22 PRACTICE PAPER

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

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

Choose the correct option.

1. **Brownian motion is due to**
   (*a*) attraction and repulsion between the charges on the colloidal particles.
   (*b*) temperature fluctuation within the liquid phase.
   (*c*) convection current.
   (*d*) impact of molecules of dispersion medium on colloidal particles.

2. **Which of the following is a zero order reaction?**
   (*a*) $CH_3COOC_2H_5 + H_2O \longrightarrow CH_3COOH + C_2H_5OH$
   (*b*) $H_2 + Cl_2 \xrightarrow{h\nu} 2HCl$
   (*c*) $2NO + O_2 \longrightarrow 2NO_2$
   (*d*) $CH_3COOC_2H_5 + NaOH \longrightarrow CH_3COONa + C_2H_5OH$

3. **The amount of chlorine prepared by electrolysis of molten sodium chloride with 10 amperes of current flowing for 10 minutes is _____.**
   (*a*) 3.8 g (*b*) 2.2 g (*c*) 4.4 g (*d*) 6 g

4. **Mole fraction of the solute in a 1.0 molal aqueous solution is**
   (*a*) 0.1770 (*b*) 0.0177 (*c*) 0.0344 (*d*) 1.7700

5. **Given below are two statements labelled as Assertion and Reason:**
   Assertion (A) : Ferrimagnetic substances lose magnetism on heating.
   Reason (R) : Fe_3O_4 and $MgFe_2O_4$ are examples of substances that show ferrimagnetism.
   (*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.

6. **Which of the following solids is not an electrical conductor?**
   (*i*) Mg(*s*) **(*ii*) TiO(*s*)**
   (*iii*) I_2(*s*) **(*iv*) H_2O(*s*)**
   (*a*) (*i*) only (*b*) (*ii*) only
   (*c*) (*iii*) and (*iv*) (*d*) (*ii*), (*iii*) and (*iv*)

7. **The value of Henry's constant K_H is _____.**
(*a*) greater for gases with higher solubility (*b*) greater for gases with lower solubility
(*c*) constant for all gases (*d*) not related to the solubility of gases

8. **When 96500 coulomb of electricity is passed through $AgNO_3$ solution, the metal deposited will be equal to**
(*a*) one gram equivalent (*b*) 1 gram mole
(*c*) 1 gram metal (*d*) electrochemical equivalent

9. **The unit of rate constant of a second order reaction is**
(*a*) mol litre^{-1} sec^{-1} (*b*) sec^{-1} (*c*) mol^{-1} litre sec^{-1} (*d*) mol litre^{-1} sec

10. **Lyophilic sols are more stable than lyophobic sols because**
(*a*) the colloidal particles have negative charge.
(*b*) the colloidal particles have positive charge.
(*c*) the colloidal particles are solvated.
(*d*) there is strong electrostatic repulsion between the negatively charged colloids.

11. **For tetrahedral arrangement, the radius ratio r^+/r^- is**
(*a*) 0.732 – 1.0 (*b*) 0.225 – 0.414 (*c*) 0.414 – 0.732 (*d*) 0.155 – 0.225

12. **When a non-volatile solute is dissolved in a pure solvent**
(*a*) freezing point of the solution is decreased.
(*b*) freezing point of the solution is increased.
(*c*) boiling point of the solution is decreased.
(*d*) Both (*a*) and (*c*)

13. **If an article is to be electroplated, would it be made as**
(*a*) cathode (*b*) anode
(*c*) neither cathode nor anode (*d*) either cathode or anode

14. **Which one of the following plots gives the value of activation energy?**
(*a*) $\log k$ vs $\frac{1}{T}$ (*b*) $\log k$ vs T (*c*) k vs T (*d*) $\frac{1}{k}$ vs T

15. **Second Faraday's law of electrolysis is related to the**
(*a*) atomic number of the cation. (*b*) atomic number of the anion.
(*c*) equivalent mass of the electrolyte. (*d*) speed of the cation.

16. **At 298 K, the conductivity of a saturated solution of AgCl in water is 3.9×10^{-6} ohm^{-1} cm^{-1}. If $\lambda^0_m(Ag^+) = 83$ ohm^{-1} cm^2 mol^{-1} and $\lambda^0_m(Cl^-) = 87$ ohm^{-1} cm^2 mol^{-1}, then solubility product of AgCl is**
(*a*) 2.29×10^{-5} (*b*) 5.24×10^{-10} (*c*) 4.80×10^{-10} (*d*) 2.19×10^{-5}

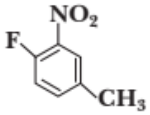
17. **In the extraction of iron from iron oxide ore, the reducing agent is**
(*a*) C (*b*) CO (*c*) $CaCO_3$ (*d*) SiO_2

18. **The number of electrons that are involved in the oxidation of $KMnO_4$ in acidic medium is**
(*a*) 1 (*b*) 5 (*c*) 3 (*d*) 2

19. **To which isomers the following complexes belong?**
$[Co(NH_3)_5SO_4]Cl$ and $[Co(NH_3)_5Cl]SO_4$
(*a*) Linkage isomer (*b*) Ionisation isomer
(*c*) Ligand isomer (*d*) Geometrical isomer

20. **Among the following ions which has the maximum paramagnetism?**
(*a*) $[Cr(H_2O)_6]^{3+}$ (*b*) $[Fe(H_2O)_6]^{2+}$
(*c*) $[Cu(H_2O)_6]^{2+}$ (*d*) $[Zn(H_2O)_6]^{2+}$

21. **PCl_3 reacts with water to form**
(*a*) PH_3 (*b*) H_3PO_4 and HCl (*c*) $POCl_3$ (*d*) H_3PO_4

22. **The IUPAC name of the compound**  **is:**

(*a*) 4-fluoro-1-methyl-3-nitrobenzene
(*b*) 1-fluoro-4-methyl-2-nitrobenzene
(*c*) 2-fluoro-5-methyl-1-nitrobenzene
(*d*) 4-methyl-1-fluoro-2-nitrobenzene

23. **Hot conc. H_2SO_4 acts as moderately strong oxidising agent. It oxidises both metals and non-metals. Which of the following element is oxidised by conc. H_2SO_4 into two gaseous products?**

(*a*) Cu (*b*) S (*c*) C (*d*) Zn

24. **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+}.

25. **A transition element X has a configuration [Ar] $3d^4$ in its +3 oxidation state. Its atomic number is**

(*a*) 25 (*b*) 26 (*c*) 22 (*d*) 19

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

Statement P : The reaction is feasible only when the value of ΔG is negative.

Statement Q : ΔG is negative only when ΔS is positive.

(*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

27. **The coordination number of cobalt in $[Co(NH_3)_2Cl_2]$ is**

(*a*) 3 (*b*) 2 (*c*) 5 (*d*) 4

28. **In qualitative analysis when H_2S is passed through an aqueous solution of salt acidified with dil. HCl, a black precipitate is obtained. On boiling the precipitate with dil. HNO_3, it forms a solution of blue colour. Addition of excess of aqueous solution of ammonia to this solution gives _____.**

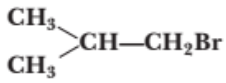
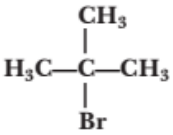
(*a*) deep blue precipitate of Cu $(OH)_2$
(*b*) deep blue solution of $[Cu(NH_3)_4]^{2+}$
(*c*) deep blue solution of $Cu(NO_3)_2$
(*d*) deep blue solution of $Cu(OH)_2.Cu(NO_3)_2$

29. **Reduction potentials of some ions are given below. Arrange them in decreasing order of oxidising power.**

Ion	ClO_4^-	IO_4^-	BrO_4^-
Reduction potential E°/V	E° = 1.19 V	E° = 1.65 V	E° = 1.74 V

(*a*) $ClO_4^- > IO_4^- > BrO_4^-$
(*b*) $IO_4^- > BrO_4^- > ClO_4^-$
(*c*) $BrO_4^- > IO_4^- > ClO_4^-$
(*d*) $BrO_4^- > ClO_4^- > IO_4^-$

30. **Arrange the following compounds in increasing order of their boiling points.**

(*i*)  (*ii*) $CH_3CH_2CH_2CH_2Br$ (*iii*) 

(*a*) (*ii*) < (*i*) < (*iii*) (*b*) (*i*) < (*ii*) < (*iii*) (*c*) (*iii*) < (*i*) < (*ii*) (*d*) (*iii*) < (*ii*) < (*i*)

31. **The position of Br in the compound in $CH_3CH{=}CHC(Br)(CH_3)_2$ can be classified as _____.**

(*a*) Allyl (*b*) Aryl (*c*) Vinyl (*d*) Secondary

32. **Which of the following compound will not react with ammonical $AgNO_3$ solution?**

(*a*) Acetylene
(*b*) Acetone
(*c*) Acetaldehyde
(*d*) Formic acid

33. **Natural rubber is a polymer of:**

(*a*) butadiene
(*b*) ethylene
(*c*) isoprene
(*d*) chloroprene

34. Which of the following medicine is used for the treatment of typhoid?

(*a*) Quinine (*b*) Chloramphenicol

(*c*) Novalgin (*d*) Aspirin

35. Glucose cannot be classified as :

(*a*) carbohydrate (*b*) aldose (*c*) oligosaccharide (*d*) hexose

36. Acetamide and ethylamine can be distinguished by reacting with

(*a*) Aqueous HCl and heat (*b*) Aqueous NaOH and heat

(*c*) Acidified $KMnO_4$ (*d*) Bromine water

37. An ether is more volatile than an alcohol having the same molecular formula. This is due to

(*a*) dipolar character of ethers.

(*b*) alcohols having resonance structures.

(*c*) inter-molecular hydrogen bonding in ethers.

(*d*) inter-molecular hydrogen bonding in alcohols.

38. Which of the following is more basic than aniline?

(*a*) Benzylamine (*b*) Diphenylamine

(*c*) Triphenylamine (*d*) *p*-Nitroaniline

39. Aniline upon heating at 288 K with conc. HNO_3 and conc. H_2SO_4 mixture gives

(*a*) *o*–and *p*–nitroaniline (*b*) *o*–nitroaniline

(*c*) *o*–, *m*– and *p*–nitroaniline (*d*) *p*–nitroaniline

40. Match the following enzymes given in Column I with the reactions they catalyse given in Column II.

Column I	Column II
A. Invertase	(*i*) Decomposition of urea into NH_3 and CO_2
B. Maltase	(*ii*) Conversion of glucose into ethyl alcohol
C. Pepsin	(*iii*) Hydrolysis of maltose into glucose
D. Urease	(*iv*) Hydrolysis of cane sugar
E. Zymase	(*v*) Hydrolysis of proteins into peptides

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

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

41. The weakest acid among the following is

(*a*) $CHCl_2COOH$ (*b*) CH_3COOH

(*c*) $CH_2ClCOOH$ (*d*) CCl_3COOH

42. The main force(s) which stabilise the 2° and 3° structures of proteins is/are

(*a*) hydrogen bonds (*b*) disulphide linkages

(*c*) van der Waals (*d*) all of these

43. When compound X is oxidised by acidified potassium dichromate, compound Y is formed. Compound Y on reduction with $LiAlH_4$ gives X. (X) and(Y) respectively are

(*a*) C_2H_5OH, CH_3COOH (*b*) CH_3COCH_3, CH_3COOH

(*c*) C_2H_5OH, CH_3COCH_3 (*d*) CH_3CHO, CH_3COCH_3

44. The correct order of boiling points of for primary(1°), secondary(2°) and tertiary(3°) alcohol is

(*a*) 1° > 2° > 3° (*b*) 3° > 2° > 1°

(*c*) 2° > 1° > 3° (*d*) 2° > 3° > 1°

45. Calcium acetate when dry distilled gives

(*a*) formaldehye (*b*) acetaldehyde

(*c*) acetone (*d*) acetic anhydride

46. *n*-propyl alcohol and isopropyl alcohol can be chemically distinguished by

(*a*) PCl_5 (*b*) Reduction

(*c*) Oxidation with potassium dichromate (*d*) Ozonolysis

47. **IUPAC name of *m*-cresol is**

(*a*) 3-chlorophenol (*b*) Benzene-1, 3-diol

(*c*) 3-methoxyphenol (*d*) 3-methylphenol

48. **The role of phosphate in detergent powder is to**

(*a*) control pH level of the detergent water mixture.

(*b*) remove Ca^{2+} and Mg^{2+} ions from the water that causes the hardness of water.

(*c*) provide whiteness to the fabrics.

(*d*) form solid detergent as phosphate less detergent are liquid in nature.

49. **Terylene is a condensation polymer of ethylene glycol and**

(*a*) benzoic acid (*b*) phthalic acid

(*c*) terephthalic acid (*d*) salicylic acid

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

Assertion (A) : Aromatic acids do not undergo Friedel-Crafts reaction.

Reason (R) : —COOH group is a *m*-directing group.

(*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.

Answers

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

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1. (*d*) Brownian movement is believed to be due to unequal bombardment of colloidal particles by the molecules of the dispersion medium.

2. (*b*) Combination of hydrogen and chlorine in presence of sunlight over the surface of water to yield hydrogen chloride is a zero order reaction as the rate of this reaction independent of concentration of H_2 and Cl_2 *i.e.*, Rate = k.

$$H_2(g) + Cl_2(g) \xrightarrow{h\nu} 2HCl(g)$$

3. (*b*) $w = \text{Zit} = \frac{E}{F} \times i \times t = \frac{35.5}{96500} \times 10 \times 10 \times 60$

$= 2.21\text{g}$

4. (*b*) 1 molal aqueous solution means 1 mole of solute is dissolved in 1 kg of water

$\Rightarrow$ Number of moles of solute = 1 mole

Number of moles of water = $\frac{1000}{18}$

= 55.55 moles

$\therefore$ Total no. of moles = 1 + 55.55=56.55 moles

Now, we know

Mole fraction of solute

$= \frac{\text{Moles of solute}}{\text{Total moles in solution}}$

$\Rightarrow$ Mole fraction of solute = $\frac{1}{56.55} = 0.0177$

5. (*b*) The correct explanation of assertion is, there is a loss of ferrimagnetism of ferrimagnetic substances on heating changing them into paramagnetic due to realignment of the electron spins which get oriented in particular direction.

6. (*c*) Iodine is a non-polar molecular solid in which iodine molecules are held together by London force or dispersion force, this is soft and non - conductor for electricity. Water is a hydrogen bonded molecular solid in which H and O are held together polar covalent bond and each water molecular held together by hydrogen bonding. Due to non-ionic nature, so, it is not an electrical conductor.

7. (*b*) According to Henry's law, $p = K_H \chi$, *i.e.*, Henry's constant is inversely proportional to mole fraction of gas in solution. So, Henry's constant is greater for gases with lower solubility.

8. (*a*) The cathodic reaction is

$$\underset{\substack{1\text{ mol}\\108\text{ g}}}{Ag^+} + e^- \longrightarrow \underset{\substack{1\text{ mol}\\1\text{ F} = 96500\text{ C}}}{Ag}$$

Therefore, 96500 coulombs of charge is needed to deposit one gram equivalent of Ag at cathode.

9. (*c*) The unit of rate constant for nth order reaction is k = (concentration)$^{1-n}$ time^{-1}.

Therefore, for second order reaction, the unit of k is(concentration)$^{1-2}$ time^{-1} or mol^{-1} litre sec^{-1}.

10. (*c*) The greater stability of the lyophilic colloidal sols than the lyophobic sols is due to the fact that the former are highly hydrated in the solution.

11. (*b*) For tetrahedral arrangement, co-ordination number is 4 and radius ratio (r^+/r^-) is 0.225 – 0.414.

12. (*a*) Non-volatile solutes lowers the vapour pressure of a solvent. This results in decrease in the freezing point of a solution. As only at lower temperature, the vapour pressure of solution will be equal to that of the solute.

13. (*a*) The electroplating process uses an electric current to dissolve metal and deposit it onto the surface. The process works using four primary components:

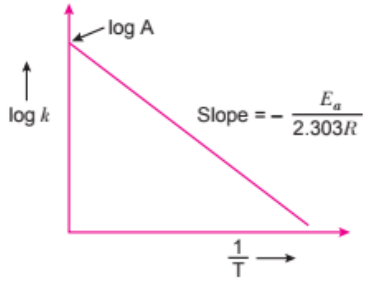
Anode: The anode, or positively charged electrode, in the circuit is the metal that will form the plating.

Cathode: The cathode in the electroplating circuit is the part that needs to be plated. It is also called the substrate. This part acts as the negatively charged electrode in the circuit.

Solution: The electrodepositing reaction takes place in an electrolytic solution. This solution contains one or more metal salts, usually including copper sulphate, to facilitate the flow of electricity.

Power source: Current is added to the circuit using a power source. This power source applies a current to the anode, introducing electricity to the system.

14. (*a*) A plot of log k v/s $\frac{1}{T}$ is a straight line, whose slope is $\frac{-E_a}{2.303R}$.



15. (*c*) According to the Faraday's second law of electrolysis "when same quantity of electricity is passed through different electrolytes, the amount of different substance deposited at the electrodes is directly proportional to their equivalent mass."

16. (*b*) $\lambda^0_m(AgCl) = \lambda^0_{(Ag^+)} + \lambda^0_{(Cl^-)}$

$= (83 + 87)\ ohm^{-1}\ cm^2\ mol^{-1}$

$= 170\ ohm^{-1}\ cm^2\ mol^{-1}$

Solubility of sparingly soluble salt can be calculated as

$$S = \frac{\kappa \times 1000}{\lambda^o_m}\ (mol/L)$$

$$\therefore \quad S = \frac{3.9 \times 10^{-6} \times 1000}{170} = 2.29 \times 10^{-5}\ mol/L$$

$$AgCl(s) \rightleftharpoons Ag^+(aq) + Cl^-(aq)$$

$$K_{sp} = (S)^2 = (2.29 \times 10^{-5})^2 = 5.24 \times 10^{-4}\ mol^2/L^2$$

17. (*b*) In the combustion zone (higher temperature range in the blast furnace) carbon dioxide reacts with carbon to produce carbon monoxide. It is the carbon monoxide which is the main reducing agent in the furnace.

18. (*b*) In acidic medium, the reaction is

$$MnO_4^- + 8H^+ + 5e^- \longrightarrow Mn^{2+} + 4H_2O$$

So, 5 electrons are involved.

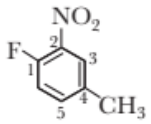
19. (*b*) $[Co(NH_3)_5\ SO_4]\ Cl$ and $[Co(NH_3)_5\ Cl]\ SO_4$. shows ionisation isomerism as the counter ion in a complex salt is itself a potential ligand and can displace a ligand which can then become the counter ion.

20. (*b*) Among the given ions, $[Fe(H_2O)_6]^{3+}$ has maximum paramagnetism. This is because, it contains maximum number of unpaired electrons, *i.e.*, 4.

21. (*b*) $PCl_3 + H_2O \longrightarrow POCl_3 + 2HCl$;

$POCl_3 + 3H_2O \longrightarrow H_3PO_4 + 3HCl$

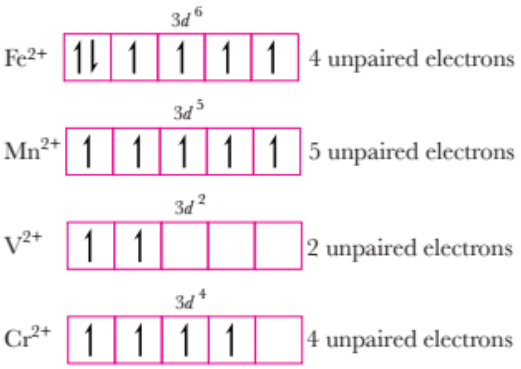
22. (*b*)



1-fluoro-4-methyl-2-nitrobenzene by lowest locant rule.

23. (*c*) $C + 2H_2SO_4 \longrightarrow 2SO_2(s) + CO_2(g) + 2H_2O$

24. (*a*) Paramagnetism can be identified by number of unpaired electrons. More number of unpaired electrons, more is magnetic strength.



Hence, Mn^{2+} is more magnetic than Fe^{2+} as it contains more number of unpaired electrons than Mn^{2+}.

25. (*a*) $X = [Ar]^{18}\ 3d^4$

Number of electrons = 18 + 4 = 22

As given, the element is in +3 oxidation state and therefore the number of electrons is 22 + 3 = 25.

So, the atomic number is 25.

26. (*a*) Statement 2 is false as $\Delta G = \Delta H - T.\ \Delta S$. As, it is not only depends on the sign of ΔS while on ΔH also.

27. (*d*) The coordination number of a metal ion in a complex may be defined as the total number of ligand donor atoms to which the metal ion is directly bonded. Here, cobalt is attached to 4 ligands and therefore its coordination number is 4.

28. (*b*) $CuSO_4 + H_2S \longrightarrow \underset{\text{Black ppt}}{CuS} + H_2SO_4$

$CuS + 2HNO_3 \longrightarrow \underset{\text{Blue solution}}{Cu(NO_3)_2} + H_2S$

$Cu(NO_3)_2 + 4NH_3 \longrightarrow \underset{\text{Deep blue solution}}{[Cu(NH_3)_4]^{2+}} + 2NO_3^-$

29. (*c*) As by convention, positive sign is used to represent the reduction potential, this implies that greater is the reduction potential, more earily is the substance reduced or in other words stronger oxidising agent it is. Hence, the correct order is

BrO_4^- > IO_4^- > ClO_4^-

$E^o = 1.74\ V$ > $E^o = 9.65V$ > $E^o = 1.19V$

30. (*c*) With increase in surface area boiling point increases.

31. (*a*) In, Allylic halides the halogen is linked to sp^3-hybridised carbon atom which is next to a carbon-carbon double bond *i.e.*, to an allylic carbon.

32. (*b*) Acetone being a ketone does not react with ammonical $AgNO_3$.

33. (*c*) Natural rubber may be considered as a linear polymer of isoprene (2-methyl-1, 3-butadiene) and is also called as cis - 1, 4 - polyisoprene.

34. (*b*) Chloramphenicol has been the drug of choice for typhoid fever for more than 40 years in regions of the world where *Salmonella typhi* remains susceptible to the drug.

35. (*c*) Glucose is a monosaccharide.

36. (*b*) Acetamide evolves NH_3 while ethylamine does not after reacting with *aq*.NaOH.

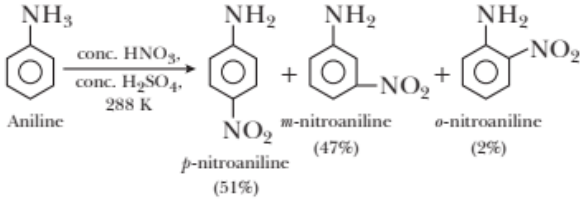
$$CH_3CONH_2 + NaOH \xrightarrow{\Delta} CH_3COONa + \underset{\text{Ammonia gas}}{NH_3}\uparrow$$

$$CH_3CH_2NH_2 + NaOH \xrightarrow{\Delta} \text{No reaction}$$

37. (*d*) An ether is more volatile than an alcohol having the same molecular formula. This is due to intermolecular hydrogen bonding in alcohols. In alcohols, H atom is attached to strongly electronegative O atom of other molecule. Therefore, they exist as an associated molecule due to hydrogen bonding.

38. (*a*)  because the benzene ring does not exert any conjugation effect in benzyl amine due to which delocalisation of electron does not occur and electron pair on N get easily protonated.

39. (*c*)



41. (*b*) Acidity increases with increasing number of electron-withdrawing substituents on the α-carbon. Therefore, the correct increasing order of the given compounds is

Acetic acid < Chloroacetic acid < Dichloroacetic acid (Cl_2CH—COOH) < Trichloroacetic acid (Cl_3C—COOH).

43. (*a*)

$$\underset{\text{Ethanol (X)}}{C_2H_5OH} + K_2Cr_2O_7 \xrightarrow{H_2SO_4} \underset{\text{Ethanoic acid (Y)}}{CH_3COOH}$$

$$CH_3COOH + LiAlH_4 \xrightarrow{H^+} \underset{\text{Ethanol (X)}}{CH_3CH_2OH}$$

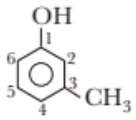
44. (*a*) Amongst isomeric alcohols, the boiling point decrease with branching due to corresponding decrease in surface area.

45. (*c*) Calcium acetate when dry distilled gives acetone. The reaction is as follows:

$$\underset{\text{Calcium acetate}}{(CH_3COO)Ca} \xrightarrow{\text{Dry distillation}} \underset{\text{Acetone}}{CH_3COCH_3} + CaCO_3$$

46. (*c*) *n*-propyl alcohol oxidize with acidified $K_2Cr_2O_7$ to give propanoic acid while isopropyl alcohol oxidizes with acidified $K_2Cr_2O_7$ to give propanone.

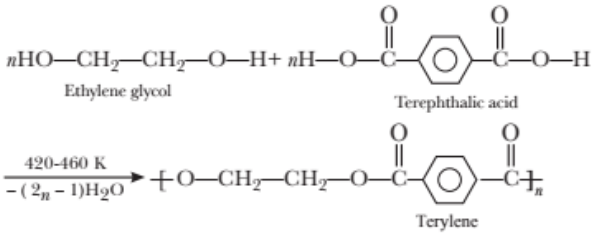
47. (*d*) The structure of *m*-cresol is



So, the IUPAC name is 3-methylphenol.

48. (*b*) The advantage of using phosphates in a consumer laundry detergent or dishwashing detergent is that they acts as a water softner by remaining Ca^{2+} and Mg^{2+} ions from hard water by forming stable soluble complex.

49. (*c*)



50. (*b*) The correct explanation, is due to deactivation of the ring by the —COOH group; aromatic acids do not undergo Friedal craft reactions.