XII CHEMISTRY TEST ON SOLID STATE, SOLUTION, ELECTROCHEMISTRY, CHEMICAL KINETICS & HALO ALKANE AND ALCOHOL

M.M.: 50 **Time: 2 HOURS**

1. 0.1 molal solutions of glucose and potassium chloride respectively, which one will have a higher boiling point? **1**

2. Define specific conductivity. **1**

3. Write the structure of the following compound: 2 -(2-chlorophenyl)-1-iodoethane. **1**

4. Which would undergo S_N1 reaction faster in the following pair: **1**

$$CH_3—CH_2—CH_2—Br \text{ and } CH_3—\underset{\displaystyle Br}{\underset{|}{CH}}—CH_3$$

5. Which would undergo S_N2 reaction faster in the following pair and why? **1**

$$CH_3—CH_2—Br \text{ and } CH_3—CH_2—I$$

6. What is meant by 'reverse osmosis'? **1**

7. Calculate the mass of a non-volatile solute (molar mass 40 g mol^{-1}) which should be dissolved in 114 g octane to reduce its vapour pressure to 80%. **2**

8. State Raoult's Law for a solution containing volatile components. How does Raoult's law become a special case of Henry's Law? **2**

9. An electrolyte AB is 50% ionised in aqueous solution. Calculate the freezing point of 1 molal aqueous solution. **2**

10. Arrange the following metals in the order in which they displace each other from the solution of their salts. **2**

Al, Cu, Fe, Mg and Zn.

11. The resistance of 0.01 M KCl solution is 200 ohms. Calculate the specific conductivity and molar conductivity if cell constant is equal to unity. **2**

12. State Kohlrausch law of independent migration of ions. Write an expression for the molar conductivity of acetic acid at infinite dilution according to Kohlrausch law. **2**

13. The same quantity of electrical charge deposited 0.583 g of Ag when passed through $AgNO_3$, $AuCl_3$ solution. Calculate the weight of gold formed. (At. weight of Au = 197 g mol^{-1}). **2**

14. The decomposition of NH_3 on platinum surface is a zero order reaction. What are the rates of production of N_2 and H_2 if $k = 2.5 \times 10^{-4}$ mol^{-1} L s^{-1}? **2**

15. A first order reaction takes 100 minutes for completion of 60% of the reaction. Find the time when 90% of the reaction will be completed. **2**

16. Rate constant 'k' of a reaction varies with 'T' according to the equation: **2**

$$\log k = \log A - \frac{Ea}{2.303\,R}\left(\frac{1}{T}\right)$$

where E_a is the activation energy. When a graph is plotted for log k vs $\frac{1}{T}$, a straight line with a slope –4250 K is obtained. Calculate 'E_a' for the reaction. (R = 8.314 J K^{-1} mol^{-1})

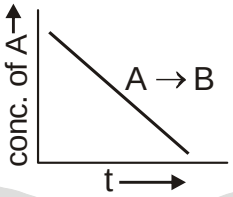
17. Write the mechanism of the following reaction: **2**

$$n\text{-}BuBr + KCN \xrightarrow{EtOH\text{-}H_2O} n - BuCN$$

18. p-Dichlorobenzene has higher m.pt. than those of o- and m-isomers. Discuss. **2**

19. Write the mechanism of for motion of Alcohol from alkene. **2**

20. For a general reaction $A \rightarrow B$, plot of concentration of A vs time is given in figure. Answer the following question on the basis of this graph. **3**



(i) What is the order of the reaction? (ii) What is the slope of the curve?

(iii) What are the units of rate constant?

21. An organic compound 'A' having molecular formula C_4H_8 on treatment with dil. H_2SO_4 gives 'B'. 'B' on treatment with conc. HCl and anhydrous $ZnCl_2$ gives 'C' and on treatment with sodium ethoxide gives back 'A'. Identify the compounds 'A', 'B' and 'C' and write the equations involved. **3**

22. (i) What type of stoichiometric defect is shown by KCl and why? **4**

(ii) Wht type of semiconductor is formed when silicon is doped with As?

(iii) Which one of the following is an example of molecular solid: CO_2 or SiO_2

(iv) What type of substances would make better magnets, ferromagnetic or ferrimagnetic?

23. a. What type of a battery is lead storage battery? Write the anode and cathode reactions and the overall cell reaction occurring in the operation of a lead storage battery.

b. Calculate the potential for half-cell containing 0.10 M $K_2Cr_2O_7$(aq), 0.20 M Cr^{3+} (aq) and 1.0×10^{-4} M H^+ (aq)

The half-cell reaction is

$$Cr_2O_7^{2-}(aq) + 14\,H^+(aq) + 6e^- \longrightarrow 2Cr^{3+}(aq) + 7H_2O(l)$$

and the standard electrode potential is given as E° = 1.33 V. **4**

24. How can the following conversions be carried out? **4**

(i) Ethanol to but-1-yne

(ii) Benzyl alcohol to 2-phenylethanoic acid

(iii) 2-Chlorobutane to 3, 4-dimethylhexane

(iv) Aniline to phenyl isocyanide