24

PRACTICE PAPER

Time allowed: 45 minutes **Maximum Marks: 200**

General Instructions: *Same as Practice Paper–1.*

Choose the correct option.

1. **Ohm^{-1} cm^{-1} is the unit of**
   (*a*) specific conductance (*b*) equivalent conductance
   (*c*) cell constant (*d*) molar conductance

2. **On dissolving sugar in water at room temperature solution feels cool to touch. Under which of the following cases dissolution of sugar will be most rapid?**
   (*a*) Sugar crystals in cold water. (*b*) Sugar crystals in hot water.
   (*c*) Powdered sugar in cold water. (*d*) Powdered sugar in hot water.

3. **Which of the following statement is not true about amorphous solids?**
   (*a*) On heating they may become crystalline at certain temperature.
   (*b*) They may become crystalline on keeping for long time.
   (*c*) Amorphous solids can be moulded by heating.
   (*d*) They are anisotropic in nature.

4. **When $AgNO_3$ solution is added to KCl solution a white precipitate is formed. This reaction is**
   (*a*) slow (*b*) moderate (*c*) instantaneous (*d*) all of these

5. **When the hydrogen gas is adsorbed on the surface of the nickel, the nickel metal is termed as**
   (*a*) adsorber (*b*) adsorbent (*c*) absorber (*d*) adsorbate

6. **According to Freundlich adsorption isotherm, the amount of gas adsorbed at very high pressure**
   (*a*) goes on increasing with pressure. (*b*) goes on decreasing with pressure.
   (*c*) reaches a constant limiting value. (*d*) increases first and decreases later with pressure.

7. **If the rate of a reaction between *A* and *B* is given as rate = $k[A][B]^2$, then the reaction is**
   (*a*) First order with respect to *A*. (*b*) Second order with respect to *B*.
   (*c*) Overall is third order. (*d*) All of the above

8. **Which of the following is the best reducing agent?**
   (*a*) F_2 (*b*) Cl_2 (*c*) Br_2 (*d*) I_2

9. **The number of tetrahedral voids in a unit cell of *ccp* structure**
   (*a*) 4 (*b*) 6 (*c*) 8 (*d*) 10

10. **If the molarity of a solution of sulphuric acid is 1.35 M, then its molality will be**
    (The density of the acid solution is 1.02 g cm^{-3})
    (*a*) 3.43 m (*b*) 1.80 m (*c*) 1.52 m (*d*) 2.39 m

11. The half-life period of a zero order reaction is

(*a*) directly proportional to a^2.
(*b*) directly proportional to $a^{1/2}$.
(*c*) directly proportional to a.
(*d*) directly proportional to a^3.

12. In the following

$$2Br_2 + 6CO_3^{2-} + 3H_2O \longrightarrow 5Br^- + BrO_3^- + 6HCO_3^-$$

(*a*) Bromine is oxidised and carbonate ion is reduced.
(*b*) Bromine is reduced and carbonate ion is oxidised.
(*c*) Bromine is neither reduced nor oxidised.
(*d*) Bromine is reduced as well as oxidised.

13. The presence of Frenkel defects in a crystal _____ its density.

(*a*) decreases
(*b*) increases
(*c*) does not change
(*d*) either increase or decrease

14. When an egg is placed in concentrated solution of sodium chloride, it shrinks due to

(*a*) exosmosis (*b*) endosmosis (*c*) diffusion (*d*) surface tension

15. The electrode potential data are given below

$$Fe^{3+} + e^- \longrightarrow Fe^{2+},\ E^\circ = 0.77\ V$$
$$Al^{3+} + 3e^- \longrightarrow Al,\ E^\circ = -1.66\ V$$
$$Br_2 + 2e^- \longrightarrow 2Br^-,\ E^\circ = +1.08\ V$$

Based on the data, the reducing power of Fe^{3+}, Al^{3+}, Br_2 will increase in the order:

(*a*) $Br_2 < Fe^{3+} < Al^{3+}$
(*b*) $Fe^{3+} < Al^{3+} < Br_2$
(*c*) $Al^{3+} < Br_2 < Fe^{3+}$
(*d*) $Al^{3+} < Fe^{3+} < Br_2$

16. Which of the following statement is not correct for standard hydrogen electrode ?

(*a*) Hydrogen ion concentration is 1 M.
(*b*) Pressure of hydrogen gas is 1 bar pressure.
(*c*) It is a primary electrode.
(*d*) It has a metallic conductor which does not adsorb hydrogen gas.

17. Which of the following statement is incorrect?

(*a*) Fe^{2+} is more paramagnetic than Mn^{2+}.
(*b*) V^{2+} is less paramagnetic than Cr^{2+}.
(*c*) Cr^{2+} is less paramagnetic than Mn^{2+}.
(*d*) Mn^{2+} is more paramagnetic than V^{2+}.

18. The formula of dichloridobis (urea) copper (II) is

(*a*) $Cu[(O{=}C(NH_2)_2)]\ Cl_2$
(*b*) $Cu[O{=}C(NH_2)_2]Cl_2$
(*c*) $[CuCl_2(O{=}C(NH_2)_2)_2]$
(*d*) $[CuCl_2(O{=}C(NH_2)_2)H_2]$

19. The oxidation state of Ni in $[Ni(CO)_4]$ is

(*a*) 4
(*b*) 0
(*c*) 2
(*d*) 3

20. Which method of purification is represented by the equation

$$\underset{\text{(Impure)}}{Ti} + 2I_2 \xrightarrow{500\ K} TiI_4 \xrightarrow{1675\ K} \underset{\text{(Pure)}}{Ti} + 2I_2$$

(*a*) Cupellation
(*b*) Poling
(*c*) van Arkel
(*d*) Zone refining

21. Heating of an ore in the absence of air below the melting point is called

(*a*) leaching
(*b*) roasting
(*c*) smelting
(*d*) calcination

22. **Which of the following is not tetrahedral in shape?**

(*a*) NH_4^+ (*b*) $SiCl_4$

(*c*) SF_4 (*d*) SO_4^{2-}

23. **Given below are two statements labelled as Statement P and Statement Q:**

Statement P : CH_4 molecule is formed by sp^3 hybridisation.

Statement Q : PCl_5 molecule is trigonal bipyramidal in shape.

(*a*) P is true, but Q is false (*b*) P is false, but Q is true

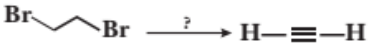
(*c*) Both P and Q are true (*d*) Both P and Q are false

24. **Oxygen is not evolved when ozone reacts with**

(*a*) KI (*b*) H_2O_2

(*c*) $SnCl_2$ (*d*) PbS

25. **The reagents for the following conversion is/are**



(*a*) Zn/CH_3OH

(*b*) alcoholic KOH followed by $NaNH_2$

(*c*) aqueous KOH followed by $NaNH_2$

(*d*) alcoholic KOH

26. **Toluene reacts with a halogen in the presence of iron (III) chloride giving ortho and para halo compounds. The reaction is _____.**

(*a*) Electrophilic elimination reaction (*b*) Electrophilic substitution reaction

(*c*) Free radical addition reaction (*d*) Nucleophilic substitution reaction

27. **On addition of conc. H_2SO_4 to a chloride salt, colourless fumes are evolved but in case of iodide salt, violet fumes come out. This is because**

(*a*) H_2SO_4 reduces HI to I_2. (*b*) HI is of violet colour.

(*c*) HI gets oxidised to I_2. (*d*) HI changes to HIO_3.

28. **Which one of the following complexes will have four isomers?**

(*a*) $[Co(en)(NH_3)_2\ Cl_2]Cl$ (*b*) $[Co(PPh)_3)_2(NH_3)_2\ Cl_2]Cl$

(*c*) $[Co(en)_3]Cl$ (*d*) $[Co(en)_2Cl_2]Cl$

29. **Which of the following compound is not coloured?**

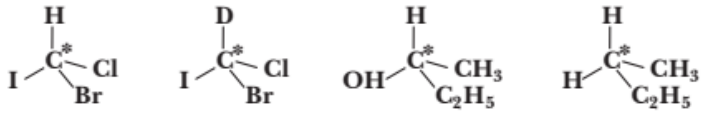
(*a*) Copper(II) sulphate (*b*) Zinc(II) chloride

(*c*) Chromium(III) sulphate (*d*) Manganese(II) oxalate

30. **Which of the following transition metal ions will have definite value of magnetic moment?**

(*a*) Sc^{3+} (*b*) Ti^{3+} (*c*) Cu^+ (*d*) Zn^{2+}

31. **In which of the following molecules carbon atom marked with asterisk (*) is asymmetric?**



(*i*) (*ii*) (*iii*) (*iv*)

(*a*) (*i*), (*ii*), (*iii*), (*iv*) (*b*) (*i*), (*ii*), (*iii*)

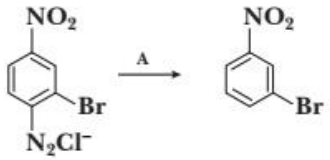
(*c*) (*ii*), (*iii*), (*iv*) (*d*) (*i*), (*iii*), (*iv*)

32. **The mixture of dettol is**

(*a*) Chloroxylenol + Terpineol (*b*) Bithionol + Terpineol

(*c*) Chloroxylenol + Bithionol (*d*) Chloroxylenol + Salol

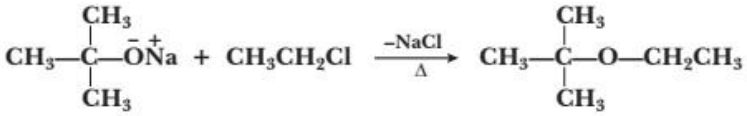
33. In the reaction



(*a*) H_3PO_2 and H_2O (*b*) H^+/H_2O

(*c*) $HgSO_4/H_2SO_4$ (*d*) Cu_2Cl_2

34. The reaction



is called

(*a*) Williamson synthesis (*b*) Williamson continuous etherification process

(*c*) Etard reaction (*d*) Gatternman-Koch reaction

35. Among the following sets of reactants which one produces anisole?

(*a*) CH_3CHO; RMgX (*b*) C_6H_5OH; NaOH; CH_3Br

(*c*) C_6H_5OH; neutral $FeCl_3$ (*d*) $C_6H_5—CH_3$; CH_3COCl; $AlCl_3$

36. Which of the following substance is not used as an antacid?

(*a*) $NaHCO_3$ (*b*) $Al(OH)_3$

(*c*) $Mg(OH)_2$ (*d*) NaOH

37. Bakelite is a product of the reaction between:

(*a*) formaldehyde and NaOH (*b*) aniline and urea

(*c*) phenol and methanal (*d*) phenol and chloroform

38. Which one is the formula of a disaccharide?

(*a*) $C_{12}H_{22}O_{11}$ (*b*) $C_6H_{12}O_6$

(*c*) $C_{18}H_{22}O_{11}$ (*d*) $C_{10}H_{20}O_{10}$

39. A new carbon-carbon bond is possible in

(*a*) Cannizzaro reaction (*b*) Friedel-crafts reaction

(*c*) Clemmensen reduction (*d*) None of these

40. Among acetic acid, phenol and *n*-hexanol, which one will react with $NaHCO_3$ solution to give sodium salt and CO_2?

(*a*) Acetic acid (*b*) *n*-Hexanol

(*c*) Acetic acid and phenol (*d*) Phenol

41. In the diazotisation of aniline with sodium nitrite and hydrochloric acid, the excess of acid is used primarily to

(*a*) suppress the concentration of free aniline. (*b*) suppress the hydrolysis to phenol.

(*c*) ensure a stoichiometric amount of nitrous acid. (*d*) neutralise the base liberated.

42. Sodium formate on heating yields

(*a*) oxalic acid and H_2 (*b*) sodium oxalate and H_2

(*c*) CO_2 and NaOH (*d*) sodium oxalate

43. During dehydration of alcohols to alkenes by heating with conc. H_2SO_4 the initiation step is

(*a*) formation of carbocation. (*b*) elimination of water.

(*c*) formation of an ester. (*d*) protonation of an alcohol molecule.

44. Which will not respond to carbylamine reaction?

(*a*) Ethylamine (*b*) Dimethylamine

(*c*) Methylamine (*d*) Phenylamine

45. $RCOOH \longrightarrow RCH_2OH$

This mode of reduction of an acid to an alcohol can be affected only by

(*a*) Zn/HCl (*b*) Na/alcohol

(*c*) $LiAlH_4$ (*d*) Zn-Hg/HCl

46. **Given below are two statements labelled as Assertion and Reason:**

Assertion (A) : For making rubber synthetically, isoprene molecules are polymerised.

Reason (R) : Neoprene (a polymer of chloroprene) is a synthetic rubber.

(*a*) Assertion and reason both are correct statements and reason is correct explanation for assertion.

(*b*) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

(*c*) Assertion is correct statement but reason is wrong statement.

(*d*) Assertion is wrong statement but reason is correct statement.

47. **Arrange the following compounds in the increasing order of their acidic strength:**

***i*. *m*-nitrophenol**

***ii*. *m*-cresol**

***iii*. phenol**

***iv*. *o*-chlorophenol**

(*a*) *iii* < *ii* < *i* < *iv* (*b*) *ii* < *iv* < *iii* < *i*

(*c*) *ii* < *iii* < *iv* < *i* (*d*) *ii* < *iii* < *i* < *iv*

48. $C_2H_5COCl + H_2 \xrightarrow[S \text{ or Xylene}]{Pd/BaSO_4} X + Y$

compounds X and Y are

(*a*) CH_3CHO and HCl (*b*) C_2H_5CHO and HCl

(*c*) CH_3COCH_3 and HCl (*d*) $CH_3COC_2H_5$ and HCl

49. **By which bond the polypeptide chains are held together in fibrous protein?**

(*a*) Covalent bond (*b*) Hydrogen bond

(*c*) Disulphide bond (*d*) Both (*b*) and (*c*)

50. **Match the vitamins given in Column I with the disease given in Column II.**

Column I	Column II
A. Vitamin A	(*i*) Rickets
B. Vitamin B	(*ii*) Bleeding gums
C. Vitamin C	(*iii*) Night blindness
D. Vitamin D	(*iv*) Muscle weekness

(*a*) A–(*i*), B–(*ii*), C–(*iii*), D–(*iv*) (*b*) A–(*iii*), B–(*iv*), C–(*ii*), D–(*i*)

(*c*) A–(*ii*), B–(*iii*), C–(*i*), D–(*iv*) (*d*) A–(*iv*), B–(*iii*), C–(*i*), D–(*ii*)

Answers

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

Solutions

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1. (*a*) Specific conductance or conductivity(κ) is defined as the conductance of a substance having unit length and unit area of cross section. It can be mathematically represented as

$$\kappa = \frac{1}{R} \times \frac{l}{A}$$

$$\kappa = \frac{1}{\text{ohm}} \times \frac{\text{cm}}{\text{cm}^2} = \text{ohm}^{-1}\,\text{cm}^{-1}$$

2. (*d*) Powdered sugar has large surface area and hot water means high temperature and hence dissolution increases due to both the factors.

3. (*d*) Amorphous solids are isotropic in nature.

4. (*c*) Some reactions occurs with a very fast speed and is known as instantaneous reactions. For example, precipitation of AgCl from $AgNO_3$ and KCl.

5. (*b*) The substance accumulating at the surface of the solid during adsorption is called adsorbate and the surface on which adsorption occurs is called adsorbent. Thus, nickel metal acts as an adsorbent.

6. (*c*) At high pressure range, the extent of adsorption of a gas is independent of the applied pressure, *i.e.*,reaches a constant limiting value.

7. (*d*) Rate = $k[A][B]^2$,

The order with respect to A = 1 and the order with respect to B = 2

Therefore, the overall order is 1 + 2 = 3.

8. (*d*) According to the electrochemical series, the strongest reducing agent among the given option is I_2. This is because of having lower reduction potential as compared to F_2, Cl_2 and Br_2.

9. (*c*) In *ccp*, number of atoms present per unit cell =4

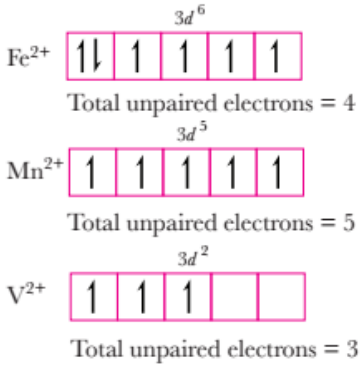
Since in cubic closed packing, the number of tetrahedral voids is equal to twice the number of atoms present per unit cell, hence

Number of tetrahedral voids = 2 × 4 = 8

power. Thus, the correct increasing order will be $Fe^{3+} < Br_2 < Al^{3+}$.

16. (*d*) Standard hydrogen electrode consists of platinum electrode coated with platinum black. The electrode is immersed in 1 M HCl solution. Pure hydrogen gas is passed through the upper inlet at 1 bar pressure. A small amount of hydrogen gas is adsorbed by the platinised electrode.

17. (*a*)



Total unpaired electrons = 4

Total unpaired electrons = 5

Total unpaired electrons = 3

10. (*c*) Let the solution be 1 litre or 1000 cm^3.

$\therefore$ Number of moles of H_2SO_4 = 1.35

Weight of solution = $1000 \times 1.02 = 1020$ g

Weight of sulphuric acid = $1.35 \times 98 = 132.3$ g

Weight of water = $1020 - 132.3 = 887.7$ g

Molality of $H_2SO_4 = \frac{1.35}{887.7} \times 1000 = 1.52$ m

11. (*c*) The half life period of zero order reaction is $t_{1/2} = \frac{a}{2k}$

where '*a*' is the initial concentration of reactant.

Thus, half-life period of a zero order reaction is directly proportional to *a*.

12. (*d*)

$$\overset{0}{2Br_2} + \overset{+4\ -2}{6CO_3^{2-}} + \overset{+1\ -2}{3H_2O} \longrightarrow \overset{-1}{5Br^-} + \overset{+5\ -2}{BrO_3^-} + \overset{+1\ +4\ -2}{6HCO_3^-}$$

Reduction

Oxidation

13. (*c*) Frenkel defect is produced because of missing ions from their normal crystal sites. It is produced when some ions are displaced from their normal sites and occupy interstitial sites. So, it does not affect the density of the crystal.

14. (*a*) When egg is placed in a saline solution (hypertonic solution), exosmosis occurs and the egg shrinks due to loss of water to the surrounding environment.

15. (*a*) Here is the negative standard reduction potential lower is the standard reduction potential value greater will be its reducing

Cr^{2+} : $3d^4$ | 1 | 1 | 1 | 1 | |

Total unpaired electrons = 4

As, more number of unpaired electrons means more paramagnetic behaviour.

19. (*b*) The oxidation state of nickel in $[Ni(CO)_4]$ is zero, because CO is a neutral ligand and the complex is also neutral in nature.

20. (*c*) van Arkel method is very useful for removing all the oxygen and nitrogen present in the form of impurity in certain metals like Zr and Ti. Impure metal is heated with iodine in an evacuated vessel and the resultant tetraiodide is decomposed on a tungsten filament to get the pure metal.

21. (*d*) Calcination is the process of heating an ore below its melting point either in the absence or limited supply of air.

22. (*c*) The hybridisation of S in SF_4 is sp^3d and the shape is trigonal bi-pyramidal.

24. (*c*) $2KI + H_2O + O_3 \longrightarrow 2KOH + I_2 + O_2$

$PbS + 4O_3 \longrightarrow PbSO_4 + 4O_2$

$H_2O_2 + O_3 \longrightarrow H_2O + 2O_2$

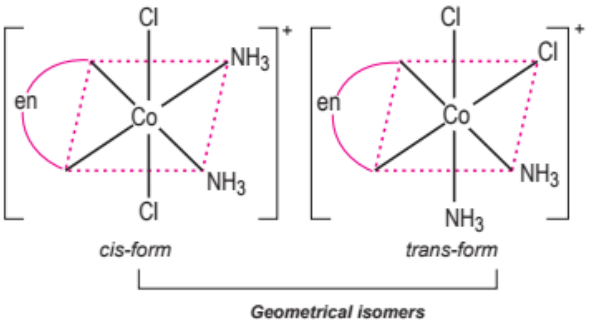
$SnCl_2 + O_3 + 6HCl \longrightarrow SnCl_4 + 3H_2O$

25. (*b*) $\underset{\text{1,2-dibromoethane}}{Br{-}CH_2{-}CH_2{-}Br} + \text{alc.KOH} \longrightarrow$

$\underset{\text{1-bromoethene}}{BrCH = CH_2} \xrightarrow{NaNH_2} \underset{\text{ethyne}}{CH \equiv CH}$

27. (*c*) On addition of conc. H_2SO_4 to a chloride salt, due to formation of colourless HCl gas we get fumes. While in case of iodide salt, due to formation of I_2 violet fumes comes out, as HI get converted into I_2.

28. (*a*) $[Co(en)(NH_3)_2Cl_2]Cl$ have 4 isomers as follow:



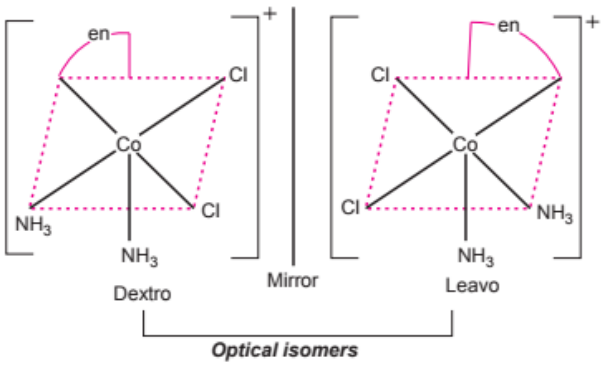
36. (*d*) NaOH is corrosive in nature and is strong base while others are mild bases.

37. (*c*) Condensation reaction of phenol with formaldehyde in the presence of either an acid or a base catalyst forms novolac. Novolac on heating with formaldehyde undergoes cross linking to form an infusible solid mass called bakelite.

38. (*a*) It is sucrose which is a disaccharide. On hydrolysis, it gives glucose and fructose.

$$\underset{\text{Sucrose}}{C_{12}H_{22}O_{11}} + H_2O \xrightarrow{HCl} \underset{\text{D-Glucose}}{C_6H_{12}O_6} + \underset{\text{D-fructose}}{C_6H_{12}O_6}$$

39. (*b*) A new carbon-carbon bond is possible in Friedel-crafts reaction. In this reaction, benzene and other aromatic compounds react with alkyl halides in the presence of anhydrous $AlCl_3$ to form alkyl benzenes.



29. (*b*) Zinc (II) chloride having zinc ion with electronic configuration, [Ar] $3d^{10}$ does not have unpaired electrons.

30. (*b*) Value of magnetic moment depends upon number of unpaired electrons. All except Ti^{3+} ($3d^1$) have either fully filled *d*-subshell (Zn^{2+}, Cu^+) or empty *d*-subshell (Sc^{3+}). Therefore, only Ti^{3+} has a net value of magnetic moment.

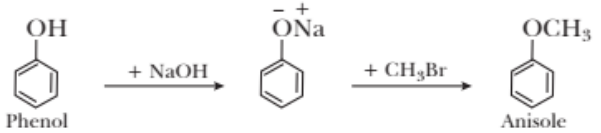
31. (*b*) The carbon atom having four different group is called asymmetric carbon atom.

32. (*a*) Dettol (antiseptic) is a mixture of 4.8% chloroxylenol + 9.9% α-terpineol and absolute alcohol.

34. (*a*) The given reaction is known as Williamson's synthesis. In general, it is written as

$$R{-}X + \overset{+}{Na}{-}\bar{O}{-}R' \longrightarrow R{-}O{-}R' + NaX$$

35. (*b*)



40. (*a*) When acetic acid is added to an aqueous solution of sodium bicarbonate, brisk effervescence of CO_2 is evolved.

$$CH_3COOH + NaHCO_3 \longrightarrow CH_3COO^-Na^+ + H_2O + CO_2$$

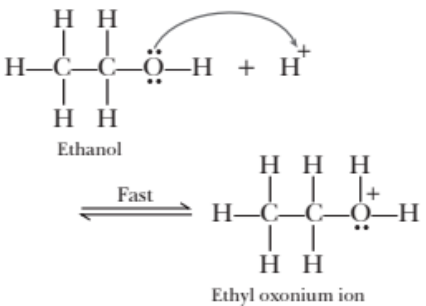
Phenols and alcohols do not react with $NaHCO_3$ solution.

41. (*a*) Excess of HCl is added to keep the mixture acidic enough to suppress the undesirable side reactions such as coupling of the diazonium salt thus formed with the free aniline.

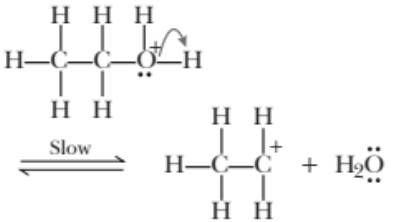
42. (*b*) $2HCOONa \xrightarrow{\Delta} \begin{matrix} COONa \\ | \\ COONa \end{matrix} + H_2$

43. (*d*) The mechanism of dehydration of ethanol involves the following steps:

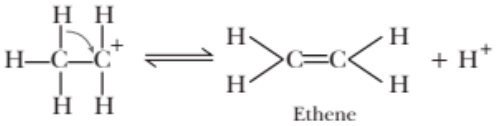
Step 1: Formation of protonated alcohol



Step 2: Formation of carbocation: It is the slowest step and hence, the rate determining step of the reaction.



Step 3: Formation of ethane by elimination of a proton



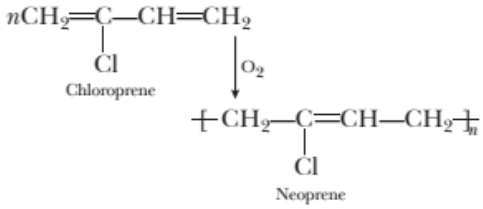
Ethene

The acid used in step 1 is released in step 3. To drive the equilibrium to the right, ethene is removed as it is formed.

44. (*b*) Only primary aliphatic and aromatic amines give carbylamine reaction. $(CH_3)_2NH$ being secondary amine do not give carbylamine reaction.

45. (*c*) The given reaction is affected by $LiAlH_4$/ether or B_2H_6 as both are strong oxidising agents.

46. (*d*) The correct assertion is "For making synthetic rubber, chloroprene molecules are polymerised.



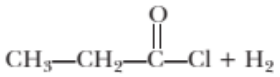
Chloroprene

Neoprene

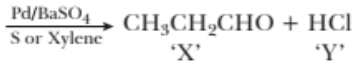
47. (*c*) Nitro group has both −R effect and −I effect, but −R effect predominates. Due to stronger electron withdrawing nature of $-NO_2$ group, phenoxide ion is stabilized more. Hence nitrophenol is more acidic than phenol. Methyl group destabilizes the phenoxide ion by +I effect and hyper conjugation. Hence *m*-cresol is weaker acid than phenol. Chlorine have both +R and −I effect, but −I effect predominates. Hence *o*-chlorophenol is more acidic than phenol. −R effect of nitro group is stronger than −I effect of chlorine, hence *m*-nitrophenol is more acidic than *o*-chlorophenol. Therefore the correct order of acidic strength is

m-nitrophenol > *o*-chlorophenol > phenol > *m*-cresol

Acidic strength in increasing order is *ii* < *iii* < *iv* < *i*

48. (*b*) 

Propionyl Chloride



Propanal

49. (*d*) When the polypeptide chains run parallel and are held together by hydrogen and disulphide bonds, then fibrous protein is formed.