

1. Classify the following compounds on the basis of their medicinal use: (1)
  - (a) Mixture of chloroxylenol and terpineol
  - (b) Chloramphenicol
2. Explain roasting with the help of example. (1)
3. Describe the stoichiometric defect which does not affect the density of a crystal lattice. (1)
4. (a) The  $E^\circ$  value of  $Ce^{4+}/Ce^{3+}$  is 1.74 volts. What will be the nature of  $Ce^{4+}$  ions in aqueous solution, an oxidizing agent or a reducing agent? Give reason. (1)
- (b) What is the composition of the alloy called 'Misch metal'? (1)
- (c) Give any one consequence of Lanthanoid Contraction. (1)
5. (a) Which is coloured  $[Ti(H_2O)_6]^{3+}$  or  $[Sc(H_2O)_6]^{3+}$ ? (2)
- (b) Write the effect of increasing pH on a solution of potassium dichromate. (OR)
- (a) Give the ionic equation to show that potassium permanganate can oxidise iodide salts in alkaline medium.
- (b)  $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$ . Name the important phenomenon taking place in the above reaction. Explain with the help of oxidation state.
6. (a) What is meant by Saytzeff's rule? (2)
- (b) What happens when 2-bromobutane is heated with alcoholic KOH? Give chemical reaction.
7. What is meant by nucleophilic substitution reaction? Explain the mechanism of the reaction when tert-butyl chloride undergoes nucleophilic substitution reaction with  $OH^-$ . (2)
8. Justify the formation of a low spin complex and a high spin complex taking the examples of  $[Fe(CN)_6]^{3-}$  and  $[FeF_6]^{3-}$  on the basis of 'crystal field splitting energy',  $\Delta_0$ . (2)
9. Aluminium crystallizes in a fcc packed structure. Its metallic radius is 125 pm. (2)
  - (a) What is the length of the side of the unit cell?
  - (b) How many unit cells are there in  $1.00 \text{ cm}^3$  of aluminium?
10. Heptane and octane form ideal solution. At 373 K, the vapour pressures of the two liquid components are 105.2 kPa and 46.8 kPa, respectively. What will be the vapour pressure, in bar, of a mixture of 25.0 g of heptane and 35.0 of octane? (2)
11. (a) Write IUPAC name of isobutyraldehyde. (2)
- (b) Give an example for the preparation of a carboxylic acid using a Grignard Reagent.
- (c) Explain the mechanism of 'Esterification' of carboxylic acids.
12. (a) Why are aldehydes more reactive than ketones towards nucleophilic substitution reaction?(3)
- (b) How will you convert Benzaldehyde to  $\alpha$  - Hydroxyphenylacetic acid?
- (c) How can you get Benzonitrile from Benzenamine?
13. What happens when (3)
  - (i) Aqueous potassium iodide solution is reacted with  $O_3$
  - (ii) Sulphur reacts with conc.  $H_2SO_4$
  - (iii) Sulphur dioxide is passed through lime water.
14. (a) Give D and L configuration of glyceraldehydes. (3)
- (b) Convert acetaldehyde to lactic acid.
- (c) Give the industrial preparation of 'phenol' from cumene.
15. (a) What is meant by peptisation? Explain (3)
- (b) What is the effect of temperature on chemisorption? Explain
- (c) What are 'associated colloids'? Explain with an example.
16. (a) The conductivity of 0.20 M solution of KCl at 298 K is  $0.0248 \text{ S cm}^{-1}$ . Calculate its molar conductivity. (3)
- (b) What is a 'secondary cell'? Write the cell reactions which occur in lead storage battery (i) When battery is in use (ii) when the battery is on charging.
17. (a) Calculate the potential of the following cell reaction at 298 K : (3)
 
$$Sn^{4+} (1.50M) + Zn(s) \rightarrow Sn^{2+} (0.50 M) + Zn^{2+} (2.0M)$$
 The standard potential  $E^\circ$  of the cell is 0.89 volts. Whether, the potential of the cell will increase or decrease, if the concentration of  $Sn^{4+}$  is increased in the cell?

18. (a) Rate of reaction  $A + B \rightarrow P$  is given below as a function of different initial concentrations of A and B. (3)

[A] Mole litre <sup>-1</sup>	[B] Mole litre <sup>-1</sup>	Rate Mole litre <sup>-1</sup> second <sup>-1</sup>
0.01	0.01	0.005
0.02	0.01	0.010
0.01	0.02	0.005

Determine order of reaction w.r.t (A) and (B). What is the half life of (A) in the reaction?

(b) Why is it that the rate of reaction becomes almost double for every 10 degree rise in temperature? Explain.

19. (a) Explain the use of t-butyl peroxide in 'Free radical addition polymerisation' of ethane. (3)

(b) Write one use of following : (i) PHBV (ii) Buna – N

(c) Give the preparation of Nylon-6

20. (a) Explain cleansing action of soaps. (3)

(b) Define the following giving an example.

(i) Antifertility drugs (ii) Antihistamines.

21. (a) For the decomposition reaction:  $N_2O_4(g) \rightarrow 2NO_2(g)$  (5)

the initial pressure of  $N_2O_4$  falls from 0.46 atm to 0.28 atm in 30 minutes. What is the rate of appearance of  $NO_2$ ?

(b) For Zero order reaction prove that half life is directly proportional to initial concentration.

(c) Write IUPAC name of  $[PtCl_2(C_5H_5N)(NH_3)]$ .

22. (a) (i) What is meant by electrolytic refining? (5)

(ii) Why is sky blue in colour?

(b) Complete the following equations:

(i)  $U + 3ClF_3 \rightarrow$  (ii)  $3SCl_2 + 4NaF \xrightarrow{MeCN, 350K}$

23. (a) What is meant by denaturation of proteins? (3)

(b) How will you classify vitamins? Name the diseases caused due to lack of Vitamin A and Vitamin C.

(c) Give one example of acidic amino acid.

(OR)

(a) Give two differences between RNA and DNA(1)

(b) Write reactions of glucose with (i) Acetic anhydride (ii) Hydroxylamine(1)

(c) What are globular proteins? Give one example.(1)

24. (a) Account for the following: (5)

(i) What is basicity of phosphorus acid and why?

(ii)  $PCl_3$  fumes in moist air.

(iii) In preparation of fluorine by electrolysis of  $KHF_2$ , anode and cathode are kept separated by a diaphragm of Teflon.

(iv) Hydrofluoric acid is used for etching of glass.

(b) Write  $HOBr$ ,  $HOI$  and  $HOCl$  in the decreasing order of their acidic strength.

(OR)

(a) How will you prepare sulphuric acid from sulphur? Write all the chemical reactions involved.

(b) Complete the following reactions:

(i)  $C_{12}H_{22}O_{11} \xrightarrow{Conc. H_2SO_4}$  (ii)  $CaF_2 + H_2SO_4 \rightarrow$

25. (a) Why is osmotic pressure suitable colligative property to determine molecular weight of biomolecules? (5)

(b) Describe the reactions with a suitable example.

(i) ROSENMUND'S REDUCTION (ii) CARBYLAMINE REACTION

(c) 2 grams of  $C_6H_5COOH$  dissolved in 25 grams of benzene shows a depression in freezing point equal to 1.62 K. Molar depression constant for benzene is  $4.9 K kg mol^{-1}$ . What is the percentage association of acid if it forms double molecule (dimer) in solution?

OR

(a) What are maximum boiling azeotropes? Give one example.

(b) Distinguish between the following by suitable chemical test.

(i) Acetaldehyde and Acetic acid (b) Ethanol and Diethyl ether

(c) Calculate the mass of non-volatile solute (molecular mass 40) which should be dissolved in 114 g of octane to reduce its vapour pressure to 80%.