



TIME 3 HOURS

M.M 70

Important instructions:

1. All questions are compulsory.
2. Q No. 1 to 5 is very short answer type questions and carries 1 mark each.
3. Q. No. 6 to 10 are short answer type questions carrying 2 marks each.
4. Q No. 11 to 22 are short answer type questions carrying 3 marks each.
5. Q No. 23 is value based question and carries 4 marks.
6. Q No. 24 to 26 are long answer type questions carrying 5 marks each.

1. How is solubility of gas in a liquid affected by pressure?
2. Write the IUPAC name of $C_2H_5-O-CH_2-CH(CH_3)-CH_3$.
3. Write the structure of: 4-methylpent-3-en-2-one.
4. What type of semi conductor is obtained when silicon is doped with aluminium?
5. Write a non exothermic reaction taking place in the blast furnace during the extraction of iron.
6. Gold (At. Mass = 197 u, atomic radius = 0.144 nm) crystallises in a face centred unit cell. Determine the density of gold.
7. Sucrose decomposes in acid solution into glucose and fructose according to the first order rate law with $t_{1/2} = 4$ hours. Calculate the fraction of sucrose which remains after 12 hours.
OR
The rate constant for a first order reaction is 60 sec^{-1} . How much time will it take to reduce the concentration of the reactant to $1/10^{\text{th}}$ of its initial value?
8. Describe the construction of standard hydrogen electrode and the reactions taking place in it.
9. (a) What is the role of depressant in froth floatation process?
(b) Out of C and CO which is a better reducing agent for FeO.
(i) In the lower part of blast furnace (higher temperature)
(ii) In the upper part of blast furnace (lower temperature)
10. Propose mechanism of the reaction taking place when
(a) (-)-2-bromo-2-methylbutane reacts with sodium hydroxide to form (-)-2-methylbutan-2-ol
(b) Hydration of ethene to yield ethanol.
11. Explain: (a) Grignard reagents should be prepared under anhydrous conditions.
(b) Propanol has higher boiling point than that of hydrocarbon, butane?
12. Give chemical tests to distinguish between compounds in each of the following pairs:
(i) phenol and benzyl alcohol.
(ii) Butan-2-ol and 2-methylpropan-2-ol
13. Explain the electrolytic reduction of anhydrous aluminium oxide.
14. Explain giving reason for each of the following:
(i) Phenol undergo electrophilic substitution reaction faster than benzene.
(ii) Ethers are stored in dark coloured bottles

16. A solution containing 12.5 g of a non electrolyte substance in 175 g of water gave a boiling point elevation of 0.70 K. Calculate the molar mass of the substance. $K_b = 0.52 \text{ K kg mol}^{-1}$
17. Molar conductivities at infinite dilution for NH_4Cl , NaOH and NaCl solutions at 298 K are 129.8, 217.4, and $108.9 \text{ Scm}^2 \text{ mol}^{-1}$ respectively and the molar conductivity of a 10^{-2} M solution of NH_4OH is $9.33 \text{ Scm}^2 \text{ mol}^{-1}$. Suggest how this information may be used to calculate the degree of dissociation of NH_4OH in its above mentioned solution.
18. The rate constant of a reaction at 500 K and 700 K are 0.02 s^{-1} and 0.07 s^{-1} respectively. Calculate the value of activation energy for the reaction.
19. Write short notes on the following: (i) Zone refining (ii) van -Arkel method of refining.
20. Explain the following reactions by giving suitable examples:
(i) Wurtz reaction. (ii) Fittig reaction.
21. What happens when :
(i) n-butyl chloride is treated with alcoholic KCN
(ii) ethyl chloride is treated with aqueous KOH
(iii) bromobenzene is treated with magnesium in the presence of dry ether
22. Give the chemical equations for the following reactions:
(i) oxidation of propan-1-ol with alkaline KMnO_4 solution.
(ii) Bromine in CS_2 with phenol
(iii) Treating phenol with chloroform in the presence of aqueous NaOH .
23. Mohan drank wine from a local alcohol shop. HE later complained of blurred vision and physical discomfort. He lost his eye sights in couple of days and finally died in hospital.
(i) What would be the reason for his death?
(ii) What is the main component of wine? Give its IUPAC name.
What values can be derived from such incidents?

24. Complete the following reaction , give the names of the major products :

- (i) $\text{CH}_3\text{COOH} + \text{SOCl}_2 \xrightarrow{\text{heat}}$
 (ii) $\text{CH}_3\text{CH}_2\text{Cl} + \text{NaI} \xrightarrow{\text{acetone}}$
 (iii) $(\text{CH}_3)_3\text{CBr} + \text{KOH} \xrightarrow{\text{ethanol, heat}}$
 (iv) $\text{C}_6\text{H}_6 + \text{CH}_3\text{COCl} \xrightarrow{\text{anhydrous AlCl}_3}$
 (v) $\text{CH}_3\text{CH}_2\text{Br} + \text{KCN} \xrightarrow{\text{ethanol}}$

25. Account for the following:

- (i) Haloarenes are much less reactive than haloalkanes towards nucleophilic substitution reactions
 (ii) Although chlorine is an electron withdrawing group, yet it is ortho , para directing in electrophilic aromatic substitution reactions. Why
 (iii) Propanol has highly soluble in water.
 (iv) o- nitro phenol has higher boiling point than p- nitrophenol.
 (v) Alpha chloro butanoic acid is more acidic than butanoic acid

26. An organic compound (A) contains 69.77% carbon, 11.63% hydrogen and rest oxygen. The molecular mass of the compound is 86. It does not reduce Tollen's reagent but forms an addition compound with sodium hydrogen sulphite (B) and gives iodoform test(C). On vigorous oxidation, it gives ethanoic and propanoic acid. Write the possible structure of the compound A, B and C. Also write all the chemical equations involved.

15. (a) State and explain Faraday's second law of electrolysis.
- (b) Write the Nernst equation and calculate e.m.f of cell and maximum work obtainable from the following cell: $\text{Fe (s)} / \text{Fe}^{2+} (0.001 \text{ M}) // \text{H}^+ (1\text{M}) / \text{H}_2(\text{g})(1\text{bar}) / \text{Pt(s)}$ $E^\circ_{\text{Fe}^{2+}/\text{Fe}} = -0.44 \text{ V}$