (d) $HCHO$

228. Which of the following can work as a dehydrating agent for alcohols [BHU 1980]

- (a) H_2SO_4 (b) Al_2O_3
(c) H_3PO_4 (d) All of these

229. What is formed when glycerol reacts with HI [DCE 2002]

- (a) $\begin{array}{c} CH_2OH \\ | \\ CHI \\ | \\ CH_2OH \end{array}$ (b) $\begin{array}{c} CH_2 \\ || \\ CH \\ | \\ CH_2I \end{array}$
(c) $\begin{array}{c} CH_3 \\ | \\ CH_2 \\ | \\ CH_3 \end{array}$ (d) $\begin{array}{c} CH_2OH \\ | \\ C = O \\ | \\ CH_3 \end{array}$

230. The dehydration of 2-methyl butanol with conc. H_2SO_4 gives [UPSEAT 2004]

- (a) 2-methyl butene as major product
(b) Pentene
(c) 2-methyl but-2-ene as major product
(d) 2-methyl pent-2-ene

231. Which alcohol reacts with fatty acids to form fats

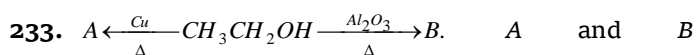
[MP PMT/PET 1988; MP PET 1991]

- (a) Ethanol (b) Glycerol
(c) Methanol (d) Isopropanol

232. Which will dehydrate easily [Roorkee 1995]

- (a) 3-methyl-2-butanol (b) Ethyl alcohol
(c) 2-methyl propane-2-ol (d) 2-methyl butanol-2



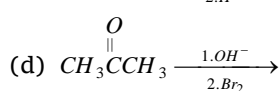
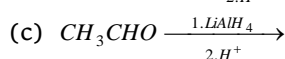
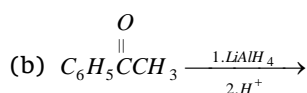
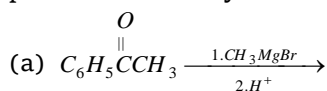


respectively are

[RPMT/PET 2000]

- (a) Alkene, alkanal (b) Alkyne, alkanal
(c) Alkanal, alkene (d) Alkene, alkyne

234. Which one of the following reactions would produce secondary alcohol [MP PET 1994]



235. On reaction with hot conc. H_2SO_4 , which one of the following compounds loses a molecule of water

[CPMT 1989]

- (a) CH_3COCH_3 (b) CH_3COOH
(c) CH_3OCH_3 (d) CH_3CH_2OH

236. The best method to prepare cyclohexene from cyclohexanol is by using [IIT 2005]

- (a) Conc. $HCl + ZnCl_2$ (b) Conc. H_3PO_4
(c) HBr (d) Conc. HCl

237. Which of the following compound is most acidic

[BCECE 2005]

- (a) CH_4 (b) C_2H_6
(c) $CH \equiv CH$ (d) C_2H_5OH

238. C_2H_5OH can be differentiated from CH_3OH by

[MP PMT 1994]

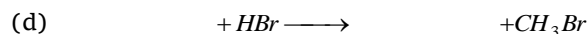
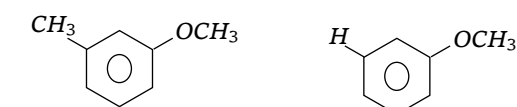
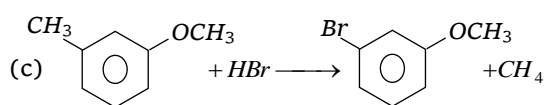
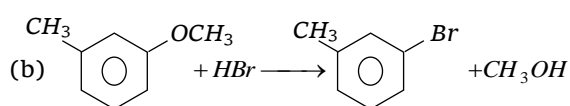
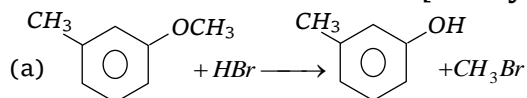
- (a) Reaction with HCl (b) Reaction with NH_3
(c) By iodoform test (d) By solubility in water

239. A compound does not react with 2,4-dinitrophenyl hydrazine and Na , compound is [UPSEAT 2003]

- (a) Acetone (b) Acetaldehyde
(c) CH_3OH (d) $CH_2 = CHOCH_3$

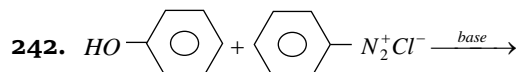
240. Which of the following reaction is correctly represented

[Orissa JEE 2005]

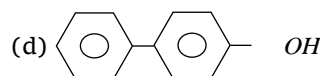
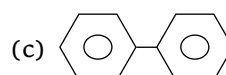
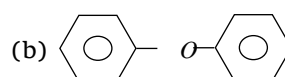
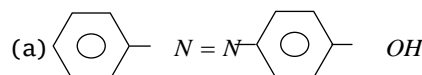


241. Tertiary butyl alcohol gives tertiary butyl chloride on treatment with [Orissa JEE 2005]

- (a) Conc. HCl / anhydrous $ZnCl_2$
(b) KCN
(c) $NaOCl$
(d) Cl_2



[DPMT 2005]



243. In which of the following reactions carbon carbon bond formation takes place [DPMT 2005]

- (a) Cannizzaro (b) Reimer-Tiemann
(c) HVZ reaction (d) Schmidt reaction

244. Reaction of phenol with chloroform/sodium hydroxide to give *o*-hydroxy benzaldehyde involves the formation of

[J & K 2005]

- (a) Dichloro carbene (b) Trichloro carbene
(c) Chlorine atoms (d) Chlorine molecules

245. Which is not correct

[J & K 2005]


- (a) Phenol is more acidic than acetic acid
(b) Ethanol is less acidic than phenol
(c) Ethanol has lower boiling point than ethane
(d) Ethyne is a non-linear molecule

Uses of alcohol, Phenol and Ethers

- Glycerol is used in the manufacture of [SCRA 1991]
 - Dynamite
 - Varnish
 - Paints
 - Soft drinks
- Glycerol as a triester present in [MP PMT 1990]
 - Petroleum
 - Kerosene
 - Vegetable oil and fat
 - Naphtha
- In presence of air, fermentation of ethyl alcohol by azotobacter bacteria forms [MP PMT 1989]
 - $CH_2 = CH_2$
 - C_2H_6
 - CH_3CHO
 - CH_3COOH
- Aspirin is also known as [CPMT 1989, 94; MP PET 1995]
 - Methyl salicylic acid
 - Acetyl salicylic acid
 - Acetyl salicylate
 - Methyl salicylate

1236 Alcohol, Phenol and Ethers

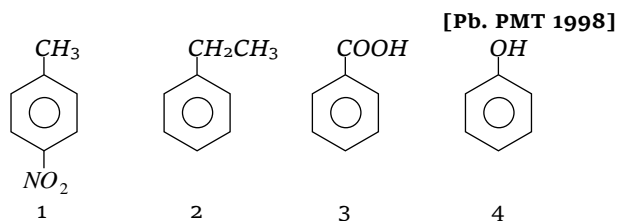
5. Substances used in bringing down the temperature in high fevers are called [DPMT 1983]
(a) Pyretics (b) Antipyretics
(c) Antibiotics (d) Antiseptics
6. When glycol is heated with dicarboxylic acid, the products are
(a) Polyesters (b) Polyethers
(c) Polyethylene (d) No reaction at all
7. Cresol is [BHU 1996]
(a) A mixture of three cresols with little phenol
(b) Used as dye for wood
(c) A soapy solution of cresols
(d) Having an aldehyde group
8. Phenol is used in the manufacture of [AIIMS 1996]
(a) Bakelite (b) Polystyrene
(c) Nylon (d) PVC
9. In cold countries ethylene glycol is added to water in the radiators to [CPMT 1971; NCERT 1971; MP PMT 1993]
(a) Bring down the specific heat of water
(b) Lower the viscosity
(c) Reduce the viscosity
(d) Make water a better lubricant
10. Power alcohol is [KCET 1990]
(a) An alcohol of 95% purity
(b) A mixture of petrol hydrocarbons and ethanol
(c) Rectified spirit
(d) A mixture of methanol and ethanol
11. 4-chloro-3, 5-dimethyl phenol is called [KCET 2003]
(a) Chloramphenicol (b) Paracetamol
(c) Barbitol (d) Dettol
12. Alcoholic fermentation is brought about by the action of [CPMT 1977, 79, 88; DPMT 1983]
(a) CO_2 (b) O_2
(c) Invertase (d) Yeast
13. Rectified spirit is a mixture of [DPMT 1982; MP PMT 1976, 77, 96; CPMT 1976, 77, 90; KCET 1990]
(a) 95% ethyl alcohol + 5% water
(b) 94% ethyl alcohol + 4.53% water
(c) 94.4% ethyl alcohol + 5.43 % water
(d) 95.57% ethyl alcohol + 4.43% water
14. Methyl alcohol is toxic. The reason assigned is [RPET 2000]
(a) It stops respiratory track
(b) It reacts with nitrogen and forms CN^- in the lungs
(c) It increases CO_2 content in the blood
(d) It is a reduction product of formaldehyde
15. Glycerol is used [Kurukshetra CET 2002]
(a) As a sweetening agent
(b) In the manufacture of good quality soap
(c) In the manufacture of nitro glycerine
(d) In all of these
16. Glycerol is not used in which of following cases
(a) Explosive making (b) Shaving soap making
(c) As an antifreeze for water (d)
17. Liquor poisoning is due to [CPMT 1971]
(a) Presence of bad compound in liquor
(b) Presence of methyl alcohol
(c) Presence of ethyl alcohol
(d) Presence of carbonic acid
18. In order to make alcohol undrinkable pyridine and methanol are added to it. The resulting alcohol is called
(a) Power alcohol (b) Proof spirit
(c) Denatured spirit (d) Poison alcohol
19. Denatured spirit is mainly used as a [MNR 1995; MP PET 2002]
(a) Good fuel
(b) Drug
(c) Solvent in preparing varnishes
(d) Material in the preparation of oil
20. Main constituent of dynamite is [MP PET 1992; BHU 1979]
(a) Nitrobenzene (b) Nitroglycerine
(c) Picric acid (d) TNT
21. Wine (alcoholic beverages) contains [CPMT 1972, 77; BHU 1996; AFMC 2001]
(a) CH_3OH (b) Glycerol
(c) C_2H_5OH (d) 2-propanol
22. Tonics in general contain [MNR 1995]
(a) Ether (b) Methanol
(c) Ethanol (d) Rectified spirit
23. Widespread deaths due to liquor poisoning occurs due to [DPMT 2001]
(a) Presence of carbonic acid in liquor
(b) Presence of ethyl alcohol in liquor
(c) Presence of methyl alcohol in liquor
(d) Presence of lead compounds in liquor
24. Diethyl ether finds use in medicine as [KCET 1989]
(a) A pain killer (b) A hypnotic
(c) An antiseptic (d) An anaesthetic
25. Washing soap can be prepared by saponification with alkali of the oil [CPMT 1986]
(a) Rose oil (b) Paraffin oil
(c) Groundnut oil (d) Kerosene
26. Ether can be used [CPMT 1982]
(a) As a general anaesthetic (b) As a refrigerant
(c) In perfumery (d) All of these
27. The Bouveault-Blanc reduction involves [MP PET 1991]
(a) C_2H_5OH / Na (b) $LiAlH_4$
(c) $C_2H_5MgX^-$ (d) Zn / HCl
28. Which is used as an antifreeze [AFMC 1992]
(a) Glycol (b) Ethyl alcohol
(c) Water (d) Methanol

 Critical Thinking

Objective Questions



1. Which will undergo a Friedel-Craft's alkylation reaction



- (a) 1, 2 and 4 (b) 1 and 3
(c) 2 and 4 (d) 1 and 2
2. The product 'A' in the following reaction is
- $$\begin{array}{c} \text{H}_2\text{C} - \text{CH}_2 \\ \diagdown \quad \diagup \\ \text{O} \end{array} \xrightarrow{\text{RMgI}} \text{A}$$
- [MP PMT 2003]
- (a) RCHOHR (b) $\text{RCHOH} \cdot \text{CH}_3$
(c) $\text{R}-\text{CH}_2-\text{CH}_2-\text{OH}$ (d) $\text{R} > \text{CHCH}_2\text{OH}$
3. Glycerol boils at 290°C with slight decomposition. Impure glycerine can be purified by
- [CPMT 1983, 94]
- (a) Steam distillation (b) Simple distillation
(c) Vacuum distillation (d) Extraction with a solvent
4. Phenol $\xrightarrow{\text{NaNO}_2/\text{H}_2\text{SO}_4} \text{B} \xrightarrow{\text{H}_2\text{O}} \text{C} \xrightarrow{\text{NaOH}} \text{D}$
Name of the above reaction is
- [KCET 2003]
- (a) Liebermann's reaction
(b) Phthalein fusion test
(c) Reimer-Tiemann reaction
(d) Schottenf-Baumann reaction
5. The correct order of boiling point for primary (1°), secondary (2°) and tertiary (3°) alcohols is
- [CPMT 1999; RPMT 2002]
- (a) $1^\circ > 2^\circ > 3^\circ$ (b) $3^\circ > 2^\circ > 1^\circ$
(c) $2^\circ > 1^\circ > 3^\circ$ (d) $2^\circ > 3^\circ > 1^\circ$
6. What will be the products of reaction if methoxybenzene reacts with HI
- (a) Methyl alcohol (methanol) + iodobenzene
(b) Methyl iodide (iodomethane) + benzene
(c) Methyl iodide + phenol
(d) Methyl iodide + iodobenzene
7. Ethylene reacts with Baeyer's reagent to give
- [CPMT 1988]
- (a) Ethane (b) Ethyl alcohol
(c) Ethylene glycol (d) None of these
8. Which of the following statements is correct regarding case of dehydration in alcohols
- [CPMT 1980, 85; MP PMT 2001; BHU 2002]
- (a) Primary > Secondary (b) Secondary > Tertiary
(c) Tertiary > Primary (d) None of these
9. Oxiran is
- (a) Ethylene oxide (b) Diethyl ether
(c) Ethyl glycolate (d) Glycolic ester

10. Propan-1-ol can be prepared from propene by alcohol

[AIIMS 2003]

- (a) $\text{H}_2\text{O}/\text{H}_2\text{SO}_4$
(b) $\text{Hg}(\text{OAc})_2/\text{H}_2\text{O}$ followed by NaBH_4
(c) B_2H_6 followed by H_2O_2
(d) $\text{CH}_3\text{CO}_2\text{H}/\text{H}_2\text{SO}_4$

11. Distinction between primary, secondary and tertiary alcohol is done by
- [MP PMT/PET 1988; RPMT 2000]
- (a) Oxidation method
(b) Lucas test
(c) Victor Meyer method
(d) All of these

12. Oxidation of which of the following by air in presence of vanadium pentoxide gives phenol

- (a) Toluene (b) Benzene
(c) Benzaldehyde (d) Phenyl acetic acid

13. The most suitable method of the separation of a 1 : 1 mixture of *ortho* and *para* nitrophenols is

[CBSE PMT 1994, 99; CPMT 1997]

- (a) Distillation (b) Sublimation
(c) Crystallization (d) Chromatography

14. Which of the following does not form phenol or phenoxide

[AFMC 2000]

- (a) $\text{C}_6\text{H}_5\text{Cl}$ (b) $\text{C}_6\text{H}_5\text{COOH}$
(c) $\text{C}_6\text{H}_5\text{N}_2\text{Cl}$ (d) $\text{C}_6\text{H}_5\text{SO}_3\text{Na}$

15. Which of the following will be obtained by keeping ether in contact with air for a long time

[RPMT 2000]

- (a) $\text{C}_2\text{H}_5 - \text{O} - \text{CH}(\text{CH}_3) - \text{O} - \text{OH}$
(b) $\text{C}_2\text{H}_5 - \text{OCH}_2 - \text{OH}$
(c) $\text{C}_2\text{H}_5 - \text{O} - \text{C}_2\text{H}_5\text{OH}$
(d) $\text{CH}_3 - \text{O} - \text{CH}(\text{CH}_3) - \text{O} - \text{OH}$

16. When a mixture of ethanol and methanol is heated in the presence of concentrated H_2SO_4 the resulting organic product or products is/are

[Manipal MEE 2000]

- (a) $\text{CH}_3\text{OC}_2\text{H}_5$
(b) CH_3OCH_3 and $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$
(c) $\text{CH}_3\text{OC}_2\text{H}_5$ and CH_3OCH_3
(d) $\text{CH}_3\text{OC}_2\text{H}_5$, CH_3OCH_3 and $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$

17. In the following groups




The order of leaving group ability is [IIT 1997]

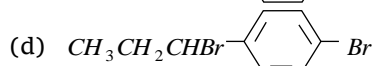
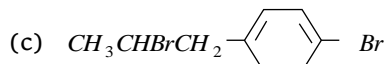
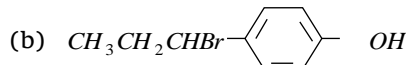
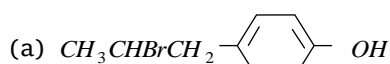
- (a) $\text{I} > \text{II} > \text{III} > \text{IV}$
(b) $\text{IV} > \text{III} > \text{I} > \text{II}$
(c) $\text{III} > \text{II} > \text{I} > \text{IV}$
(d) $\text{II} > \text{III} > \text{IV} > \text{I}$

18. Epoxides are

- (a) Cyclic ethers
(b) Not ethers
(c) Aryl-alkyl ethers
(d) Ethers with another functional group

1238 Alcohol, Phenol and Ethers

19. The reaction of $CH_3CH=CH-$  $-OH$ with HBr gives [IIT-JEE 1998]



20. Which of the following compounds on boiling with $KMnO_4$ (alk.) and subsequent acidification will not give benzoic acid [KCET 2001]

- (a) Benzyl alcohol (b) Acetophenone
(c) Anisole (d) Toluene

21. The best reagent to convert pent-3-en-2-ol into pent-3-in-2-one is [AIIEE 2005]

- (a) Acidic permanganate
(b) Acidic dichromate
(c) Chromic anhydride in glacial acetic acid
(d) Pyridinium chloro-chromate

22. When alcohol reacts with concentrated H_2SO_4 intermediate compound formed is [AFMC 2005]

- (a) Carbonium ion (b) Alkoxy ion
(c) Alkyl hydrogen sulphate (d) None of these

Assertion & Reason

For AIIMS Aspirants

Read the assertion and reason carefully to mark the correct option out of the options given below:

- (a) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(c) If assertion is true but reason is false.
(d) If the assertion and reason both are false.
(e) If assertion is false but reason is true.

1. Assertion : A triester of glycerol and palmitic acid on boiling with aqueous $NaOH$ gives a solid cake having soapy touch
Reason : Free glycerol is liberated which is a greasy solid [AIIMS 1996]
2. Assertion : Phenol is a weak acid than ethanol
Reason : Groups with + M effect and - I effect decrease acidity at p -position [AIIMS 2002]
3. Assertion : Phenol is more reactive than benzene towards electrophilic substitution reaction

Reason : In the case of phenol, the intermediate carbocation is more resonance stabilized

[IIT-JEE (Screening) 2000]

4. Assertion : Phenol undergo Kolbe reaction, ethanol does not.

Reason : Phenoxide ion is more basic than ethoxide ion. [AIIMS 1994]

5. Assertion : Lucas reagent is a mixture of anhydrous $ZnCl_2$ and concentrate HCl

Reason : Primary alcohol produce ppt. with Lucas reagents. [AIIMS 1995]

6. Assertion : Resorcinol turns $FeCl_2$ solution purple.

Reason : Resorcinol have phenolic group. [AIIMS 2000]

7. Assertion : Glycerol is purified by distillation under reduced pressure.

Reason : Glycerol is a trihydric alcohol.

8. Assertion : Alcohol and phenol can be distinguished by sodium hydroxide.

Reason : Phenol is acidic while alcohol is neutral.

9. Assertion : Alcohols are dehydrated to hydrocarbons in the presence of acidic zeolites.

Reason : Zeolites are porous catalysts.

10. Assertion : The major products formed by heating $C_6H_5CH_2OCH_3$ with HI are $C_6H_5CH_2I$ and CH_3OH .

Reason : Benzyl cation is more stable than methyl cation. [AIIMS 2004]

11. Assertion : The pK_a of acetic acid is lower than that of phenol.

Reason : Phenoxide ion is more resonance stabilized.

[AIIMS 2004]

12. Assertion : Alcoholic fermentation involves conversion of sugar into ethyl alcohol by yeast.

Reason : Fermentation involves the slow decomposition of complex organic

13. Assertion : The water solubility of the alcohols follow the order t -butyl > s -butyl alcohol > n -butyl alcohol.

Reason : Alcohols form H -bonding with water to show soluble nature.

14. Assertion : Absolute ethanol can be obtained by simple fractional distillation of a mixture of alcohol and water.

Reason : The absolute alcohol boils at $78.3^\circ C$.

15. Assertion : Acid catalysed dehydration of t -butanol is slower than n -butanol.

Reason : Dehydration involves formation of the protonated alcohol, ROH_2^+ .

16. Assertion : Tertiary alcohols give turbidity immediately with Lucas reagent.

Reason : A mixture of conc. HI + anhydrous $ZnCl_2$ is called Lucas reagent.



17. Assertion : 4-nitrophenol is more acidic than 2, 4, 6-trinitrophenol.
Reason : Phenol is a weaker acid than carbonic acid.
18. Assertion : Phenols cannot be converted into esters by direct reaction with carboxylic acids.
Reason : Electron withdrawing groups increase the acidity of phenols.
19. Assertion : *tert*-butyl alcohol undergoes acid catalysed dehydration readily than propanol.
Reason : 3° alcohols do not give Victor-Meyer's test.
20. Assertion : The ease of dehydration of alcohols follows the order. Primary > Secondary > Tertiary.
Reason : Dehydration proceeds through the formation of oxonium ions.
21. Assertion : Phenol reacts with acyl halides in presence of pyridine to form phenyl acetate.
Reason : Benzoylation of phenol is carried out in the presence of NH_4OH .
22. Assertion : Alcohols are easily protonated than phenols.
Reason : Alcohols undergo intermolecular hydrogen bonding due to the presence of highly electronegative oxygen.
23. Assertion : Phenol is less acidic than *p*-nitrophenol.
Reason : Phenolate ion is more stable than *p*-nitrophenolate ion.
24. Assertion : Treatment of phenol with nitrous acid yields *p*-benzoquinone monoxime.
Reason : *p*-nitrosophenol and *p*-benzoquinone monoxime are tautomers.
25. Assertion : Reimer-Tiemann reaction of phenol with CCl_4 in $NaOH$ at 340 K gives salicylic acid as the major product.
Reason : The reaction occurs through intermediate formation of dichlorocarbene.
26. Assertion : Primary and secondary alcohols can be distinguished by Victor-Meyer's test.
Reason : Primary alcohols form nitrolic acid which dissolve in $NaOH$ to form blood red colouration but secondary alcohols form pseudonitrotes which give blue colouration with $NaOH$.
27. Assertion : HIO_4 cleaves 1, 2-glycols but not 1, 3- or higher glycols.
Reason : Only 1, 2- glycols form cyclic esters which subsequently undergo cleavage to form carbonyl compounds.
28. Assertion : Dehydration of glycerol with $KHSO_4$ gives acrolein.

- Reason : Acrolein is an α, β -unsaturated aldehyde.
29. Assertion : Both symmetrical and unsymmetrical ethers can be prepared by Williamson's synthesis.
Reason : Williamson's synthesis is an example of nucleophilic substitution reaction.
30. Assertion : Etherates are coordination complexes of ethers with Lewis acids.
Reason : Ethers are easily cleaved by mineral acids such as HCl and H_2SO_4 at 373 K.
31. Assertion : $(CH_3)_3Br$ and CH_3CH_2ONa react to form $(CH_3)_3C-O-CH_2CH_3$.
Reason : Good yields of ethers are obtained when *tert*-alkyl halides are treated with alkoxides.
32. Assertion : A rate of hydrolysis of methyl chloride to methanol is higher in DMF than in water.
Reason : Hydrolysis of methyl chloride follows second order kinetics. [AIIMS 2005]
33. Assertion : *t*-Butyl methyl ether is not prepared by the reaction of *t*-butyl bromide with sodium methoxide.
Reason : Sodium methoxide is a strong nucleophile.

[AIIMS 2005]

Answers

General introduction of alcohol, Phenol & Ethers

1	b	2	d	3	c	4	d	5	a
6	c	7	c	8	b	9	c	10	b
11	b	12	c	13	c	14	a	15	c
16	b	17	b	18	b	19	b	20	b
21	a	22	c	23	a	24	a	25	b
26	a	27	c	28	a	29	c	30	d
31	a	32	b	33	c	34	b	35	d
36	d	37	b	38	a	39	a		

Preparation of alcohol, Phenol and Ethers

1	c	2	c	3	b	4	c	5	d
6	c	7	c	8	d	9	a	10	b
11	c	12	c	13	b	14	b	15	d
16	c	17	b	18	c	19	d	20	b

1240 Alcohol, Phenol and Ethers

21	c	22	b	23	c	24	c	25	c
26	d	27	a	28	d	29	b	30	a
31	b	32	b	33	d	34	c	35	d
36	c	37	a	38	a	39	b	40	c
41	b	42	a	43	a	44	c	45	c
46	b	47	c	48	b	49	a	50	b
51	d	52	a	53	d	54	a	55	c
56	a	57	b	58	c	59	b	60	bc
61	a	62	d	63	b	64	a		

Properties of alcohol, Phenol and Ethers

1	c	2	a	3	a	4	c	5	a
6	d	7	d	8	b	9	d	10	c
11	a	12	b	13	c	14	c	15	c
16	b	17	c	18	c	19	d	20	a
21	b	22	b	23	a	24	b	25	c
26	b	27	a	28	b	29	a	30	d
31	b	32	b	33	c	34	c	35	b
36	a	37	d	38	a	39	c	40	b
41	d	42	b	43	d	44	a	45	c
46	b	47	c	48	a	49	a	50	a
51	d	52	c	53	b	54	c	55	a
56	c	57	d	58	a	59	d	60	c
61	d	62	a	63	c	64	b	65	c
66	b	67	d	68	b	69	c	70	b
71	c	72	c	73	a	74	a	75	c
76	a	77	a	78	a	79	d	80	a
81	c	82	a	83	d	84	b	85	c
86	a	87	b	88	d	89	b	90	c
91	b	92	d	93	d	94	b	95	a
96	a	97	b	98	a	99	c	100	d
101	d	102	c	103	a	104	b	105	d
106	a	107	d	108	b	109	a	110	c
111	b	112	b	113	a	114	a	115	a
116	b	117	a	118	d	119	a	120	c
121	a	122	d	123	a	124	a	125	c
126	b	127	c	128	b	129	a	130	a
131	b	132	b	133	c	134	a	135	d
136	a	137	b	138	d	139	a	140	b
141	a	142	b	143	b	144	a	145	b

146	a	147	a	148	a	149	a	150	b
151	b	152	b	153	b	154	a	155	b
156	c	157	d	158	c	159	c	160	a
161	c	162	c	163	b	164	d	165	a
166	b	167	c	168	b	169	d	170	b
171	c	172	b	173	b	174	b	175	a
176	a	177	c	178	a	179	b	180	c
181	b	182	b	183	c	184	a	185	d
186	c	187	b	188	a	189	c	190	a
191	d	192	a	193	a	194	b	195	ad
196	d	197	b	198	b	199	b	200	a
201	b	202	c	203	d	204	a	205	b
206	a	207	b	208	b	209	b	210	b
211	a	212	a	213	b	214	a	215	a
216	c	217	d	218	d	219	a	220	a
221	b	222	a	223	d	224	b	225	c
226	a	227	c	228	d	229	b	230	a
231	b	232	d	233	c	234	b	235	d
236	b	237	d	238	c	239	d	240	a
241	a	242	a	243	b	244	a	245	a

Uses of alcohol, Phenol and Ethers

1	a	2	c	3	d	4	b	5	b
6	a	7	a	8	a	9	a	10	b
11	d	12	d	13	d	14	b	15	d
16	d	17	b	18	c	19	c	20	b
21	c	22	c	23	c	24	d	25	c
26	d	27	a	28	a				

Critical Thinking Questions

1	c	2	c	3	c	4	a	5	a
6	c	7	c	8	c	9	a	10	c
11	d	12	b	13	a	14	b	15	a
16	d	17	b	18	a	19	b	20	c
21	c	22	a						

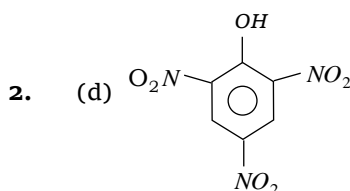
Assertion & Reason

1	c	2	d	3	a	4	c	5	c
6	a	7	b	8	a	9	b	10	a
11	c	12	a	13	b	14	e	15	e

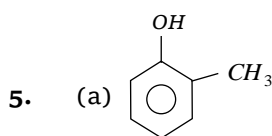
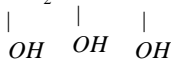
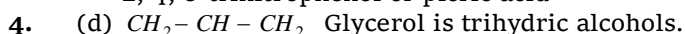
16	c	17	e	18	b	19	b	20	e
21	c	22	b	23	c	24	b	25	c
26	a	27	a	28	b	29	b	30	c
31	d	32	c	33	b				

AS Answers and Solutions

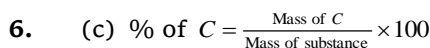
General introduction of alcohol, Phenol & Ethers



2, 4, 6-trinitrophenol or picric acid



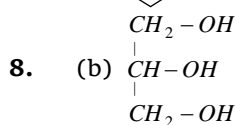
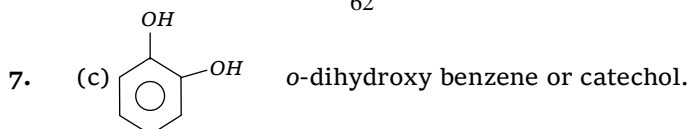
Hydroxy



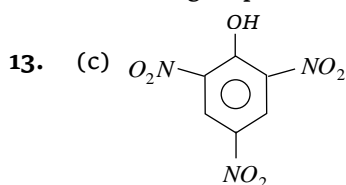
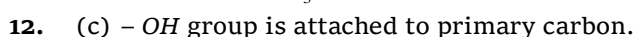
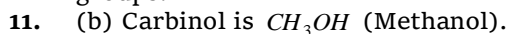
$$\text{CCl}_4 = \frac{12}{154} \times 100 = 7.79 \%$$

$$\text{C}_6\text{H}_6\text{Cl}_6 = \frac{72}{291} \times 100 = 24.74 \%$$

$$\text{CH}_2\text{OH}-\text{CH}_2\text{OH} = \frac{24}{62} \times 100 = 38.70 \%$$

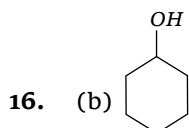
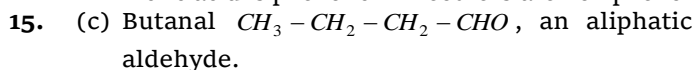


one secondary and two primary alcoholic groups.

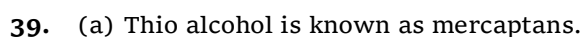
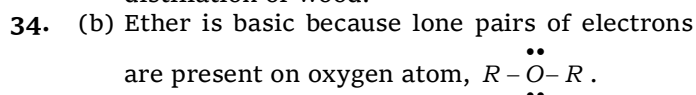
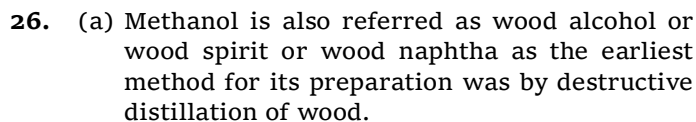
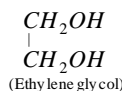
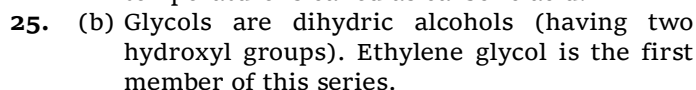
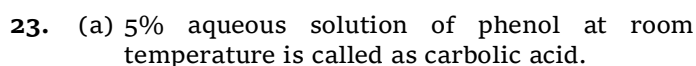
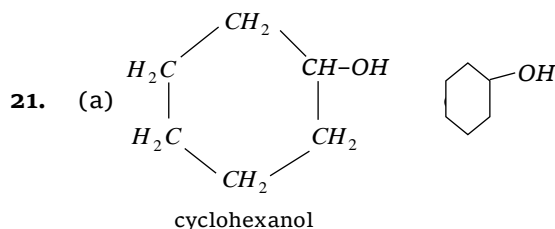
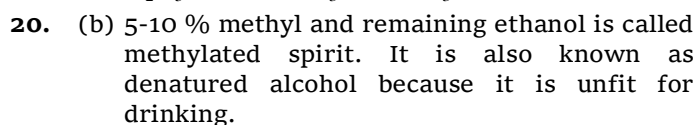


(Picric acid) or 2, 4, 6-

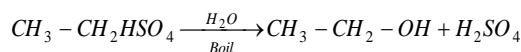
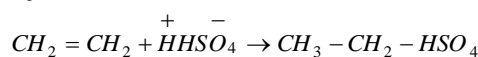
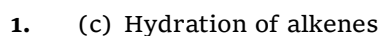
Picric acid is phenolic while ethers are non phenolic.



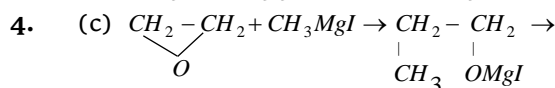
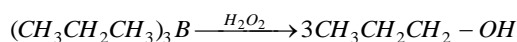
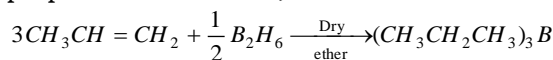
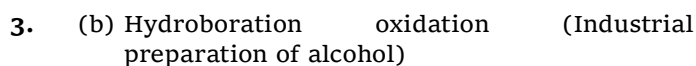
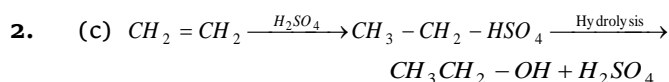
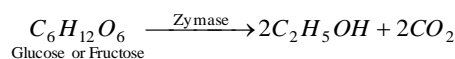
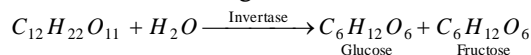
Cyclohexanol is a secondary alcohol because -OH group is linked to 2° carbon.



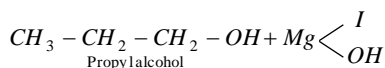
Preparation of alcohol, Phenol and Ethers

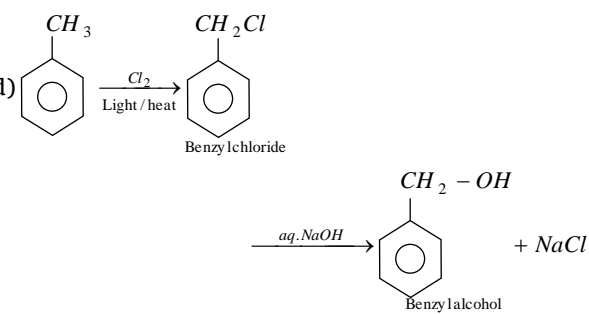
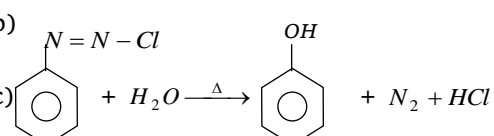
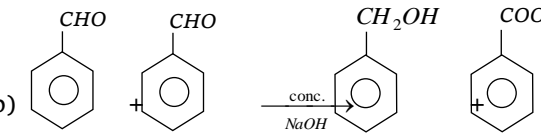
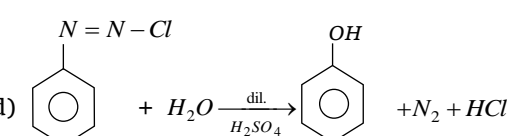
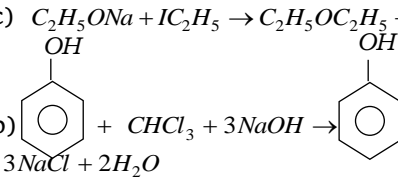


Fermentation of sugars:

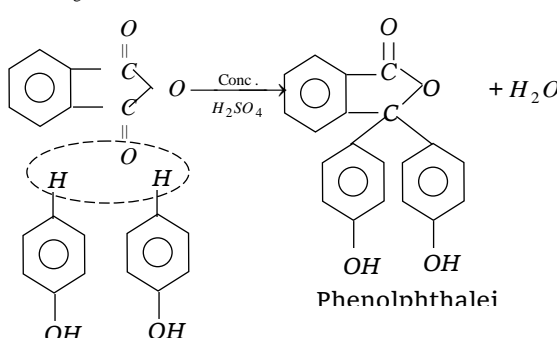
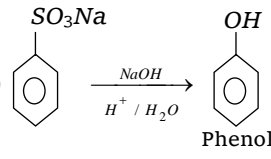
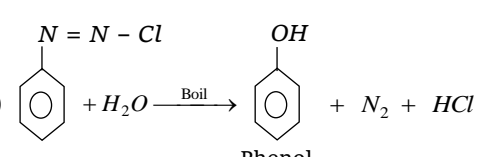


1240 Alcohol, Phenol and Ethers



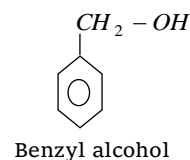
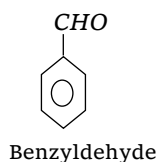
5. (d) Starch $\xrightarrow{\text{Enzymes}}$ Alcohol
6. (c) Coconut oil + Alkali \rightarrow Soap + Glycerol
It is a saponification reaction.
7. (c) $\text{C}_6\text{H}_{12}\text{O}_6 \xrightarrow{\text{Zymase}} 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$
Glucose or Fructose Ethyl alcohol
8. (d) 
9. (a) $2(\text{C}_6\text{H}_{10}\text{O}_5)_n + n\text{H}_2\text{O} \xrightarrow[\text{(from germinated barley)}]{\text{Diastase}}$ $n(\text{C}_{12}\text{H}_{22}\text{O}_{11})$
Starch Maltose
- $\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O} \xrightarrow[\text{(from yeast)}]{\text{Maltase}}$ $2\text{C}_6\text{H}_{12}\text{O}_6$
Glucose
- $\text{C}_6\text{H}_{12}\text{O}_6 \xrightarrow[\text{(from yeast)}]{\text{Zymase}}$ $2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$
10. (b) 
11. (c) $\text{CH}_3\text{COOH} + 4\text{H} \xrightarrow{\text{LiAlH}_4} \text{CH}_3\text{CH}_2\text{OH} + \text{H}_2\text{O}$
12. (c) $\text{H} \begin{matrix} \diagup \\ \text{C}=\text{O} \\ \diagdown \\ \text{H} \end{matrix} \xrightarrow{\text{CH}_3\text{MgI}} \text{CH}_2 - \text{O} - \text{MgI} \xrightarrow{\text{Hydrolysis}}$
 $\text{CH}_3 - \text{CH}_2 - \text{OH} + \text{Mg} \begin{matrix} \swarrow \text{I} \\ \searrow \text{OH} \end{matrix}$
13. (b) 
14. (b) 
15. (d) $\text{C}_2\text{H}_5\text{ONa} + \text{IC}_2\text{H}_5 \rightarrow \text{C}_2\text{H}_5\text{OC}_2\text{H}_5 + \text{NaI}$
16. (c) 
17. (c) $\text{HCHO} + \text{HCHO} \xrightarrow{\text{Conc. KOH}} \text{CH}_3\text{OH} + \text{HCOOK}$
Methyl alcohol Potassium formate

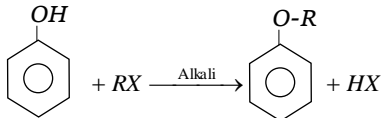
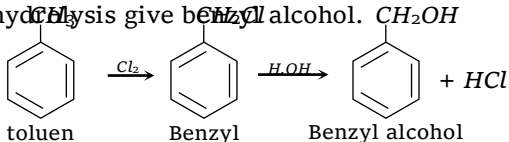
It is cannizzaro's reaction.

19. (d) Alcohol + Benzene $\xrightarrow{\text{(dry)}}$ Soluble
(Alcohol) $\text{R} - \text{OH} + \text{Na} \rightarrow \text{R} - \text{ONa} + \text{H}_2$
21. (c) $\text{CO} + \text{H}_2 \xrightarrow[672 \text{ K, } 200 \text{ atm}]{\text{Cr}_2\text{O}_2 / \text{ZnO}} \text{CH}_3\text{OH}$
water gas
23. (c) 
24. (c) $\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O} \xrightarrow[\text{(from yeast)}]{\text{Maltase}}$ $2\text{C}_6\text{H}_{12}\text{O}_6$
Maltose Glucose
26. (d) Grignard reagent reacts with compounds containing multiple bonds like $>\text{C}=\text{O}$, $>\text{C}=\text{S}$, $>\text{C}\equiv\text{N}$.
28. (d) Acetone reacts with Grignard's reagent to give tertiary alcohol.
 $(\text{CH}_3)_2\text{C}=\text{O} + \text{CH}_3\text{MgBr} \xrightarrow{\text{H}_2\text{O}} (\text{CH}_3)_3\text{C}-\text{OH}$
ter-butyl alcohol
29. (b) $\text{C}_2\text{H}_5\text{MgBr} + \text{H}_2\text{C} \begin{matrix} \diagup \\ \text{C} \\ \diagdown \end{matrix} \text{CH}_2 \xrightarrow{\text{H}_2\text{O}}$
 $\text{C}_2\text{H}_5\text{CH}_2\text{CH}_2\text{OH} + \text{MgBr}(\text{OH})$
(A) n-butyl alcohol
30. (a) 
31. (b) 
32. (b) $\text{H} \begin{matrix} \diagup \\ \text{C}=\text{O} \\ \diagdown \\ \text{H} \end{matrix} + \text{C}_2\text{H}_5\text{MgI} \rightarrow \text{CH}_2 - \text{O} - \text{MgI}$
 C_2H_5
 $\xrightarrow{\text{Hydrolysis}} \text{C}_2\text{H}_5 - \text{CH}_2 - \text{OH} \text{ or } \text{C}_3\text{H}_7\text{OH} + \text{Mg} \begin{matrix} \swarrow \text{I} \\ \searrow \text{OH} \end{matrix}$
35. (d) $\text{RMgBr} + \text{O}_2 \rightarrow \text{R} - \text{OMgBr} \xrightarrow{\text{hydrolysis}} \text{R} - \text{OH} + \text{Mg} \begin{matrix} \swarrow \text{Br} \\ \searrow \text{OH} \end{matrix}$
Grignard reagent Alcohol
39. (b) $\text{C}_6\text{H}_{12}\text{O}_6 \xrightarrow{\text{Zymase}}$ $2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$
Glucose

During fermentation CO_2 gas is eliminated.

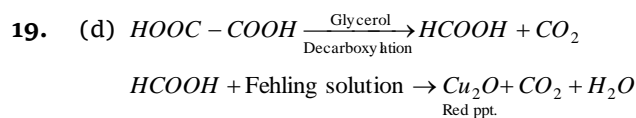
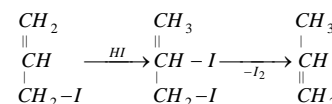
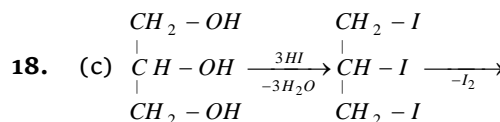
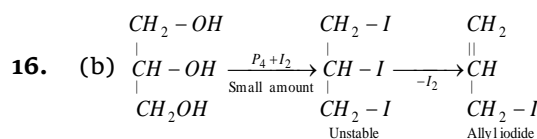
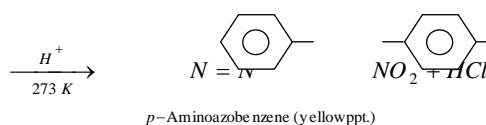
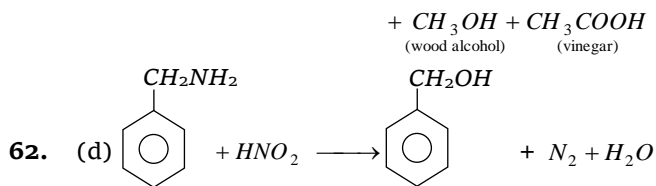
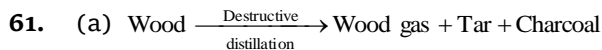
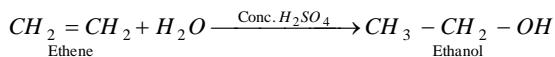
40. (c) $\text{C}_2\text{H}_5 - \text{NH}_2 + \text{HNO}_2 \rightarrow \text{C}_2\text{H}_5\text{OH} + \text{N}_2 + \text{H}_2\text{O}$



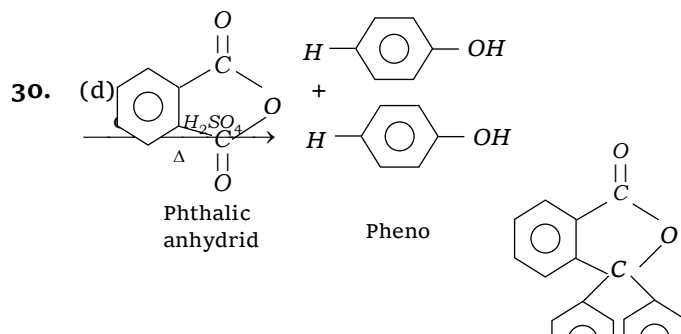
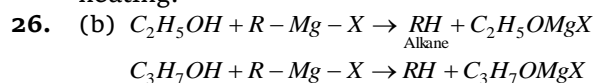
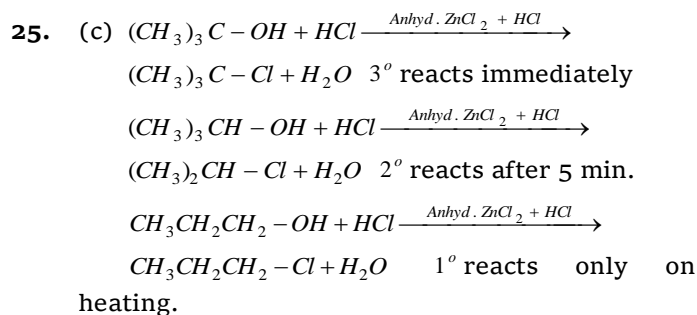
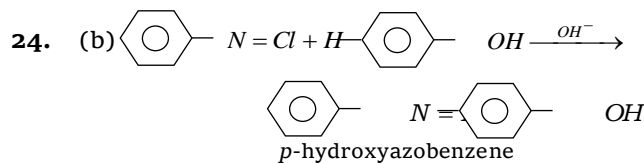
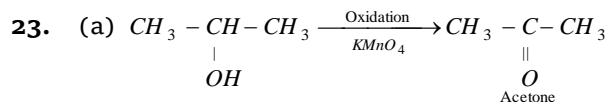
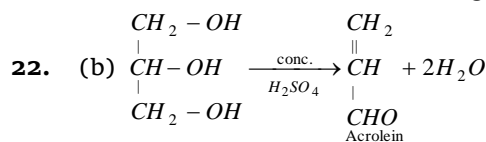
41. (b) $\xrightarrow{\text{LiAlH}_4}$
42. (a) $\text{CO} + \text{H}_2 \xrightarrow[573 \text{ K, 200 atm}]{\text{CuO-ZnO-Cr}_2\text{O}_3} \text{CH}_3\text{OH}$
Methanol
43. (a) $\text{CH}_3-\text{CH}=\text{C} \begin{matrix} \text{CH}_3 \\ \text{CH}_3 \end{matrix} + \text{H}_2\text{O} \xrightarrow{\text{Markownikoff rule}} \text{CH}_3-\text{CH}_2-\text{C} \begin{matrix} \text{CH}_3 \\ \text{OH} \\ \text{CH}_3 \end{matrix}$
2 methyl 2 butene
2 methyl butan-2-ol
- $\text{CH}_3\text{CH}=\text{CH}_2 + \text{H}_2\text{O} \xrightarrow{\text{Markownikoff rule}} \text{CH}_3-\text{CH}(\text{OH})-\text{CH}_3$
propene
propene-2-ol
44. (c) $\text{CH}_3\text{CONa} + \text{Br}-\text{CH}_3 \rightarrow \text{CH}_3-\text{O}-\text{CH}_3 + \text{NaBr}$
Dimethyl ether (symmetrical ether)
- $\text{CH}_3-\text{C}(\text{CH}_3)_2-\text{O}^- \text{Na}^+ + \text{CH}_3\text{Br} \rightarrow \text{CH}_3-\text{C}(\text{CH}_3)_2-\text{OCH}_3 + \text{NaBr}$
Methyl tert-butyl ether (unsymmetrical ether)
45. (c) 
46. (b) $\text{C}_2\text{H}_5\text{Br} + \text{C}_2\text{H}_5\text{ONa} \xrightarrow{-\text{NaBr}} \text{C}_2\text{H}_5-\text{O}-\text{C}_2\text{H}_5$
Sod. ethoxide
diethyl ether
47. (c) $\text{RX} + \text{RONa} \rightarrow \text{R}-\text{O}-\text{R} + \text{NaX}$
Ether
- It is a Williamson's synthesis reaction.
48. (b) Williamson's synthesis -
 $\text{CH}_3-\text{CH}_2-\text{ONa} + \text{Cl}-\text{CH}_2-\text{CH}_3 \rightarrow \text{CH}_3-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}_3$
49. (a) Dehydration of alcohols gives ethers.
50. (b) $2\text{C}_2\text{H}_5\text{Br} + \text{Ag}_2\text{O} \xrightarrow{\text{Dry}} \text{C}_2\text{H}_5-\text{O}-\text{C}_2\text{H}_5 + 2\text{AgBr}$
- If we take moist Ag_2O then alcohol is formed
 $\text{Ag}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{AgOH}$
 $\text{C}_2\text{H}_5\text{Br} + \text{AgOH} \rightarrow \text{C}_2\text{H}_5\text{OH} + \text{AgBr}$
51. (d) $\text{CH}_3\text{OCH}_3 \xrightarrow{\text{Cl}_2/h\nu} \text{CH}_3\text{OCH}_2\text{Cl}$
Methoxy methane (Lower ether)
 α -Chlorodimethyl ether
- $\text{CH}_3\text{OCH}_3 \xrightarrow[-\text{MgBr}(\text{Cl})]{\text{CH}_3\text{MgBr}} \text{CH}_3\text{OCH}_2\text{CH}_3$
Methoxy ethane (Higher ether)
52. (a) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{Br} \xrightarrow[\text{(ii) Saturated NH}_4\text{Cl}]{\text{(i) Excess-CH}_3\text{MgI}} \text{CH}_3-\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}-\text{OH}$
Acetyl bromide
2-methyl 2-propanol
53. (d) When chlorine is passed in boiling toluene, substitution inside chain takes place and benzyl chloride is obtained which on hydrolysis give benzyl alcohol.
- 
- toluene Benzyl Benzyl alcohol
54. (a) $2\text{C}_6\text{H}_5\text{CHO} + \text{NaOH} \rightarrow \text{C}_6\text{H}_5\text{CH}_2\text{OH} + \text{C}_6\text{H}_5\text{COONa}$
Benzaldehyde (Benzyl alcohol)
55. (c) Ethanal with CH_3MgBr gives propanol-2 (after hydrolysis) and with $\text{C}_2\text{H}_5\text{OH}$, it gives acetal.
- $\text{CH}_3\text{CHO} + \text{CH}_3\text{MgBr} \rightarrow \text{CH}_3\text{CH} \begin{matrix} \text{OMgBr} \\ \text{CH}_3 \end{matrix} \xrightarrow{\text{H}^+} \text{CH}_3\text{CH} \begin{matrix} \text{OH} \\ \text{CH}_3 \end{matrix}$
Acetaldehyde 2 propanol
- $\text{CH}_3\text{CHO} + 2\text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{dry HCl}} \text{CH}_3\text{CH} \begin{matrix} \text{OC}_2\text{H}_5 \\ \text{OC}_2\text{H}_5 \end{matrix}$
Acetal
56. (a) $\text{H}_2\text{C}=\text{CH}_2 + \text{HOCl} \rightarrow \text{H}_2\text{C}-\underset{\text{Cl}}{\text{CH}_2}\text{OH}$
Ethylene (hypochlorous)
Ethylene chlorohydrine
- $\xrightarrow{[\text{NaHCO}_3]} \text{H}_2\text{C}-\underset{\text{OH}}{\text{CH}_2}-\underset{\text{OH}}{\text{CH}_2} + \text{NaCl} + \text{CO}_2$
(Ethylene glycol)
57. (b) $\text{CH}_3-\underset{\text{CH}_3}{\text{C}}-\text{O}-\text{Na} + \text{Cl}-\text{CH}_3 \rightarrow \text{CH}_3-\underset{\text{CH}_3}{\text{C}}-\text{O}-\text{CH}_3 + \text{NaCl}$
2,2 dimethyl sodium ethoxide
Methyl tert butyl ether
58. (c) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{OC}_2\text{H}_5 + \text{CH}_3\text{MgI} \rightarrow \text{CH}_3-\overset{\text{O-MgI}}{\underset{\text{CH}_3}{\text{C}}}-\text{OC}_2\text{H}_5$
Ethyl methyl ester
Acetone
- $\xrightarrow{\text{Hydrolysis}} \text{CH}_3-\underset{\text{CH}_3}{\text{C}}-\text{O}-\text{C}_2\text{H}_5 \xrightarrow{+\text{Mg} \begin{matrix} \text{Br} \\ \text{OH} \end{matrix}} \text{CH}_3-\underset{\text{CH}_3}{\text{C}}=\text{O} + \text{C}_2\text{H}_5\text{OH}$
Ethyl alcohol
59. (b) NaBH_4 and LiAlH_4 attacks only carbonyl group and reduce it into alcohol group. They do not attack on double bond.
- $\text{C}_6\text{H}_5-\text{CH}=\text{CHCHO} \xrightarrow{\text{NaBH}_4} \text{C}_6\text{H}_5-\text{CH}=\text{CH}-\text{CH}_2\text{OH}$
cinnamic aldehyde cinnamic alcohol
60. (b,c) $\text{CH}_2=\text{CH}_2 + \text{H}_2\text{O} + [\text{O}] \xrightarrow{\text{alk. KMnO}_4} \text{CH}_2-\underset{\text{OH}}{\text{CH}_2}$
Glycol



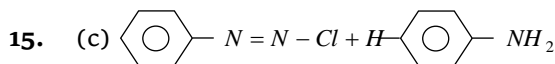
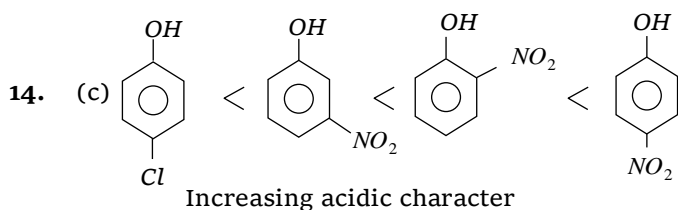
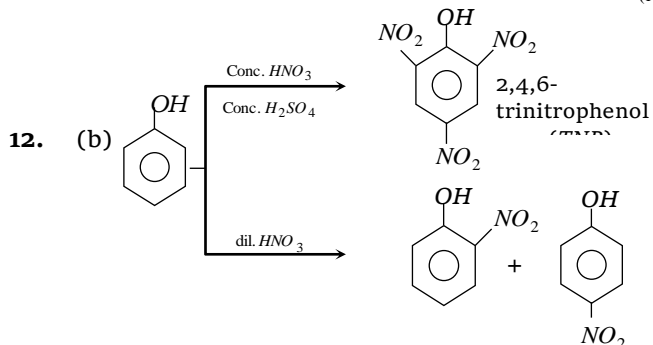
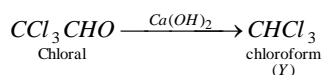
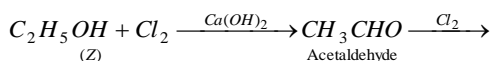
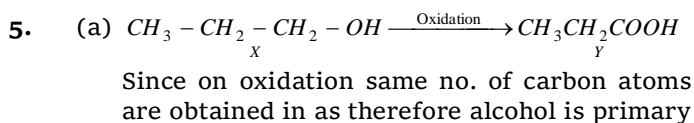
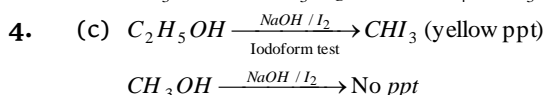
1242 Alcohol, Phenol and Ethers

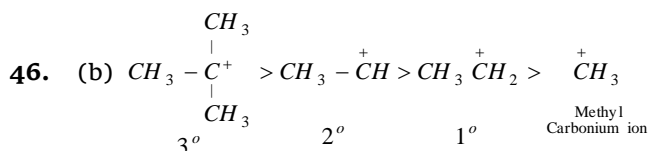
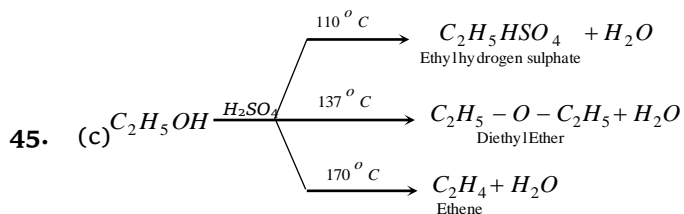
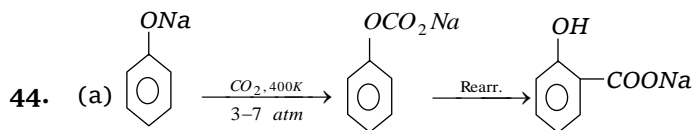
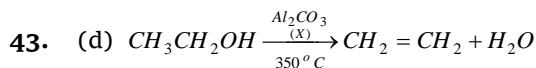
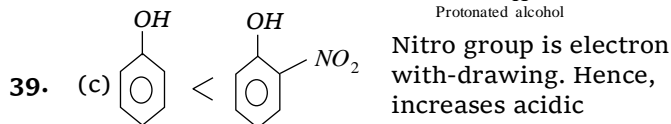
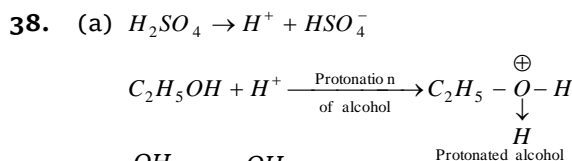
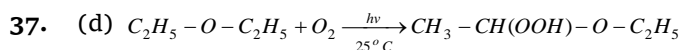
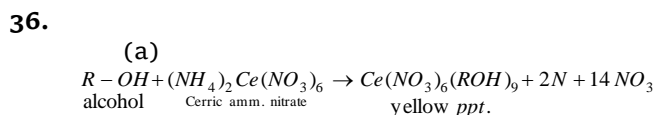
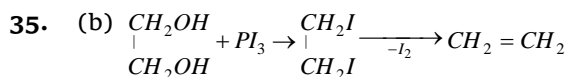
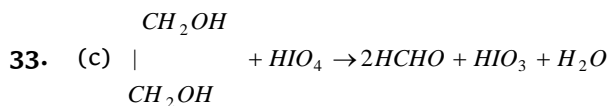


21. (b) Glycerol undergoes extensive hydrogen bonding due to the presence of 3 -OH groups. As a result the glycerol molecules are highly associated and thus it has high viscosity.

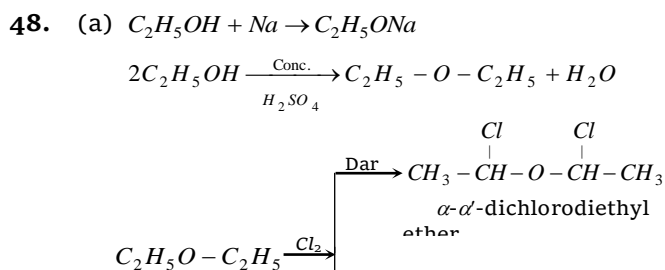


Properties of alcohol, Phenol and Ethers

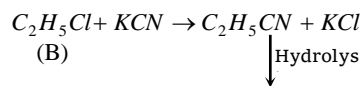
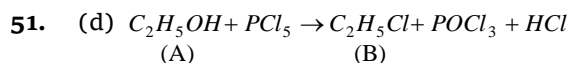




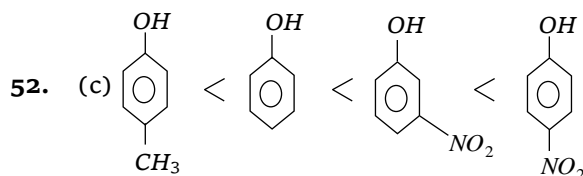
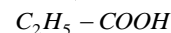
47. (c) Alcohols having less number of carbon atoms are more soluble in water.



50. (a)

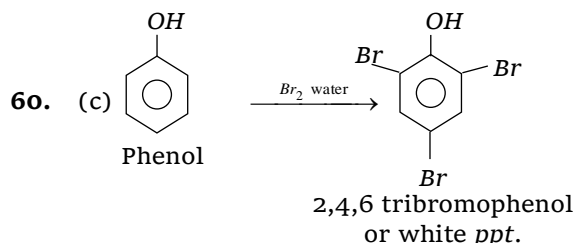
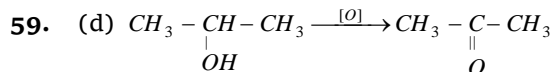
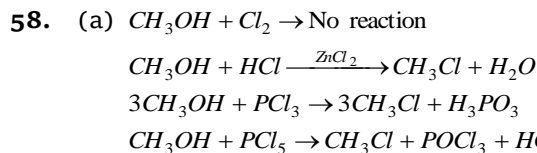
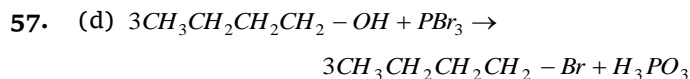
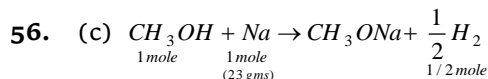


↓ Hydrolysis

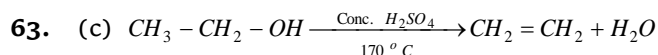
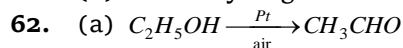


53. (b) Higher alcohols are stronger and have bitter taste.

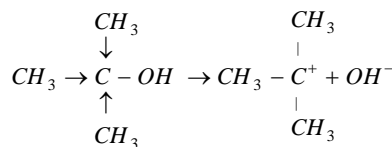
54. (c) Order of reactivity with alkali metal (e.g. Sodium) follows the order 1° > 2° > 3°.



61. (d) Due to hydrogen bonding.

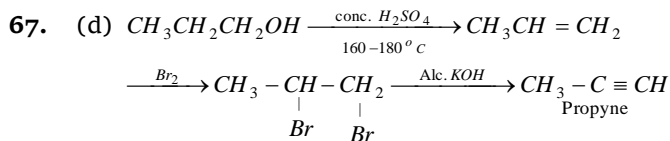


66. (b) Tertiary alcohol readily reacts with halogen acid

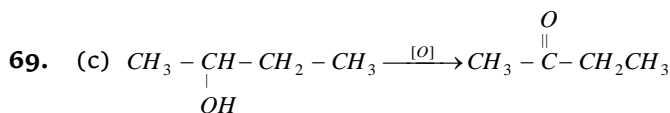


1244 Alcohol, Phenol and Ethers

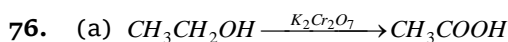
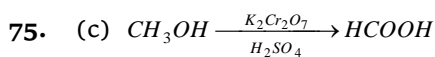
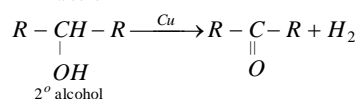
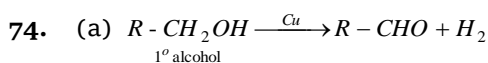
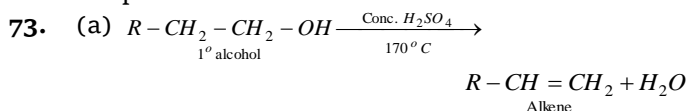
Presence of 3 alkyl group increases electron density on 3^o carbon atom. Hence -OH group is easily removed. After the removal of -OH group 3^o carbonium ion is formed which is most stable



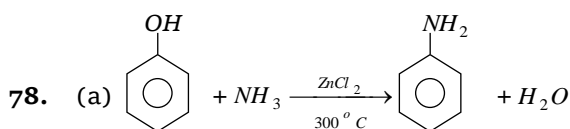
68. (b) Lower alcohols are soluble in all solvents.



70. (b) Due to the resonance stabilisation of phenoxide ion.



77. (a) Lucas test is used for the distinction of primary secondary and tertiary alcohols.

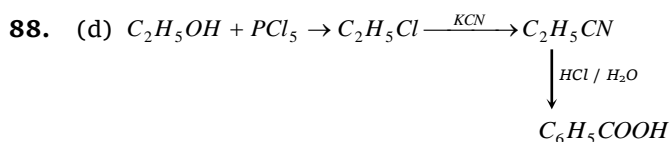
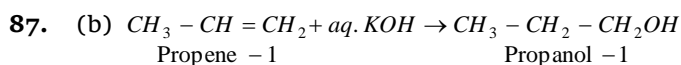


80. (a) A compound that undergoes bromination easily is phenol. Due to presence of -OH group the ring becomes much more active in substitution reactions. The bromination occurs due to availability of electrons on ortho and para position.

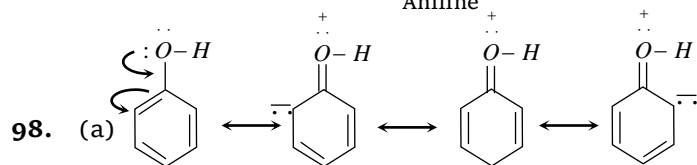
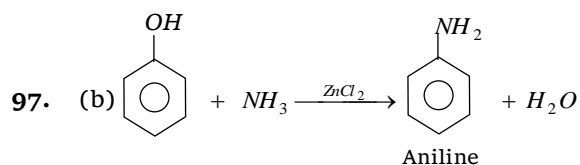
81. (c) o-Nitrophenol has intramolecular H-bonding.

84. (b) C_2H_5OH gives iodoform test having α -hydrogen atom while CH_3OH does not give due to the absence of α -hydrogen atom.

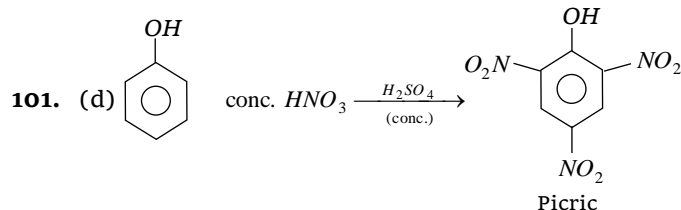
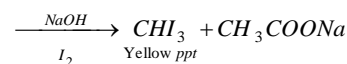
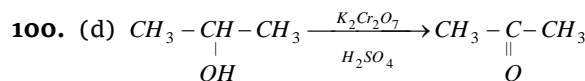
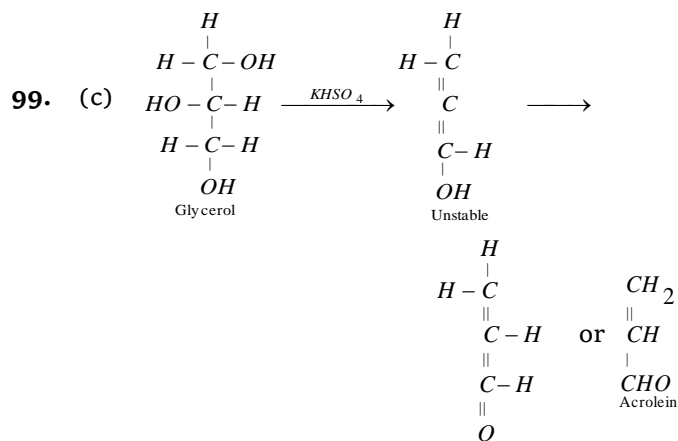
85. (c) Phenol has higher boiling point than toluene because of hydrogen bonding.



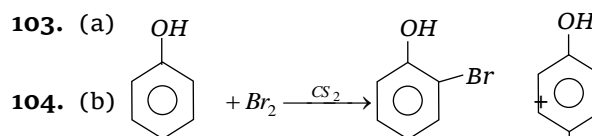
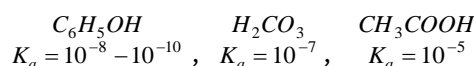
89. (b) $LiAlH_4$ + ether, is reducing agent.

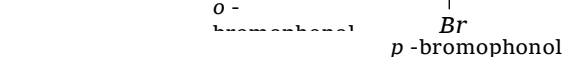


Oxygen atom of -OH group acquires positive charge.



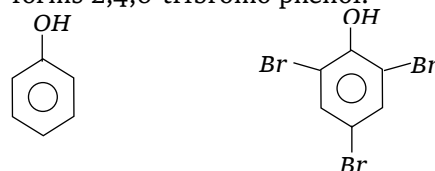
102. (c) Phenol is weaker acid than carbonic acid



104. (b) 

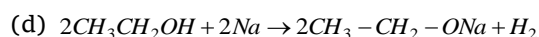
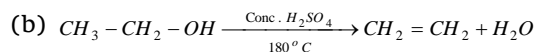
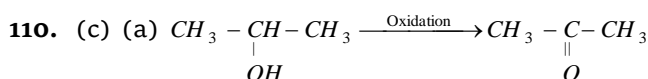
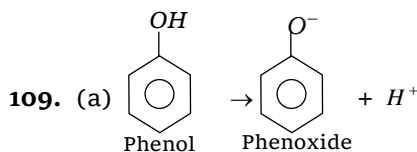
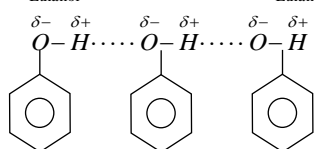
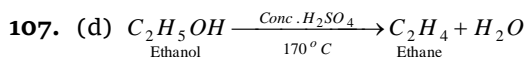
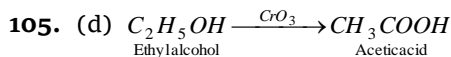
In presence of non-polar solvent (CS_2) the ionization of phenol is suppressed. The ring is slightly activated and hence mono substitution occurs.

On the other hand with Br_2 water phenol forms 2,4,6-tribromo phenol.

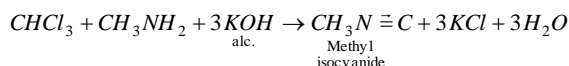




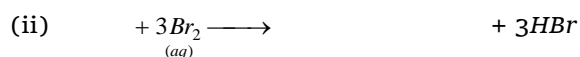
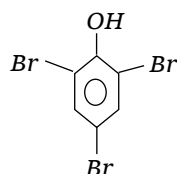
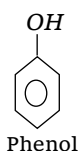
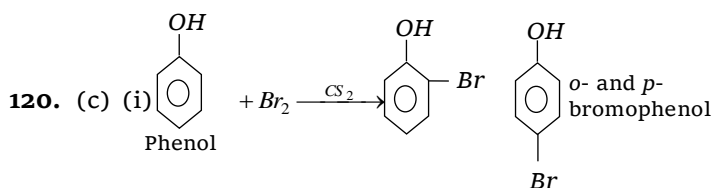
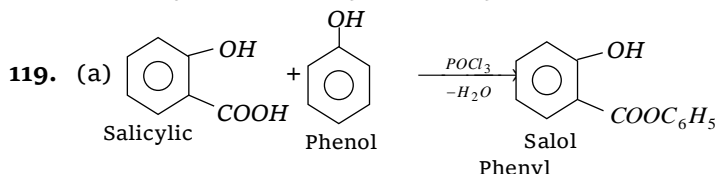
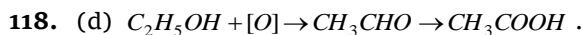
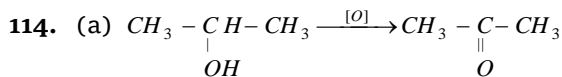
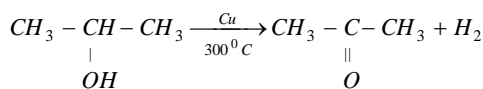
In aqueous solution phenol ionizes to give phenoxide ion. Due to the presence of negative charge on oxygen the benzene ring is highly activated and hence trisubstituted product is obtained.



112. (b) Carbylamine reaction

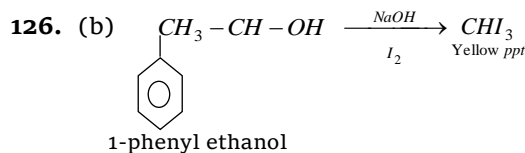
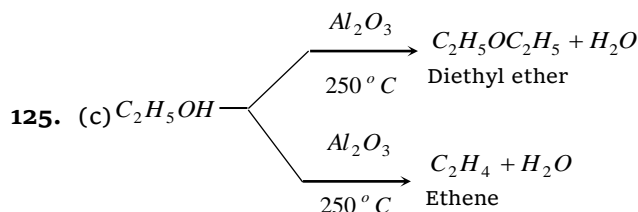
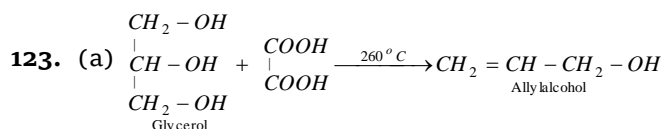


113. (a) Secondary alcohol on dehydrogenation gives acetone

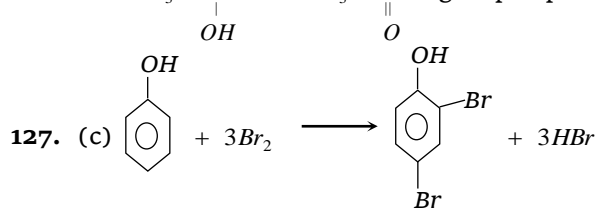


In aq. solution phenol ionize to give phenoxide in which highly activates benzene ring and give trisubstituted product while in presence of CS_2 an inert solvent phenol is unable to ionize due to which benzene ring is slightly activated. Hence, monosubstituted product is obtained.

122. (d) Traces of water from ethanol is removed by reacting with Mg metal.

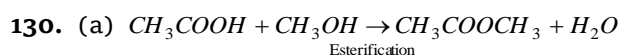
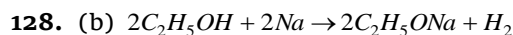


Iodoform test is given by compounds in which $CH_3 - CH -$ or $CH_3 - \underset{O}{\underset{||}{C}} -$ group is present.

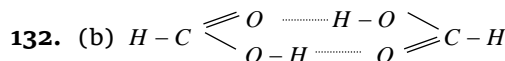


1 mole 3 moles 1 mole
94 grams of phenol reacts with 480 gms. of Br_2 .

$$2 \text{ gm. of phenol} - \frac{480}{94} \times 2 = 10.22 \text{ gms.}$$



131. (b) CH_3OH has highest boiling point because of hydrogen bonding.

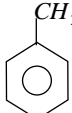


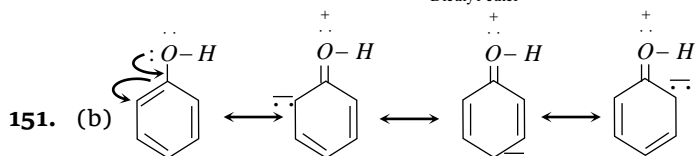
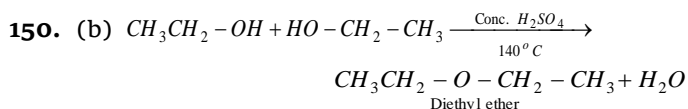
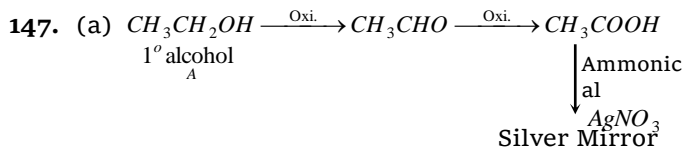
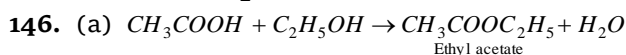
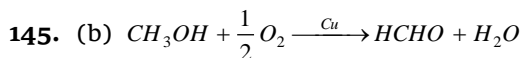
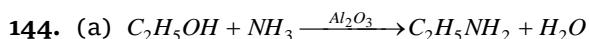
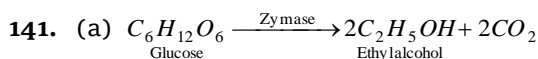
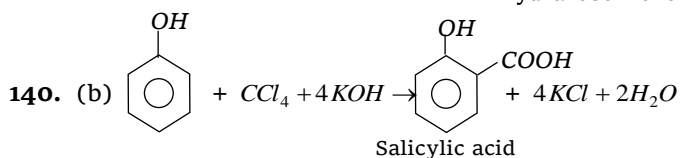
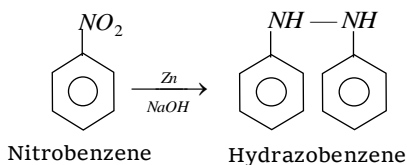
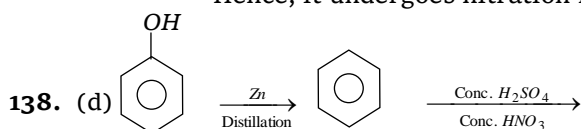
1246 Alcohol, Phenol and Ethers

Formic acid forms dimer due to which strength of H -bond increases Hence, boiling point increases.

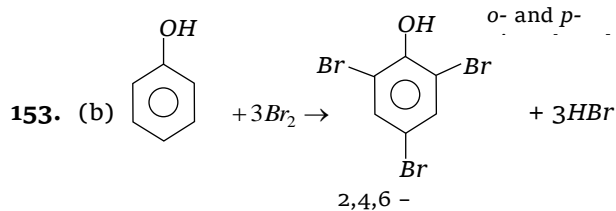
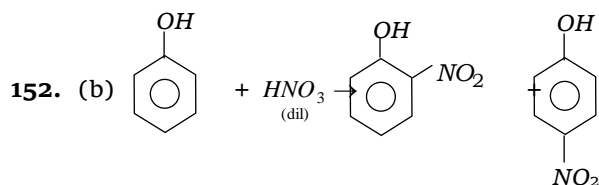
133. (c) Lower members are soluble in water and solubility decreases with increasing molecular mass because hydrophobic character increases.

135. (d) Alcohols can not be dried using anhydrous $CaCl_2$ because it forms an addition compound $CaCl_2 \cdot 4CH_3OH$.

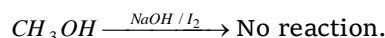
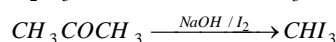
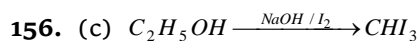
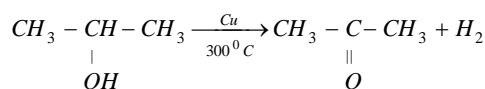
137. (b)  Presence of methyl group increases electron density at o - and p - positions. Hence, it undergoes nitration readily.



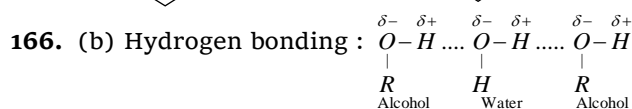
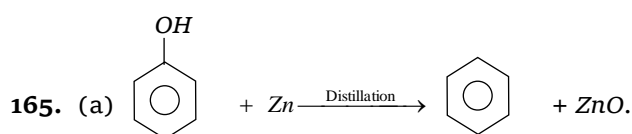
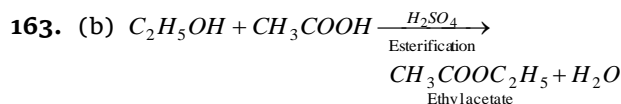
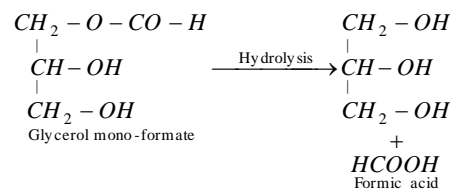
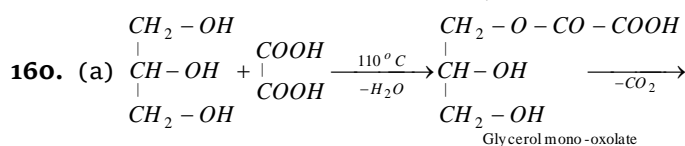
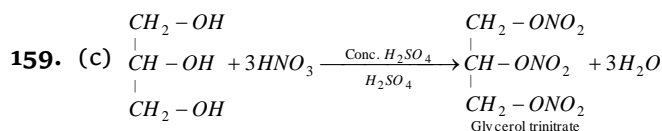
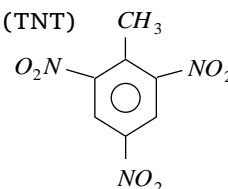
Rate of electrophilic substitution reaction in phenol is faster than in benzene because presence of $-OH$ group increases electron density at o - and p - positions.

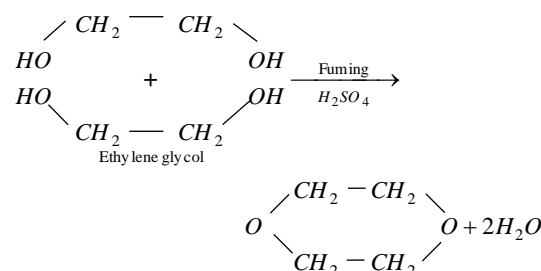
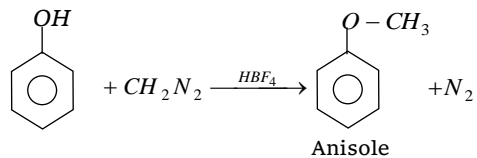


155. (b) Secondary alcohol on dehydrogenation gives acetone



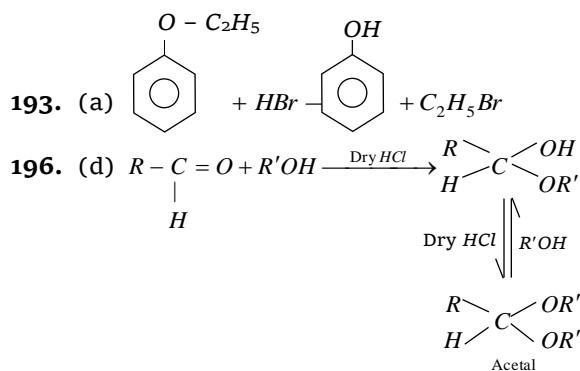
157. (d) 2,4,6 Trinitro toluene (TNT)



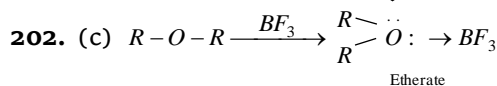
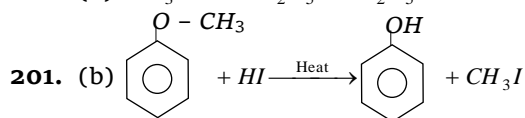
167. (c) 
168. (b) Tertiary carbonium ion is the most stable and it will be given by dehydration of tertiary alcohol.
169. (d) $CH_3CH_2OH \xrightarrow{\text{Heterolytic bond fission}} CH_3CH_2O^- + H^+$
170. (b) C_2H_5OH is soluble in water due to H-bonding.
173. (b) When ethanol dissolves in water then emission of heat and contraction in volume.
175. (a) Azeotropic distillation method -
Rectified spirit + Benzene + water
↓ Fractional distillation
First fraction at 331.8 K is ternary azeotrope (H_2O 7.4% + Benzene 74% + alcohol 18.5%)
Second fraction 341.2 K is a binary azeotrope (Benzene 67.7% + Alcohol 32.2%)
Last fraction at 351K is absolute alcohol.
176. (a) $CH_3-O \xrightarrow{[H + C_2H_5]MgBr} C_2H_6 + Mg \begin{matrix} Br \\ | \\ OCH_3 \end{matrix}$
Methyl alcohol Ethyl magnesium bromide Ethane
177. (c) 
180. (c) Alcohol is soluble in water due to H-bonding
 $\begin{matrix} \delta^- & \delta^+ & \delta^- & \delta^+ & \delta^- & \delta^+ \\ O-H \cdots O-H \cdots O-H \\ | & & | & & | \\ R & & H & & R \\ \text{Alcohol} & & \text{Water} & & \end{matrix}$
183. (c) $CH_3CH_2-OH + 2Cl_2 \rightarrow CCl_3-CHO$
Oxidation will occur with chlorination of methyl group.
185. (d) $CH_3CHO \xrightarrow{NaOH/I_2} CHI_3$
 $CH_3CH_2OH \xrightarrow{NaOH/I_2} CHI_3$
 $CH_3-\underset{\substack{| \\ OH}}{CH}-CH_3 \xrightarrow{NaOH/I_2} CHI_3$ } Yellow ppt.
- $C_6H_5-CH_2-OH \xrightarrow{NaOH/I_2} \text{No yellow ppt.}$
186. (c) Benzyl alcohol and cyclohexanol are not acidic while phenol and *m*-chlorophenol are acidic due to presence of electron withdrawing groups like $-NO_2$, $-Cl$, $-CN$ increases the acidic character of phenols. Hence, *m*-chlorophenol is more acidic than phenol.
187. (b) Three, these are

$CH_3CH_2OCH_2CH_3$ (I), $CH_3OCH_2CH_2CH_3$ (II) and $CH_3OCH(CH_3)_2$ (III). Here I and II, I and III are pairs of metamers.

189. (c) CH_3OCH_3 and $C_2H_5OCH_3$ are gases while $C_2H_5OC_2H_5$ (b.p. 308 K) is low boiling liquid.
190. (a) $C_2H_5OC_2H_5 \xrightarrow[\text{Cleavage of ethers}]{\text{Red P/HI}} 2C_2H_5I \xrightarrow[\text{Reduction}]{\text{Red P/HI}} 2C_2H_6$
Ethane
191. (d) $C_2H_5OC_2H_5 + O_2 \rightarrow CH_3-\underset{\substack{| \\ O-OH}}{CH}-O-C_2H_5$
Ether peroxide
192. (a) $C_2H_5OC_2H_5 + HI \rightarrow C_2H_5OH + C_2H_5I$

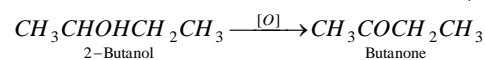
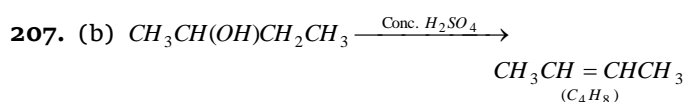
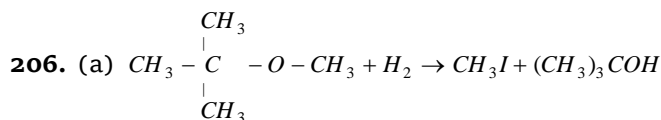


198. (b) $CH_3-O-CH_3 + 2HI \rightarrow 2CH_3I + H_2O$
199. (b) Only alkyl aryl ethers e.g., $C_6H_5OCH_3$ undergoes electrophilic substitution reactions.
200. (a) $CH_3COCl + C_2H_5O-C_2H_5 \rightarrow \text{No reaction}$

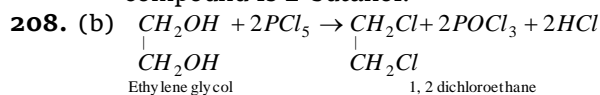


203. (d) Due to inter-molecular hydrogen bonding in alcohols boiling point of alcohols is much higher than ether.

205. (b) CH_3-OCH_3 does not have replaceable H-atom.



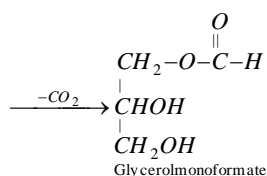
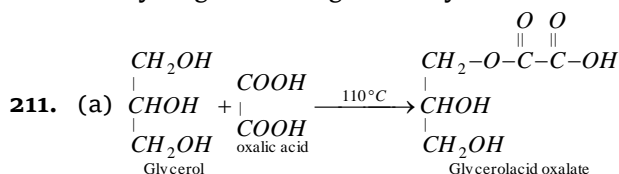
Butanone gives both an oxime and positive iodoform test, therefore, the original compound is 2-butanol.



1248 Alcohol, Phenol and Ethers

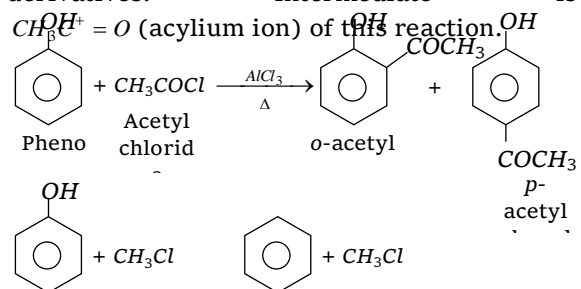
209. (b) C_2H_5OH (ethanol) is a very weak acid hence it does not react with $NaOH$. However it reacts with metallic sodium.

210. (b) Methanol has high boiling point than methyl thiol because there is intermolecular hydrogen bonding in methanol and no hydrogen bonding in methyl thiol.



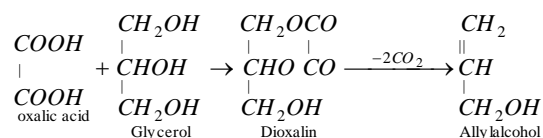
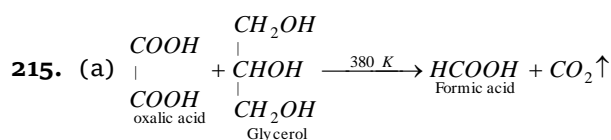
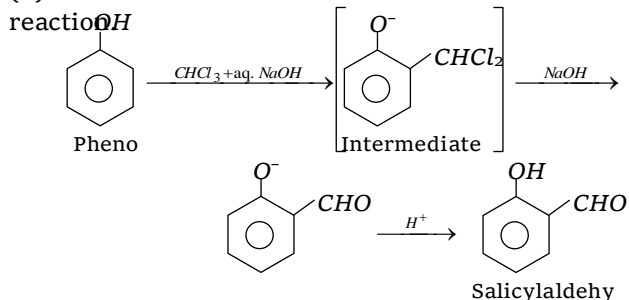
212. (a) Formation of a yellow precipitate on heating a compound with an alkaline solution of iodine is known as iodoform reaction. Methyl alcohol does not respond to this test. Iodoform test is exhibited by ethyl alcohol, acetaldehyde, acetone, methyl ketone and those alcohols which possess $CH_3CH(OH)-$ group.

213. (b) In Friedel-Craft acylation, aromatic compounds such as benzene, phenol etc. undergo acylation with CH_3COCl in the presence of anhydrous $AlCl_3$ and gives ortho and para derivatives. Intermediate is

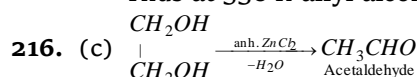


In fact denotes Friedel-Craft alkylation.

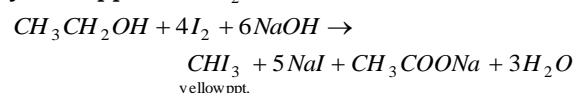
214. (a) This reaction is known as Reimer-Tiemann reaction.



Thus at 530 K allyl alcohol is formed.

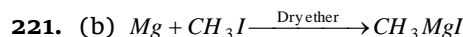
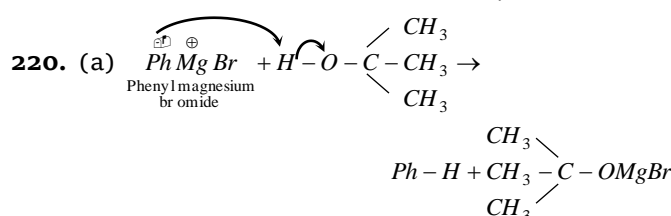
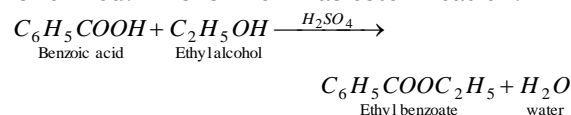


217. (d) Ethyl alcohol gives positive iodoform test (i.e. yellow ppt. with I_2 and $NaOH$)

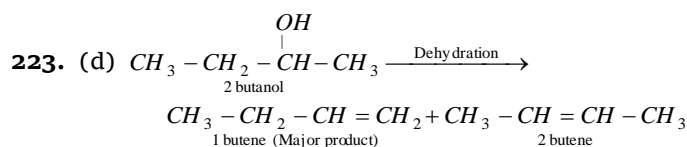
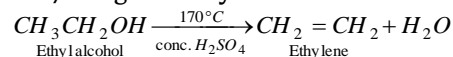


218. (d) Tertiary alcohols react fastest with hydrogen halides. 2-methyl propan-2-ol is a tertiary alcohol.

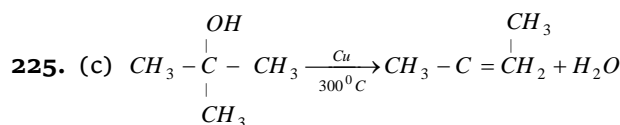
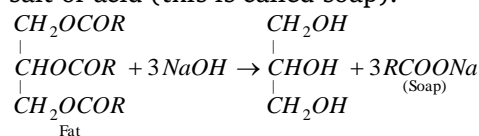
219. (a) When benzoic acid reacts with ethyl alcohol in the presence of sulphuric acid ethyl benzoate is formed. This is known as esterification.

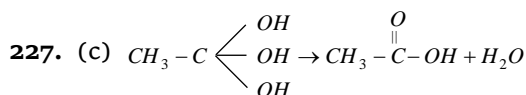


222. (a) Ethyl alcohol on dehydration with conc. H_2SO_4 at 170°C gives ethylene.



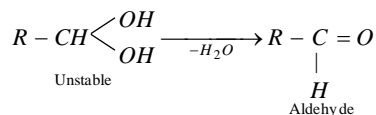
224. (b) Fats are esters of higher fatty acids with glycerol, hence on alkaline hydrolysis they give back glycerol and sodium or potassium salt of acid (this is called soap).



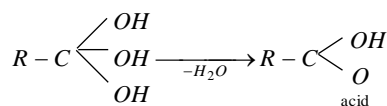


If two or more $-\text{OH}$ groups are present on carbon atom then it immediately loses water molecule and forms acid or aldehyde.

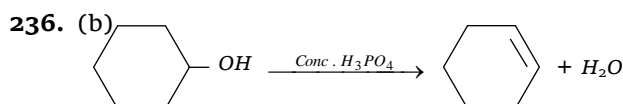
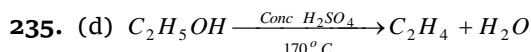
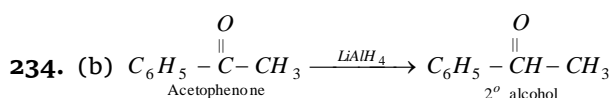
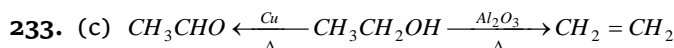
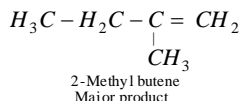
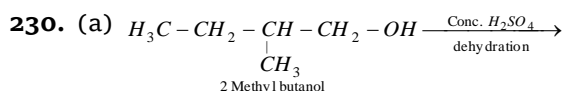
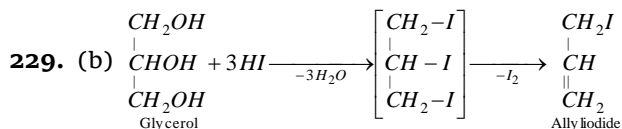
Two $-\text{OH}$ groups on the same carbon aldehyde is formed



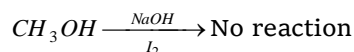
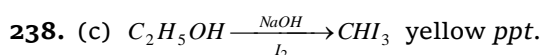
Three $-\text{OH}$ groups on the same carbon acid is formed.



228. (d) H_2SO_4 , Al_2O_3 and H_3PO_4 all can act as dehydrating agent.

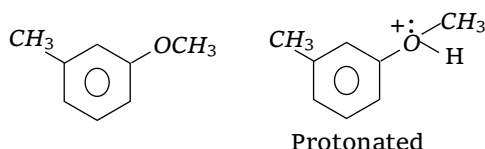


Because conc. H_3PO_4 acts as a dehydrating agent.

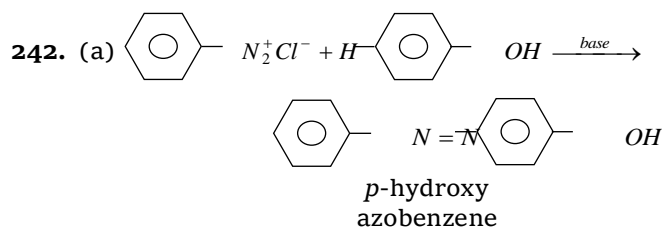
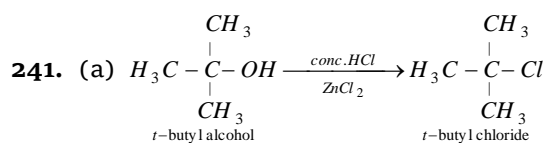
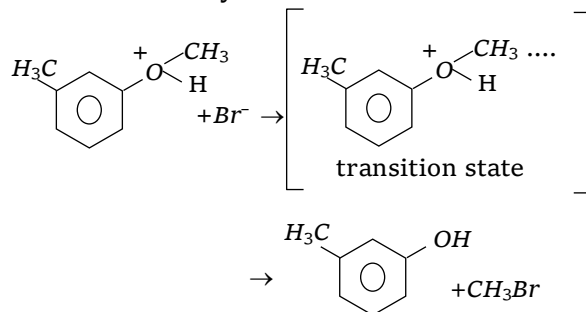


239. (d) It is not acetaldehyde or acetone as does not react with hydrazine. It is not CH_3OH as does not react with Na .

240. (a) The ether molecule gets protonated by the hydrogen of the acid to form protonated ether or oxonium salt.

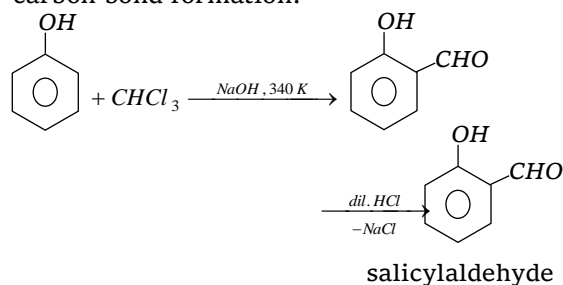


The protonated ether undergoes nucleophilic attack by halide ion (X^-) and forms alkyl alcohol and alkyl halide

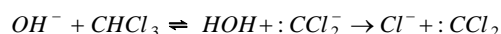


This is an example of coupling reaction

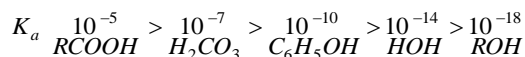
243. (b) Reimer-Tiemann reaction involves the carbon carbon bond formation.



244. (a) This is Reimer-Tiemann reaction where the electrophile is dichlorocarbene ($:\text{CCl}_2$) generated from chloroform by the action of a base.

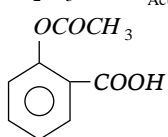


245. (a) Phenols are much more acidic than alcohols but less so than carboxylic acids or even carbonic acid. This is indicated by the values of ionisation constants. The relative acidity follows the order:

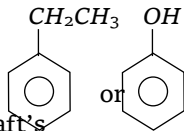


1250 Alcohol, Phenol and Ethers

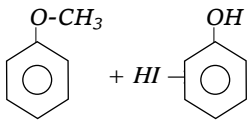
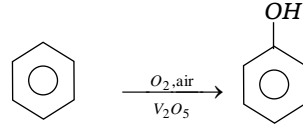
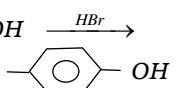
Uses of alcohol, Phenol and Ethers

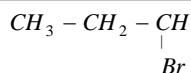
- (a) Glycerol $\xrightarrow{HNO_3}$ Glyceryl trinitrate $\xrightarrow[\text{Kieselguhr}]{\text{Absorbed on}}$ Dynamite
 + Glyceryl dinitrate
- (d) $C_2H_5OH \xrightarrow[\text{Acetobacteraceii}]{\text{air}} CH_3COOH$
- (b)  Aspirin or Acetyl salicylic acid.
- (a) $n \text{ (HOOC-C}_6\text{H}_4\text{-COOH)} + n \begin{pmatrix} CH_2-OH \\ | \\ CH_2-OH \end{pmatrix}$ (Ethylene glycol)
 Terephthallic acid
 \downarrow
 $\left(-C(=O)-C_6H_4-C(=O)-O-CH_2-CH_2-O- \right)_n$
 Polyester
- (a) Ethylene glycol is added to lowering down the freezing point of water so that it does not freeze.
- (b) Power alcohol 80% petrol and 20% ethyl alcohol
- (d) Glucose $\xrightarrow[\text{(From yeast)}]{\text{Zymase}} 2C_2H_5OH + 2CO_2$
- (d) Glycerol is not used as an antiseptic agent.
- (c) Denaturing can also be done by adding 0.5% pyridine, petroleum naphtha, $CuSO_4$ etc.
- (b) A mixture of glyceryl trinitrate and glyceryl dinitrate when absorbed on kieselgurh is called dynamite.
- (c) Tonics have generally contains ethyl alcohol.
- (c) Due to presence of methyl alcohol in liquor.
- (d) An anaesthetic.
- (c) Groundnut oil.
- (a) $C_3H_7COOC_2H_5 \xrightarrow[\text{Butyl alcohol}]{\text{Na} / C_2H_5OH} C_3H_7CH_2OH$
 Ethyl butyrate
- (a) Glycol is used as an antifreeze for automobile radiators because it lowers down the melting point of water.


Critical Thinking Questions

- (c)  will undergoes a Friedel Craft's

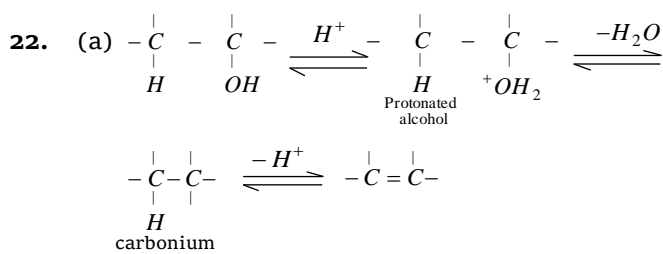
alkylation on ortho or para position because of more electron density.

- (c) $CH_2 = CH_2 + RMgI \rightarrow CH_2 - CH_2 - R \xrightarrow{HOH} \begin{matrix} | \\ OMgI \end{matrix}$
 $MgI(OH) + R - CH_2 - CH_2 - OH$
- (c) The liquids which decompose at its boiling point can be purified by vacuum distillation. Glycerol which decomposes at its boiling point (-563K) can be distilled without decomposition at 453K under 12mm Hg pressure.
- (a) Liebermann's reaction.
- (a) $1^\circ \text{ alcohol} > 2^\circ \text{ alcohol} > 3^\circ \text{ alcohol}$
 Boiling point of alcohols decreases as the number of branches increases.
- (c) 
- (c) $3CH_2 = CH_2 + 2KMnO_4 + 4H_2O \rightarrow \begin{matrix} CH_2-OH \\ | \\ 3 \text{ } \\ | \\ CH_2-OH \end{matrix} + 2KMnO_2 + 2KOH$
 Glycol
- (c) Correct order of dehydration in alcohols $3^\circ > 2^\circ > 1^\circ$.
- (a) Oxiran is ethylene oxide, $CH_2 - CH_2$
 \diagdown
 O
- (c) $6CH_3 - CH = CH_2 + B_2H_6 \xrightarrow{H_2O_2} CH_3 - CH_2 - CH_2OH$
- (d) Distinction between primary, secondary and tertiary alcohol is done by all three methods : oxidation, Victor Meyer and Lucas test.
- (b) 
- (a) *o*- and *p*-nitrophenols are separated by steam distillation because *o*-nitrophenol is steam volatile while *p*-isomer is not.
- (b) Benzoic acid.
- (a) $R - O - R' \xrightarrow{O_2 / \text{light}}$
 $C_2H_5 - O - CH(CH_3) - O - OH$
- (d) $CH_3OH + CH_3OH \xrightarrow{H_2SO_4(Conc)} CH_3OCH_3$
 $CH_3OH + C_2H_5OH \xrightarrow{H_2SO_4(Conc)} CH_3OC_2H_5$
 $C_2H_5OH + C_2H_5OH \xrightarrow{H_2SO_4(Conc)} C_2H_5OC_2H_5$
- (b) $IV > III > I > II$.
- (a) Cyclic ethers are called epoxides. $\begin{matrix} CH_2 - CH_2 \\ | \\ O \end{matrix}$
- (b) $CH_3 - CH = CH - C_6H_4 - OH \xrightarrow{HBr}$




20. (c)  on KMnO_4 oxidation does not give benzoic acid.

21. (c) Chromic anhydride in glacial acetic acid is the best reagent to convert pen-3-en-2-ol into pent-3-in-2-one.

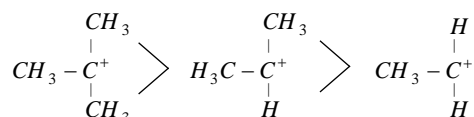


In all cases intermediate is carbonium ion, and there may be 1, 2-hydride or 1, 2-methyl shift to form more stable carbonium ion.

Assertion & Reason

3. (a) It is correct that phenol is more reactive than benzene.
4. (c) It is correct that sodium phenoxide (sodium salt of phenol) and CO_2 on heating from sodium salicylate. This is known as Kolbe's reaction. Ethanol does not respond to this reaction. Therefore, assertion is true. But the reason that phenoxide ion is more basic than ethoxide ion is not correct.
5. (c) Lucas reagent is a mixture of anhydrous ZnCl_2 and conc. HCl is used for the distinction of monohydric alcohol. Tertiary alcohols on addition produce a precipitate immediately while secondary alcohols produce ppt. after 5 minutes. Primary alcohols do not produce any precipitate. Therefore, assertion is true but reason is false.
6. (a) Phenols on treatment with neutral FeCl_3 solution produce purple colour, resorcinol contains phenolic group hence in treatment with FeCl_3 solution it gives purple colour. Here both assertion and reason are correct and reason is a correct explanation of assertion.
7. (b) Glycerol is purified by distillation under reduced pressure because it decomposes on heating below its melting point. It is a trihydric alcohol. Here, both assertion and reason are true but reason is not a correct explanation of assertion.
8. (a) Alcohols and phenols can be distinguished by treating with NaOH . Phenols react with NaOH to produce sodium phenoxide because phenols are acidic and alcohols are neutral. Both assertion and reason are true and reason is correct explanation.
9. (b) Zeolites are shape-selective porous solid acid catalysts, their catalytic activity originates from the presence of highly acidic $\text{Al}-\text{O}(\text{H})-\text{Si}$ hydroxyl in the framework.
10. (a)
$$\text{C}_6\text{H}_5\text{CH}_2\text{OCH}_3 \xrightarrow{\text{H}^+} \text{C}_6\text{H}_5\text{CH}_2^+ + \text{CH}_3\text{OH} \xrightarrow{\text{I}^-} \text{C}_6\text{H}_5\text{CH}_2\text{I}$$
- This can be explained on the basis of $\text{S}_{\text{N}}1$ mechanism. The carbonium ion produced being benzylum ion. Since this type is more stable than alkylum ion.
11. (c) Lower the value of pK_a , more acidic will be the compound. Acetic acid is more acidic than phenol. This indicates that carboxylate ion should be more stable than the phenoxide ion and it is clear that carboxylate ion has more equivalent resonating structures than the phenoxide ion.
12. (a) The conversion of sugar into ethyl alcohol by yeast is called alcoholic fermentation.
- $$\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O} \xrightarrow{\text{Invertase}} \underset{\text{Glucose}}{\text{C}_6\text{H}_{12}\text{O}_6} + \underset{\text{Fructose}}{\text{C}_6\text{H}_{12}\text{O}_6}$$
- $$\text{C}_6\text{H}_{12}\text{O}_6 \xrightarrow{\text{Zymase}} \underset{\text{Ethyl alcohol}}{2\text{C}_2\text{H}_5\text{OH}} + 2\text{CO}_2$$
13. (b) The tendency to show H -bonding decreases with increasing hydrophobic character of carbon chain. The hydrophobic character of carbon chain increases with the length of carbon chain.
14. (e) Ethyl alcohol forms azeotropic mixture with water which distills with unchanged composition (about 75% ethanol) and thus absolute alcohol cannot be obtained by simple distillation.
15. (e) The dehydration of t -butanol involves the formation of 3° carbocation which is more stable than 1° carbocation in n -butanol. Thus, tendency to lose water becomes more in t -butanol.
16. (c) A mixture of conc. HCl + anhyd. ZnCl_2 is called Lucas reagent.
17. (e) Electron withdrawing groups such as $-\text{NO}_2$, $-\text{CN}$, $-\text{X}$, increase the acidity. Greater the number of electron withdrawing groups more is the acidic character i.e. 2, 4, 6-trinitrophenol is more acidic than 4-nitrophenol.

18. (b) Phenols cannot be converted into esters by direct reaction with carboxylic acids since phenols are less nucleophilic than alcohols.
19. (b) Alcohol which forms the more stable carbocation undergoes dehydration more readily. Since tert-butyl alcohol forms more stable tert-butyl cation, therefore, it undergoes dehydration most readily than propanol.
20. (e) The ease of dehydration of alcohols can be explained on the basis of stability of the intermediate carbocation. Greater the stability of the carbocation formed, greater will be the rate of reaction. The order of stability of carbocation formed is

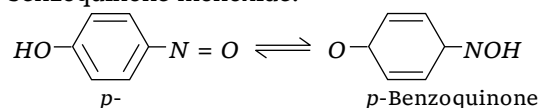


This is due to the electron releasing (+I) effect of the alkyl group. Therefore the ease of dehydration of alcohols follows the order.

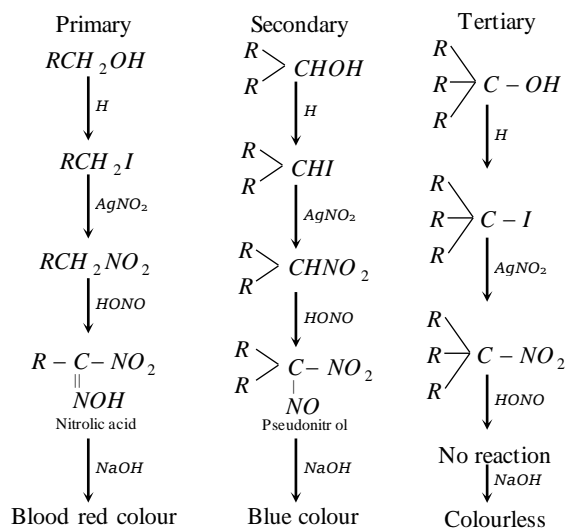
Tertiary > secondary > primary alcohol.

21. (c) Benzoylation in phenols is usually carried out in the presence of aqueous NaOH because benzoyl chloride is not readily hydrolysed by alkalis.
22. (b) In phenols, the lone pairs of electrons on the oxygen atom are delocalised over the benzene ring due to resonance and hence are not easily available for protonation. On the other hand, in alcohols, the lone pairs of electrons on oxygen atom are localized due to the absence of resonance and hence are easily available for protonation.

23. (c) *p*-Nitrophenolate ion is more stable than phenolate ion.
24. (b) Nitrous acid gives nitrosamine ion (NO^+) which attacks phenol at less hindered *p*-position of form *p*-nitrosophenol which is a tautomer of *p*-benzoquinone monoxide.



25. (c) Nucleophilic attack of phenolate ion through the ortho-carbon atom occurs on CCl_4 to form an intermediate which on hydrolysis gives salicylic acid.
26. (a) Victor-Meyer's test is used to distinguish primary, secondary and tertiary alcohols.



28. (b) Removal of two molecules of water gives a product which tautomerises to yield acrolein-an α, β -unsaturated aldehyde.
29. (b) Depending upon whether the alkyl halide and the alkoxide ion carry the same or different alkyl groups both symmetrical and unsymmetrical ethers can be prepared by Williamson's synthesis.
30. (c) Ethers being Lewis bases form etherates with Lewis acids.
31. (d) $(\text{CH}_3)_3\text{CONa}$ and $\text{CH}_3\text{CH}_2\text{Br}$ react to form $(\text{CH}_3)_3\text{C-O-CH}_2\text{CH}_3$. Good yields of ethers are obtained when primary alkyl halides are treated with alkoxides derived from any alcohol. 1°, 2° or 3°.