DPP - Daily Practice Problems

Chapter-wise Sheets

Date : | Start Time : | End Time :

CHEMISTRY CC25

SYLLABUS : Alcohols, Phenols and Ethers

Max. Marks : 180 **Marking Scheme :** + 4 for correct & (–1) for incorrect **Time : 60 min.**

INSTRUCTIONS : This Daily Practice Problem Sheet contains 45 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

1. Diethyl ether reacts, inspite of its usual inert nature, with :
(a) Dilute suphuric acid
(b) Dilute sodium hydroxide
(c) Boron trifluoride
(d) Metallic sodium

2. *n*-Propyl alcohol and isopropyl alcohol can be chemically distinguished by which reagent?
(a) PCl_5
(b) Reduction
(c) Oxidation with potassium dichromate
(d) Ozonolysis

3. Which of the following reactions will not result in the formation of anisole?
(a) Phenol + dimethyl sulphate in presence of a base
(b) Sodium phenoxide is treated with methyl iodide
(c) Reaction of diazomethane with phenol
(d) Reaction of methylmagnesium iodide with phenol

4. Intermolecular hydrogen bonding is strongest in :
(a) Methylamine (b) Phenol
(c) Formaldehyde (d) Methanol

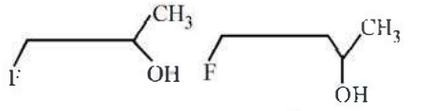
5. Vinyl carbinol is
(a) $HO-CH_2-CH=CH_2$
(b) $CH_3C(OH)=CH_2$
(c) $CH_3-CH=CH-OH$
(d) $CH_3-C(CH_2OH)=CH_2$

6. Lucas reagent is
(a) Conc. HCl and anhydrous $ZnCl_2$
(b) Conc. HNO_3 and hydrous $ZnCl_2$
(c) Conc. HCl and hydrous $ZnCl_2$
(d) Conc. HNO_3 and anhydrous $ZnCl_2$

RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ
	6. ⓐⓑⓒⓓ				

Space for Rough Work

7. The order of reactivity of the following alcohols towards conc. HCl is

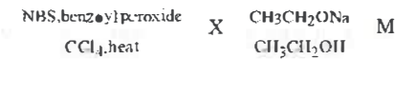


(I) (II)

(III) (IV)

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

8. What is the major product M in the following reaction ?



9. Epichlorohydrin is
(a) 3-Chloropropane
(b) 3-Chloropropan-1-ol
(c) 3-Chloro-1, 2-epoxypropane
(d) None of these

10. CH_3CH_2OH can be converted into CH_3CHO by _____
(a) catalytic hydrogenation
(b) treatment with $LiAlH_4$
(c) treatment with pyridinium chlorochromate
(d) treatment with $KMnO_4$

11. In Williamson synthesis if tertiary alkyl halide is used than
(a) ether is obtained in good yield
(b) ether is obtained in poor yield
(c) alkene is the only reaction product
(d) a mixture of alkene as a major product and ether as a minor product forms.

12. Denaturation of alcohol is the
(a) mixing of $CuSO_4$ (a foul smelling solid) and pyridine (to give the colour) to make the commercial alcohol unfit for drinking
(b) mixing of $CuSO_4$ (to give the colour) and pyridine (a foul smelling solid) to make the commercial alcohol unfit for drinking
(c) mixing of $Cu(OAc)_2$ and ammonia to make the commercial alcohol unfit for drinking
(d) mixing of $Cu(OAc)_2$ and pyridine to make the commercial alcohol unfit for drinking

13. 2-Phenylethanol may be prepared by the reaction of phenylmagnesium bromide with
(a) HCHO (b) CH_3CHO
(c) CH_3COCH_3 (d) 

14. Arrange the following in increasing order of their acidity?
o-cresol(a), salicyclic acid(b), phenol(c)
(a) c < a < b (b) b < c < a
(c) a < b < a (d) a < c < b

15. Which of the following is most reactive towards aqueous HBr?
(a) 1-Phenyl-1-propanol
(b) 1-Phenyl-2-propanol
(c) 3-Phenyl-1-propanol
(d) All are equally reactive

16. The ionization constant of phenol is higher than that of ethanol because :
(a) phenoxide ion is bulkier than ethoxide
(b) phenoxide ion is stronger base than ethoxide
(c) phenoxide ion is stabilized through delocalization
(d) phenoxide ion is less stable than ethoxide

17. Rectified spirit is a mixture of
(a) 95% ethyl alcohol + 5% water
(b) 94% ethyl alcohol + 4.53 water
(c) 94.4% ethyl alcohol + 5.43% water
(d) 95.87% ethyl alcohol + 4.13% water

RESPONSE GRID

7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ	11. ⓐⓑⓒⓓ
12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ	16. ⓐⓑⓒⓓ
17. ⓐⓑⓒⓓ				

Space for Rough Work

18. Ethanol is prepared industrially by
(a) hydration of ethylene (b) fermentation of sugar
(c) Both the above (d) None of these

19. Mechanism of acid catalysed hydration reaction involves
(i) Protonation of alkene to form carbocation by electrophilic attack of H_3O^+
(ii) Nucleophilic attack of water on carbocation.
(iii) Deprotonation to form alcohol.
(a) (i)and(ii) (b) (i)and(iii)
(c) (i), (ii) and(iii) (d) (ii) and (iii)

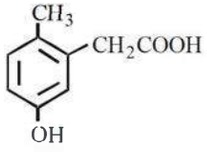
20. Match the columns

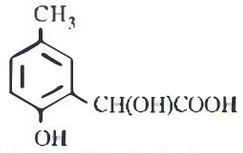
Column-I	Column-II
A. Methanol	I. Conversion of phenol to *o*-hydroxysalicylic acid
B. Kolbe's reaction	II. Wood spirit
C. Williamson's synthesis	III. Heated copper at 573 K
D. Conversion of 2° alcohol to ketone	IV. Reaction of alkyl halide with sodium alkoxide

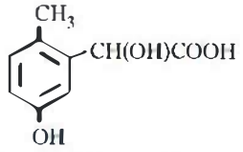
(a) A – IV; B – III; C – II; D – I
(b) A – II; B – IV; C – I; D – III
(c) A – II; B – I; C – IV; D – III
(d) A – III; B – II; C – I; D – IV

21. Absolute alcohol (100% alcohol) is prepared by distilling rectified spirit over
(a) Na (b) $CaCl_2$
(c) Mg (d) $Mg(OC_2H_5)_2$

22. *p*-cresol reacts with chloroform in alkaline medium to give the compound A which adds hydrogen cyanide to form, the compound B. The latter on acidic hydrolysis gives chiral carboxylic acid. The structure of the carboxylic acid is

(b) 

(c) 

(d) 

23. Which one of the following will show the highest pH value ?
(a) *m*–nitrophenol. (b) *p*–nitrophenol.
(c) *o*–nitrophenol. (d) Both (b) and (c).

24. Which of the following compounds is resistant to nucleophilic attack by hydroxyl ions?
(a) Methyl acetate (b) Acetonitrile
(c) Acetamide (d) Diethyl ether

25. Zerevitinov's determination of active hydrogen in a compound is based upon its reaction with
(a) Na (b) CH_3Mgl
(c) Zn (d) Al

26. Williamson's synthesis is used to prepare
(a) acetone (b) diethyl ether
(c) P.V.C. (d) bakelite

27. Which of the following statements are correct ?
(i) Ethanol mixed with methanol is called denatured alcohol.
(ii) Excess of methanol in body may cause blindness.
(iii) In the body methanol is oxidised to methanoic acid.
(iv) A methanol poisoned patient is treated by giving intravenous injections of ethanoic acid.
(a) (i),(ii) and(iii) (b) (ii), (iii) and(iv)
(c) (i) and (v) (d) (i), (iii) and (iv)

28. In the following sequence of reactions,

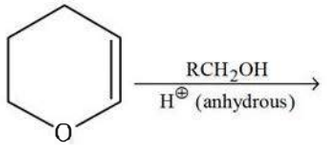
$$CH_3CH_2OH \xrightarrow{P+I_2} A \xrightarrow[\text{ether}]{Mg} B \xrightarrow{HCHO} C \xrightarrow{H_2O} D$$

the compound D is
(a) propanal (b) butanal
(c) *n*-butyl alcohol (d) *n*-propyl alcohol

29. When wine is put in air, it becomes sour due to
(a) bacteria
(b) oxidation of C_2H_5OH to CH_3COOH
(c) virus
(d) formic acid formation

30. Which of the following diols would cleave into two fragments with HIO_4
(a) 1, 3-hexanediol (b) 2, 4-hexanediol
(c) 1, 6-hexanediol (d) 3, 4-hexanediol

31. The major product of the following reaction is



(a) a hemiacetal (b) an acetal
(c) an ether (d) an ester

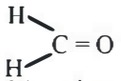
RESPONSE GRID

18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ
23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ	25. ⓐⓑⓒⓓ	26. ⓐⓑⓒⓓ	27. ⓐⓑⓒⓓ
28. ⓐⓑⓒⓓ	29. ⓐⓑⓒⓓ	30. ⓐⓑⓒⓓ	31. ⓐⓑⓒⓓ	

Space for Rough Work

32. $H_2COH \cdot CH_2OH$ on heating with periodic acid gives:

(a) 2 HCOOH (b) 

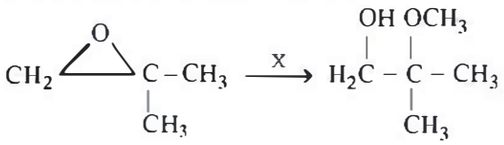
(c) 2  (d) $2\,CO_2$

33. Victor Meyer's test is not given by

(a) $(CH_3)_3COH$ (b) C_2H_5OH

(c) $(CH_3)_2CHOH$ (d) $CH_3CH_2CH_2OH$

34. What is X in the following reaction ?



(a) CH_3OH, H_2SO_4

(b) $CH_3OH, CH_3O^-\,{}^+Na$

(c) H_2O/H_2SO_4 followed by CH_3OH

(d) CH_3MgBr / ether followed by H_3O^+

35. Which of the following pairs of reagents would give 4 -methyl-2-pentanol ?

(a) $(CH_3)_2CHLi, CH_3COCH_3$

(b) $(CH_3)_2CHCH_2Li, CH_3CHO$

(c) $(CH_3)_2CHLi, CH_3CH_2CHO$

(d) $CH_3CH_2Li, (CH_3)_2CH.CHO$

36. Which of the following cannot be made by reduction of ketone or aldehyde with $NaBH_4$ in methanol ?

(a) 1 - butanol (b) 2 - butanol

(c) 2 - methyl - 1- propanol (d) 2 - methyl - 2- propanol

37. Osmium tetraoxide is a reagent used for

(a) hydroxylation of acetylenes

(b) hydroxylation of olefins to give *cis*-diols

(c) hydroxylation of olefins to form trans- diols

(d) hydroxylation of carbonyl compounds

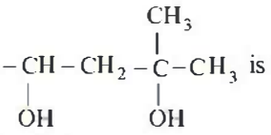
38. The reaction of sodium ethoxide with ethyl iodide to form diethyl ether is termed

(a) electrophilic substitution

(b) nucleophilic substitution

(c) electrophilic addition

(d) radical substitution

39. The IUPAC name of  is

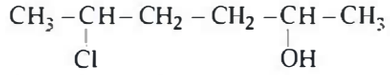
(a) 1, 1-dimethyl-1, 3-butanediol

(b) 2-methyl-2, 4-pentanediol

(c) 4-methyl-2, 4-pentanediol

(d) 1, 3, 3-trimethyl-1, 3-propanediol

40. Give IUPAC name of the compound given below



(a) 2-Chloro-5-hydroxyhexane

(b) 2-Hydroxy-5-chlorohexane

(c) 5-Chlorohexane-2-ol

(d) 2-Chlorohexan-5-ol

41. Aspirin is an acetylation product of

(a) p-Dihydroxybenzene (b) o-Hydroxybenzoic acid

(c) o-Dihydroxybenzene (d) m-Hydroxybenzoic acid

42. Acetic anhydride reacts with diethyl ether in the presence of anhydrous $AlCl_3$ to give

(a) CH_3COOCH_3 (b) $CH_3CH_2COOCH_3$

(c) $CH_3COOCH_2CH_3$ (d) CH_3CH_2OH

43. Formation of which compound given below from 1 - butanol needs an oxidising agent?

(a) $CH_3CH_2CH_2CH_2Br$ (b) $CH_3CH_2CH_2CH=O$

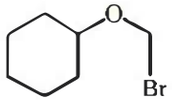
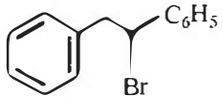
(c) $(CH_3CH_2CH_2CH_2)_2O$ (d) $CH_3-CH_2CH=CH_2$

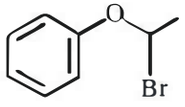
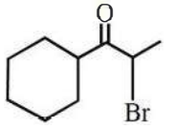
44. o – Xylene $\xrightarrow{HNO_3}$ X $\xrightarrow[H_2SO_4]{Phenol}$ Y. The product Y is

(a) Phthalic acid (b) Isophthalic acid

(c) Phenolphthalein (d) o-Hydroxysulphonic acid

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

(a)  (b) 

(c)  (d) 

RESPONSE GRID					
	32. ⓐⓑⓒⓓ	**33.** ⓐⓑⓒⓓ	**34.** ⓐⓑⓒⓓ	**35.** ⓐⓑⓒⓓ	**36.** ⓐⓑⓒⓓ
	37. ⓐⓑⓒⓓ	**38.** ⓐⓑⓒⓓ	**39.** ⓐⓑⓒⓓ	**40.** ⓐⓑⓒⓓ	**41.** ⓐⓑⓒⓓ
	42. ⓐⓑⓒⓓ	**43.** ⓐⓑⓒⓓ	**44.** ⓐⓑⓒⓓ	**45.** ⓐⓑⓒⓓ	

Space for Rough Work

DAILY PRACTICE PROBLEMS — CHEMISTRY SOLUTIONS — DPP/CC25

1. (c) Boron trifluoride being a lewis acid forms adduct with diethyl ether which is a lewis base.

2. (c) Primary alcohol on oxidation give aldehyde which on further oxidation give carboxylic acid whereas secondary alcohols give ketone.

$$\underset{\text{n-propyl alcohal}}{CH_3CH_2CH_2OH} \xrightarrow{[O]}$$

$$CH_3CH_2CHO \xrightarrow{[O]} CH_3CH_2COOH$$

$$\underset{\text{isopropyl alcohal}}{(H_3C)_2CH-OH} \xrightarrow{[O]} \underset{\text{Ketone}}{(H_3C)_2C=O}$$

3. (d) Phenol has active (acidic) hydrogen so it reacts with CH_3MgI to give CH_4, and not anisole

$$C_6H_5OH + CH_3MgI \longrightarrow CH_4 + C_6H_5OMgI$$

4. (d) Hydrogen bonding is formed in compounds in which H is attached to highly electronegative element like F, O and N.

(i) In $H-\overset{\overset{O}{\|}}{C}-H$, ● is not having H atom so it shows very little H-bonding.

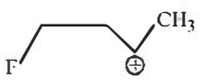
(ii) N is less electronegative than ●, so H— bond formed by amines will be weak than that by alcohols.

(iii) C_6H_5OH forms weak H-bonding due to steric hinderance due to bulky phenyl group.

5. (a) Methyl alcohol (CH_3OH) is also known as carbinol. Hence vinyl carbinol is $CH_2=CH-CH_2OH$

6. (a) Lucas reagent is conc. HCl + anhyd. $ZnCl_2$.

7. (c) The order of reactivity depends upon the stability of the carbocations formed.



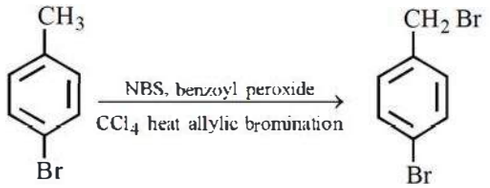
From (I) 2° carbocation — From (II) 2°

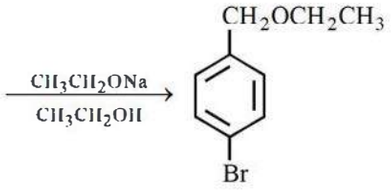
From (III) 2° — From (IV). I°, Most stable benzyl carbocation

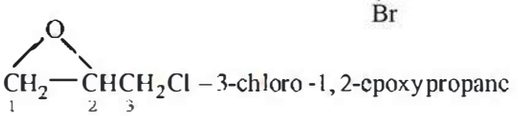
Remember that presence of electron-withdrawing group intensifies i.e., destabilises the carbocation thus (i) and (ii) are less stable than (iii). Further (i) is less stable than (ii) because –I effect is more pronounced in (i) due to less distance between F and + charge. Thus the stability order of the four carbocations and reactivity of their parent alcohols will be

IV > III > II > I

8. (b)

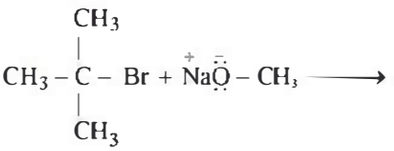




9. (c)  – 3-chloro -1, 2-epoxypropane

10. (c)

11. (c) If a tertiary alkyl halide is used, an alkene is the only reaction product and no other is formed. For example, the reaction of CH_3ONa with $(CH_3)_3C-Br$ gives exclusively 2-methylpropene.



$$CH_3-\underset{\underset{CH_3}{|}}{C}=CH_2 + NaBr + CH_3OH$$

2-Methylpropene

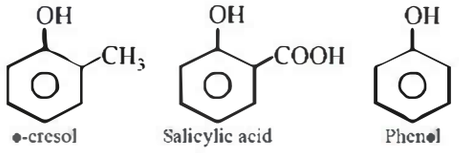
It is because alkoxides are not only nucleophiles but strong bases as well. They react with alkyl halides leading to elimination reactions.

12. (b) The commercial alcohol is made unfit for drinking by mixing in it some copper sulphate (to give it colour) and pyridine (a foul smelling liquid). It is known as denaturation of alcohol.

13. (d) 2-Phenylethanol, $\overset{1}{C}H_2OH\overset{2}{C}H_2C_6H_5$, is a 1° alcohol which can be prepared from C_6H_5MgBr by treating with ethylene oxide (note that HCHO will introduce only one carbon atom, i.e. it will give $C_6H_5CH_2OH$ and not $C_6H_5CH_2CH_2OH$).

$$C_6H_5MgBr + \text{(ethylene oxide)} \longrightarrow C_6H_5CH_2CH_2OH$$

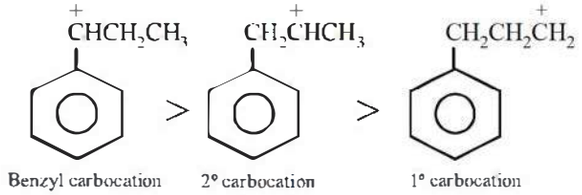
14. (d)



o-cresol Salicylic acid Phenol

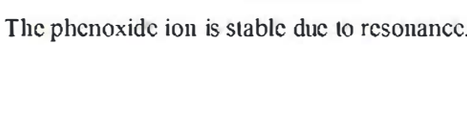
Electron releasing groups (–CH_3, –OCH_3, –NCH_3 etc) intensify the negative charge of phenoxide ion, i.e., destablises it hence decrease ionization of parent phenol. Therefore decreases acidity while electron with drawing groups (–NO_2, –COOH, –CHO etc.) increases acidity.

15. (a) Here also, carbocation is formed as an intermediate, hence the species capable of forming most stable carbocation will be most reactive.



16. (c) $C_6H_5OH + H_2O \rightleftharpoons \underset{\text{Phenoxide ion}}{C_6H_5O^-} + H_3O^+$

The phenoxide ion is stable due to resonance.



The negative charge is delocalized in the benzene ring which is a stabilizing factor in the phenoxide ion and because of this reason ionization constant of phenol is higher whereas no resonance is possible in alkoxide ions (RO^-) derived from alcohol. The negative charge is localized on oxygen atom in case of alcohols.

17. (d)

18. (c) Hydration of alkenes

$$CH_2 = CH_2 + \overset{+}{H}HSO_4 \rightarrow CH_3 - CH_2 - HSO_4$$

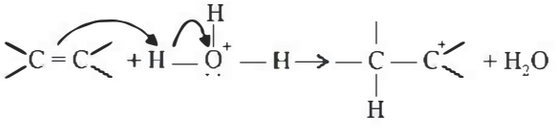
Fermentation of sugar :

$$\underset{\text{Glucose}}{C_6H_{12}O_6} + \underset{\text{Fructose}}{C_6H_{12}O_6} \xleftarrow{\text{Invertase}} \underset{\text{Glucos or Fructose}}{C_6H_{12}O_6} \xrightarrow{\text{Zymase}}$$

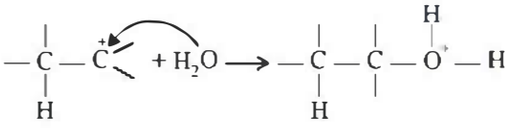
19. (c) The mechanism of the reaction involves the following three steps:

Step 1: Protonation of alkene to form carbocation by electrophilic attack of H_3O^+

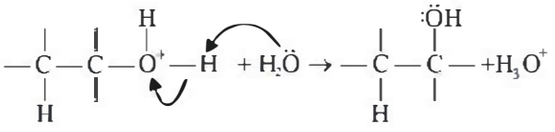
$$H_2O + H^+ \rightarrow H_3O^+$$



Step 2: Nucleophilic attack of water on carbocation.



Step 3: Deprotonation to form an alcohol.



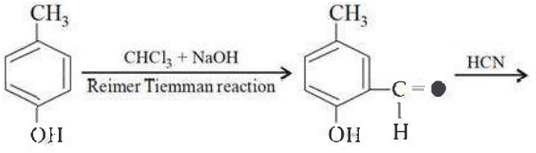
20. (c)

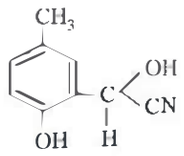
21. (d)

$$2C_2H_5OH + Mg(OH)_2 \xleftarrow{\text{distill}}$$

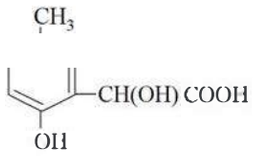
(distillate) (residue)

22. (c)



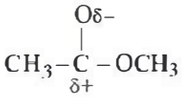


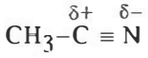
Cyanohydrin

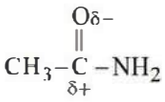


23. **(a)** In case of *m*–nitrophenol operational effect of nitrogroup is electron withdrawing inductive effect while in case of b and c, both –R and –I effect are operational.

24. **(d)** Diethyl ether, being a Lewis base, is not attacked by nucleophiles, while all others contain electrophilic carbon, hence attacked by nucleophiles like OH^- ions.







25. **(b)** Number of active hydrogen in a compound corresponds to the number of moles of CH_4 evolved per mole of the compound.

$$-NH_2, -SH, -OH \text{ or } -C\equiv CH \xrightarrow{CH_3MgI} ClCH_4 \uparrow (2CH_4 \text{ from } -NH_2)$$

26. **(b)** $C_2H_5Br + C_2H_5ONa \xrightarrow[\text{Sod. ethoxide}]{-NaBr} \underset{\text{diethyl ether}}{C_2H_5-O-C_2H_5}$

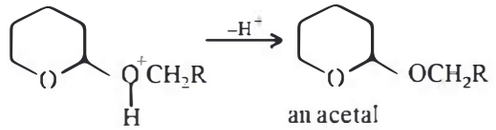
27. **(a)** A methanol poisoned patient is treated by giving intravenous injection of ethanol.

$$P+I_2 \xrightarrow{HCHO} \xrightarrow{H_2O} \underset{\text{n–propylalcohol}}{\underset{\underset{H}{|}}{\overset{\overset{CH_2CH_3}{|}}{H-C-OH}}{|}}$$

29. **(b)**

30. **(d)** $CH_3-CH_2-\underset{OH}{\underset{|}{CH}}-\underset{OH}{\underset{|}{CH}}-CH_2-CH_3 \xrightarrow{HIO_4}$

31. **(b)**



an acetal

32. **(c)** 1, 2 – Diols, when treated with an aqueous solution of periodic acid give aldehyde

$$\underset{CH_2OH}{\overset{CH_2OH}{|}} \xrightarrow{HIO_4} CH_2O + CH_2O$$

Note that a 1° alcohol gives CH_2O. Since in glycol both the OH groups, are primary hence give 2 molecules of CH_2O as by product.

33. **(a)**

34. **(a)**

35. **(b)** $CH_3-CH\begin{cases}OLi\\CH_2.CH(CH_3)_2\end{cases} + CH_3CHO$

$$\longrightarrow CH_3-\underset{OH}{\underset{|}{CH}}-CH_2-\underset{CH_3}{\underset{|}{CH}}-CH_3$$

36. **(d)** 2-methyl-2-propanol is $CH_3-\underset{CH_3}{\overset{OH}{\overset{|}{\underset{|}{C}}}}-CH_3$. It cannot be obtained by reduction of an aldehyde or ketone with $NaBH_4$.

37. **(b)**

38. **(b)** Reaction of sodium ethoxide with ethyl iodide to produce diethyl ether is known as Williamson synthesis. It is a nucleophilic substitution reaction and proceeds via S_N2 mechanism.

39. **(b)** $\overset{5}{CH_3}-\underset{OH}{\overset{4}{\underset{|}{CH}}}-\overset{3}{CH_2}-\underset{OH}{\overset{2}{\underset{|}{C}}}-\overset{1}{CH_3}$ (CH3 at C-2)

2-methyl- 2, 4-pentanediol.

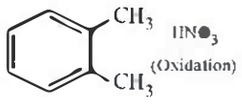
41. (b)

42. (c) $(CH_3CH_2)_2O + (CH_3CO)_2O$
Ether Acid anhydride

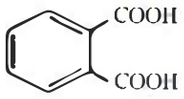
anhy. $AlCl_3$ $CH_3COOCH_2CH_3$
Ester

43. (b)

44. (c)



o-Xylene



Phthalic anhydride, X

Phenolpthalein
(Y)

45. (a)

(fails to decolorise the colour of bromine) due to unsaturation

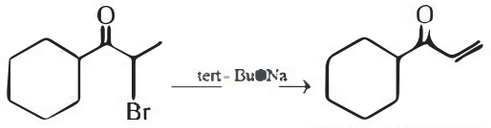
(b)

(it decolorises bromine solution)

(c)

(it decolorises bromine solution)

(d)



(it decolorises bromine solution)

Products formed in option (2), (3) & (4) decolorises bromine solution due to presence of double bond.