9 PRACTICE PAPER

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

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

Choose the correct option.

1. The rate at which a substance reacts depends upon its

(*a*) atomic weight (*b*) equivalent weight

(*b*) molecular weight (*d*) active mass

2. Which of the following statements is false?

(*a*) Two different solutions of sucrose of same molality prepared in different solvents will have the same depression in freezing point.

(*b*) The osmotic pressure of a solution is given by the equation $\pi = CRT$ (where C is the molarity of the solution).

(*c*) Decreasing order of osmotic pressure for 0.01 M aqueous solutions of barium chloride, potassium chloride, acetic acid and sucrose is

$BaCl_2 > KCl > CH_3COOH >$ sucrose.

(*d*) According to Raoult's law, the vapour pressure exerted by a volatile component of a solution is directly proportional to its mole fraction in the solution.

3. $RCOOR' + H_2O \longrightarrow R—COOH + R'OH$. The given reaction is a type of _____ reaction.

(*a*) 2nd order (*b*) unimolecular

(*c*) Pseudo unimolecular (*d*) 3rd order

4. At high altitude, the boiling point of water is lower because

(*a*) atmospheric pressure is low (*b*) temperature is low

(*c*) atmospheric pressure is high (*d*) none of these

5. If a first order reaction is 50% complete in 20 mins. Then the time required for 75% completion of reaction is

(*a*) 20 mins (*b*) 10 mins (*c*) 40 mins (*d*) 80 mins

6. The vapour pressure of water at 20°C is 17.5mm Hg. If 18 g of glucose ($C_6H_{12}O_6$) is added to 178.2 g of water at 20°C, the vapour pressure of the resulting solution will be

(*a*) 0.175 mm Hg (*b*) 17.325 mm Hg

(*c*) 0.157 mm Hg (*d*) 16.83 mm Hg

7. If Z is the number of atoms in the unit cell that represents the closest packing sequence—ABCABC, the number of tetrahedral voids in the unit cell is equal to

(*a*) Z (*b*) 2Z (*c*) $\frac{Z}{2}$ (*d*) $\frac{Z}{4}$

8. EMF of a cell

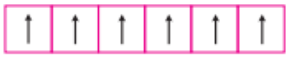
(*a*) increases with the temperature.

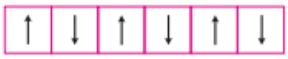
(*b*) decreases with the temperature.

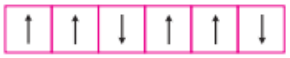
(*c*) does not change with the temperature.

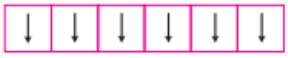
(*d*) increases or decreases, depending on the nature of cell.

9. Which of the following alignments of magnetic moment solids?

(*a*) 

(*b*) 

(*c*) 

(*d*) 

10. $E^0_{Zn^{2+}/Zn} = -0.76$ **Volt at 25°C. The electrode potential of a concentration of 0.1 M** Zn^{2+} **will be**

(*a*) – 0.73 V (*b*) – 0.79 V

(*c*) – 0.82 V (*d*) – 0.70 V

11. Which of the following is not the property of crystalline solids?

(*a*) Isotropy (*b*) Sharp melting point

(*c*) Strong intermolecular forces (*d*) A definite and regular geometry

12. Degree of ionization does not depend on

(*a*) nature of solvent (*b*) nature of an electrolyte

(*c*) pressure (*d*) molecular mass of an electrolyte

13. Platinised asbestos is used as catalyst in the manufacture of H_2SO_4**. It is an example of**

(*a*) homogeneous catalyst (*b*) auto-catalyst

(*c*) heterogeneous catalyst (*d*) induced catalyst

14. The enzyme ptyalin used for digestion of food is present in

(*a*) saliva (*b*) blood

(*c*) intestine (*d*) adrenal gland

15. The ionic conductance of Ba^{2+} **and** Cl^- **ions are respectively 127 and 76** $\Omega^{-1}\,cm^2\,eq^{-1}$ **at infinite dilution. The equivalent conductance(in** $ohm^{-1}\,cm^2\,eq^{-1}$**) of** $BaCl_2$ **at infinite dilution is**

(*a*) 203 (*b*) 279

(*c*) 101·5 (*d*) 139·5

16. E^o_{cell} **of** $Zn/Zn^{2+}||Cu^{2+}/Cu$ **is 1·10 V at 25°C, the equilibrium constant for the reaction** $Zn + Cu^{2+} \rightarrow Cu + Zn^{2+}$ **is approximately of the order of (Given: log** $K_{eq} = 37.28$**)**

(*a*) 10^{-28} (*b*) 10^{37}

(*c*) 10^{-18} (*d*) 10^{17}

17. The order of reactivity of the following alkyl halides for S_N2 **reaction is**

(*a*) RF > RCl > RBr > RI (*b*) RF > RBr > RCl > RI

(*c*) RCl > RBr > RF > RI (*d*) RI > RBr > RCl > RF

18. Which of the following does not have S—S bond?

(*a*) $S_2O_4^{2-}$ (*b*) $S_2O_3^{2-}$

(*c*) $S_2O_5^{2-}$ (*d*) $S_2O_7^{2-}$

19. The oxidation number of cobalt in $[Co(NH_3)_5Cl]Cl_2$ **is**

(*a*) + 2 (*b*) + 3

(*c*) 0 (*d*) + 4

20. Which of the following metals is obtained by leaching the ore with dilute cyanide solution?

(*a*) Silver (*b*) Titanium

(*c*) Vanadium (*d*) Zinc

21. **Which of the following metal exhibits more than one oxidation state?**

(*a*) Na (*b*) Mg

(*c*) Fe (*d*) Al

22. **Which one of the following metal ions is colourless?**

(*a*) V^{2+} (*b*) Cr^{3+} (*c*) Zn^{2+} (*d*) Ti^{3+}

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

Assertion (A) : F_2 is a strong oxidising agent.

Reason (R) : Electron gain enthalpy of fluorine is less negative.

(*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.

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

Assertion (A) : Salts of ClO_3^- and ClO_4^- are well known but those of FO_3^- and FO_4^- are non-existent.

Reason (R) : F is more electronegative than O while Cl is less electronegative than O.

(*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.

25. $C_7H_8 \xrightarrow{3Cl_2} A \xrightarrow{Br_2/Fe} B \xrightarrow{Zn/HCl} C$

The compound C is

(*a*) *o*-bromotoluene (*b*) *m*-bromotoluene

(*c*) *p*-bromotoluene (*d*) 3-bromo-2, 4, 6-trichlorotoluene

26. **MnO_4^- on reduction in acidic medium forms**

(*a*) MnO_2 (*b*) Mn^{2+} (*c*) MnO_4^{2-} (*d*) Mn

27. **Which of the following is not a basic flux?**

(*a*) $CaCO_3$ (*b*) Fe_2O_3 (*c*) SiO_2 (*d*) MgO

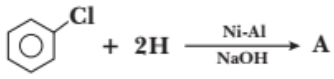
28. **Match the complexes given in Column I with their colours given in Column II.**

Column I	Column II
A. $[Co(NH_3)_6]^{3+}$	(*i*) Violet
B. $[Ti(H_2O)_6]^{3+}$	(*ii*) Green
C. $[Ni(H_2O)_6]^{2+}$	(*iii*) Pale Blue
D. $[Ni(H_2O)_4(en)^{2+}](aq)$	(*iv*) Yellowish orange
	(*v*) Blue

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

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

29. **The product (A) formed in the given reaction is**



(*a*) Diphenyl (*b*) Benzene (*c*) Iodobenzene (*d*) Toluene

30. **The shape of XeF_4 is**

(*a*) tetrahedral (*b*) octahedral (*c*) square planar (*d*) none of these

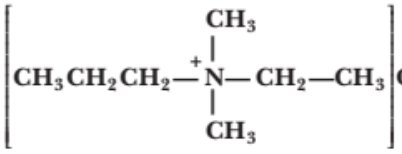
31. **Which one will give the test for Fe^{3+} in solution?**

(*a*) $[Fe(CN)_6]^{3-}$ (*b*) $[Fe(CN)_6]^{4-}$

(*c*) $(NH_4)_2SO_4.FeSO_4.6H_2O$ (*d*) $Fe_2(SO_4)_3$

32. Amino acids are best represented as :

(*a*) dipolar ions
(*b*) isoelectric ions
(*c*) amphoteric ions
(*d*) zwitter ions

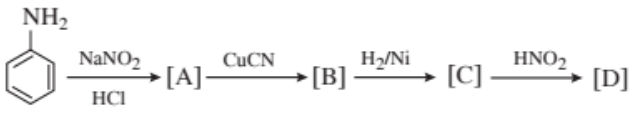
33. When  **is heated:**

(*a*) Propene is the major product.
(*b*) Ethene and $C_3H_7N(CH_3)_2$ are the only products.
(*c*) Ethene and propene are obtained in which ethene is the major product.
(*d*) Equimolar amount of ethene and propene are obtained.

34. Alcohols are soluble in water because

(*a*) alcohol forms ionic bond with water.
(*b*) alcohol forms hydrogen bond with water.
(*c*) alcohol forms covalent bond with water.
(*d*) alcohol forms interstitial compound with water.

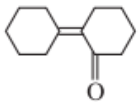
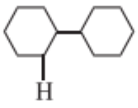
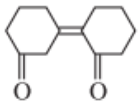
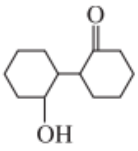
35. Aniline in a set of reactions yielded a product D.



The structure of the product (D) would be:

(*a*) C_6H_5NHOH
(*b*) $C_6H_5NHCH_2CH_3$
(*c*) $C_6H_5CH_2NH_2$
(*d*) $C_6H_5CH_2OH$

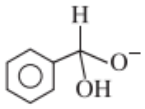
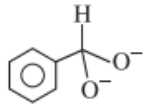
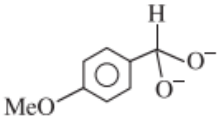
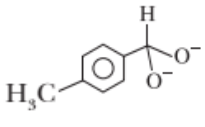
36. Of the following, which is the product formed when cyclohexanone undergoes aldol condensation followed by heating?

(*a*) 
(*b*) 
(*c*) 
(*d*) 

37. Which one is primary alcohol?

(*a*) Butan-2-ol
(*b*) Butan-1-ol
(*c*) Propan-2-ol
(*d*) 2, 3-Dimethylhexan-4-ol

38. In a cannizzaro reaction, the intermediate that will be best hydride donor is

(*a*) 
(*b*) 
(*c*) 
(*d*) 

39. Which of the following is not a condensation polymer?

(*a*) Glyptal
(*b*) Nylon-66
(*c*) Dacron
(*d*) PTFE

40. Drugs that bind to receptor site and inhibit its natural function are called

(*a*) antagonists.
(*b*) agonists.
(*c*) enzymes.
(*d*) molecular targets.

41. Which of the following is a copolymer?

(*a*) Buna-S
(*b*) PVC
(*c*) Orlon
(*d*) Neoprene

42. **Which out of the following on reduction with lithium aluminium hydride yield a secondary amine?**

(*a*) Methyl isocyanide (*b*) Acetamide

(*c*) Methyl cyanide (*d*) Nitroethane

43. **1-Phenyl ethanol can be prepared by reaction of benzaldehyde with :**

(*a*) Methyl bromide (*b*) Ethyl iodide and Mg

(*c*) Methyl bromide and $AlBr_3$ (*d*) Methyl iodide and Mg

44. **Which of the following is a cationic detergent?**

(*a*) Sodium lauryl sulphate (*b*) Cetyl trimethyl ammonium bromide

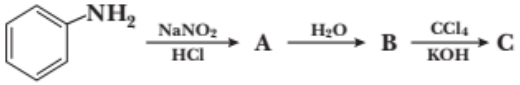
(*c*) Sodium dodecyl benzene sulphonate (*d*) Glyceryl oleate

45. **A basic amino acid among the following is**

(*a*) glycine (*b*) valine

(*c*) histidine (*d*) leucine

46. **Identify the product 'C'.**



(*a*) Salicylaldehyde (*b*) Salicylic acid (*c*) Phenol (*d*) Benzoic acid

47. **When ethanal is treated with Fehling solution, it gives a precipitate of**

(*a*) Cu (*b*) CuO (*c*) Cu_2O (*d*) $Cu_2O + Cu_2O_3$

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

Statement P : In lucas test, 3° alcohols react immediately.

Statement Q : An equimolar mixture of anhyd. $ZnCl_2$ and conc. HCl is called Lucas reagent.

(*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

49. **The correct statement regarding carbonyl compound with a hydrogen atom on its α-carbon is that it**

(*a*) rapidly equilibrates with its corresponding enol and this process is known as carbonylation.

(*b*) rapidly equilibrates with its corresponding enol and this process is known as keto–enol tautomerism.

(*c*) never equilibrates with its corresponding enol.

(*d*) rapidly equilibrates with its corresponding enol and this process is known as aldehyde–ketone equilibrium.

50. **Glucose reacts with acetic anhydride to form :**

(*a*) monoacetate (*b*) tetracetate

(*c*) pentaacetate (*d*) hexaacetate

Answers

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

Solutions

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1. (*d*) The rate at which a substance reacts depends upon its active mass as the rate of reaction is directly proportional to molar concentration of each reactant.

2. (*a*) As we know that depression in freezing point is related to molality by the expression

$\Delta T = K_b\, m$ or $\Delta T = K_b.\, w_{\text{solute}}$

So, it is clear that, it depend on weight of solvent. Hence, due to different solvents molality will be different. Hence, depression in freezing point will be different.

3. (*c*) A reaction which is not truly of first order but under certain conditions becomes reaction of the first order is called a pseudo unimolecular reaction. In given reaction, when water is taken in excess, then

Rate = k[RCOOR']

4. (*a*) High altitudes have lower atmospheric pressure. As you get higher up into the atmosphere the air pressure gets lower. Therefore, boiling point of water will generally be at lower temperature.

5. (*c*) For first order reaction, $T_{75\%} = 2 \times T_{50\%}$

Therefore, if 50% of first order reaction is completed in 20 mins, then 75% will be completed in 40 mins.

6. (*b*) Raoult's law for a solution containing a non-volatile solute and volatile solvent states that the relative lowering of vapour pressure is equal to mole fraction of solute which is non-volatile.

$$\frac{p_A^o - p}{p_A^o} = \chi_B$$

Where p_A^o = vapour pressure of solvent

p = vapour pressure of solution

χ_B = mole fraction of solute

Now, number of solute (glucose)

$$n_B = \frac{18}{180} = 0.1$$

Number of moles of solvent (water)

$$n_A = \frac{178.2}{18} = 9.9$$

$$\text{(Mole fraction of glucose } (\chi_B) = \frac{n_B}{n_A + n_B}$$

$$= \frac{0.1}{9.9 + 0.1} = \frac{0.1}{10} = 0.01$$

By Raoult's law $\dfrac{p_A^o - p}{p_A^o} = \chi_B$

$$\frac{17.5 - p}{17.5} = 0.01$$

$$p = 17.5 - 0.175 = 17.325 \text{ mmHg}$$

7. (*b*) Number of tetrahedral voids is always double to number of atoms in *ccp*.

8. (*a*) The emf of the cell depends upon temperature, nature of the metal and its ions and concentration of the electrolyte used. It increases or decreases, depending on the nature of the cell.

9. (*c*) In ferrimagnetic substances due to unequal number of magnetic moment in parallel and anti-parallel directions, the net magnetic moment is small.

10. (*b*) $E_{cell} = E^{o}_{cell} - \frac{0.059}{n}\log\frac{1}{[Zn^{2+}]}$

$$= -0.76 - \frac{0.059}{2}\log\frac{1}{0.1}$$

$$= -0.76 - \frac{0.059}{2}\log 10$$

$$= -0.76 - \frac{0.059}{2}$$

$$= -0.76 - 0.0295$$

$$= -0.7895 \text{ or } -0.79 \text{ V}$$

11. (*a*) Crystalline solids are anisotropic in nature means some of their physical properties like electrical conductivity,refractive index etc. are different in different directions in the same crystal.

12. (*d*) The degree of ionization depends on nature of an electrolyte, dilution of an electrolyte, and temperature but does not depend on the volume of an electrolyte and molecular mass of an electrolyte.

13. (*c*) When the catalyst is in a different phase from that of reactants, then it is known as heterogeneous catalyst.

$$SO_2(g) + O_2(g) \xrightarrow{Pt(s)} 2SO_3(g)$$

Here, platinised asbestos is solid in nature while reactants are in gaseous form.

14. (*a*) Ptyalin enzyme present in human saliva converts starch into glucose.

15. (*d*) $BaCl_2 \rightleftharpoons Ba^{2+} + 2Cl^-$

$$\Lambda^{\infty}_{eq}BaCl_2 = \Lambda^{\infty}_{eq}[Ba^{2+}] + 2\Lambda^{\infty}_{eq}[Cl^-]$$

$$= \frac{1}{2}\Lambda^{\infty}_{eq}[Ba^{2+}] + \Lambda^{\infty}_{eq}[Cl^-]$$

$$= \frac{1}{2}(127) + 76$$

$$\Lambda^{\infty}_{eq}(BaCl_2) = 139.5\,\Omega^{-1}\,cm\,eq^{-1}$$

Equivalent conductance of

$$BaCl_2 = \frac{127 + 76(2)}{2} = 139.5 \text{ ohm}^{-1}\text{ cm}^2\text{ eq}^{-1}$$

16. (*b*) $\Delta G^{o} = -nFE^{o}_{cell} = -2.303RT\log K_{eq}$

$$\Rightarrow \log K_{eq} = \left(\frac{2.303\,RT}{nF}\right)^{-1} E^{o}_{cell}$$

$$\Rightarrow \log K_{eq} = \left(\frac{n}{0.0591}\right)E^{o}_{cell}$$

$$\Rightarrow \log K_{eq} = \frac{2}{0.0591} \times 1.1$$

$$\log K_{eq} = 37.28$$

$$K_{eq} = 10^{37.28} \approx 10^{37}$$

17. (*d*) I is better learning group, so towards S_N2 reaction RI is most reactive.

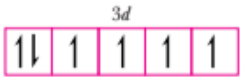
18. (*d*) $S_2O_7^{2-}$ have S—O—S bond and not S—S bond.

19. (*b*) Let the oxidation number of cobalt is *x*.

Therefore, $x + 5(0) - 1 + 2(-1) = 0$

$x = +3$

20. (*a*) During leaching process, Ag in the presence of O_2 combines with NaCN to form soluble complex, sodium dicyanoargentate [Na (Ag $(CN)_2$)].

21. (*c*) $Fe_{26} \longrightarrow 3d^6 4s^2$; 

, can exists mostly in Fe^{2+} or Fe^{3+} oxidation states in its compounds.

22. (*c*) The electronic configuration of the given metal ions is as follows:

V (Z = 23) : [Ar] $3d^3\,4s^2$

V^{2+} : [Ar] $3d^3$ 

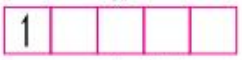
Cr (Z = 24) : [Ar] $3d^5\,4s^1$

Cr^{3+} : [Ar] $3d^3$ 

Zn (Z = 30) : [Ar] $3d^{10}\,4s^2$

Zn^{2+} : [Ar] $3d^{10}$ 

Ti (Z = 22) : [Ar] $3d^2\,4s^2$

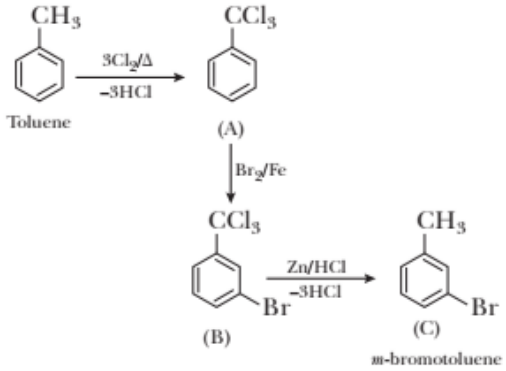
Ti^{3+} : [Ar] $3d^1$ 

Thus, only Zn^{2+} with no unpaired electron will be colourless.

23. (*b*) The correct explanation is; Due to high electronegativity it can easily accept electrons. Hence, strongest oxidising agent.

24. (*b*) F cannot show positive oxidation state of +5 and +7. Hence, FO_3^- and FO_4^- are unknown. Due to small size and absence of vacant *d*-orbitals.

25. (*b*)

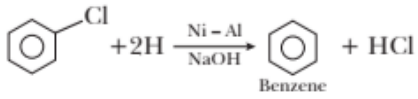


26. (*b*) In acidic solution,

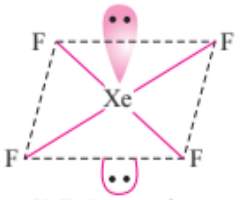
$$MnO_4^- + 8H^+ + 5e^- \longrightarrow Mn^{2+} + 4H_2O$$

27. (*c*) Silica(SiO_2) and borax($Na_2B_4O_7.10H_2O$) are examples of acidic flux.

29. (*b*)



30. (*c*)



XeF_4: Square planar

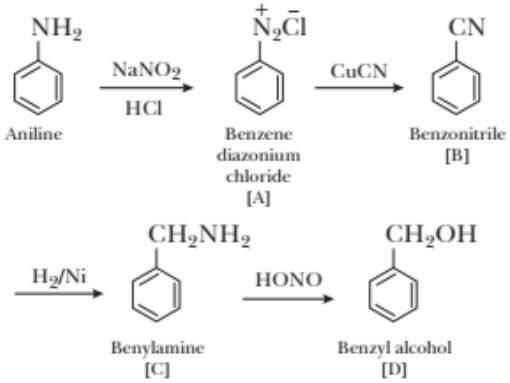
31. (*d*) $Fe_2(SO_4)_3$ breaks into individual ions and it will give Fe^{3+} ions in the solution.

32. (*d*) In aqueous solution of amino acids, the carboxyl group can lose a proton and amino group can accept a proton, giving rise to a dipolar ion known as zwitter ion. In zwitter ionic form, amino acids show amphoteric behaviour as they react both with acids and bases.

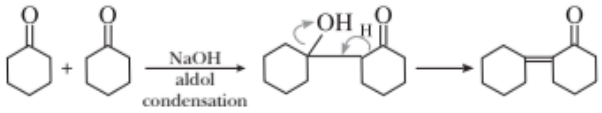
33. (*b*) Ethene is formed as the major product. According to Hoffmann's Elimination rule, the less substituted alkene is formed in preference to more subsituted alkene.

34. (*b*) The solubility of lower alcohols in water is due to their ability to form hydrogen bonds with water molecules. The solubility of alcohols in water decreases with increase in molecular mass because with increase in molecular mass the non-polar alkyl group becomes predominant and masks the effect of polar —OH group. In addition, among the isomeric alcohols the solubility increases with branching of chain. It is because the surface area of non-polar part in the molecule decreases, thus enhancing the solubility.

35. (*d*)

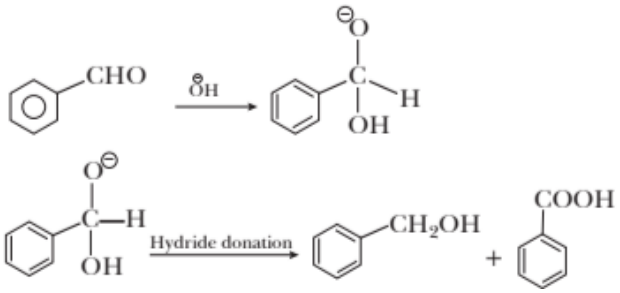


36. (*a*)



37. (*b*) Butan-1-ol is a primary alcohol because in this —OH group is attached to primary carbon atom.

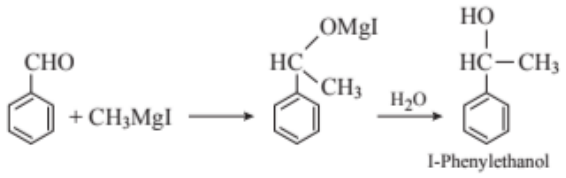
38. (*a*)



41. (*a*) In Buna S, a mixture of more than one monomeric species is allowed to polymerise. The monomeric species are buta–1, 3–diene and styrene.

42. (*a*) $CH_3N{\equiv}C$ (Methylisocyanide) $\xrightarrow{LiAlH_4/ether}$ CH_3NHCH_3 (2° amine)

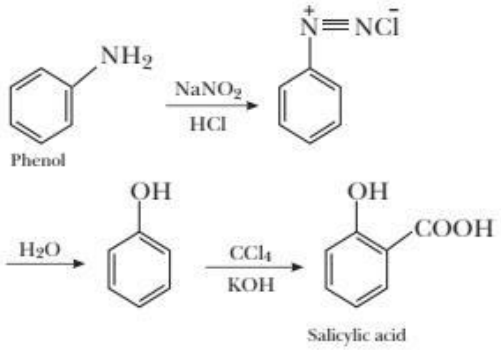
43. (*d*) 1-Phenylethanol is formed when benzaldehyde reacts with methyl iodide and magnesium followed by hydrolysis. The reaction is as follow:



44. (*b*) Cetyl trimethyl ammonium bromide is an example of cationic detergent while sodium lauryl sulphate and Sodium dodecyl benzene sulphonate are anionic detergents and glyceryl oleate is a fat.

45. (*c*) Histidine as, it has two amino groups and one —COOH group.

46. (*b*)



47. (*c*) Ethanal when warmed with a few drops of Fehling's solution gives a reddish brown precipitate of cuprous oxide.

$$CH_3CHO + 2Cu^{+} + 5OH^{-} \longrightarrow CH_3CO^{-} + Cu_2O\downarrow + 3H_2O$$

49. (*b*) The carbonyl compounds containing α-hydrogen atom exits as equilibrium mixture of keto and enol forms.

50. (*c*)