SECOND PUC PREPARATORY EXAMINATION, MARCH - 2022

SUBJECT : CHEMSITRY (34)

Time : 3 Hrs. 15 Mins. **Max Marks : 70**

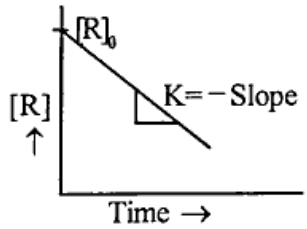
Instructions :

1. **The question paper has four parts. All parts are compulsory.**
2. **a. Part-A carries 10 marks. Each question carries 1 mark.**
   b. Part-B carries 10 marks. Each question carries 2 marks.
   c. Part-C carries 15 marks. Each question carries 3 marks.
   d. Part-D carries 35 marks. Each question carries 5 marks.
3. **Write balanced chemical equations and draw labelled diagrams wherever necessary.**
4. **Use log tables and simple calculator if necessary. (Use of Scientific Calculator is not allowed.)**

PART - A

I Answer any TEN of the following. Each question carries 1 mark. 10x1=10

1) What is meant by the term "Co-ordination number" in solids ?
2) Define "Molal elevation constant".
3) At a given temperature, Oxygen gas is more soluble in water than Nitrogen gas. Which one of them has lower value of K_H ?
4) Give an example for Secondary battery.
5) For a given graph. Mention the order of the reaction



6) Name the phenomenon in which colloidal particles are in zig-zag motion.
7) State Hardy-Schulze rule.
8) Give the composition of copper-matte.
9) Among noble gases, which one is most abundant in air.
10) What is Misch metall ?
11) Name the product formed when ethyl bromide reacts with alc AgCN.
12) Among phenol and alcohol, which is more acicdic ?
13) "Benzaldehyde under goes Cannizzaro's reaction". Why ?
14) Write the partial structure of Neoprene.
15) Give an example for food preservative.

PART -B

II Answer any FIVE of the following. Each question carries 2 marks. 5x2=10

16) Write any two differences between Frenkel and Schottky defect.
17) State Henry's law. Write it's mathematical form.
18) Draw the neat labelled diagram of standard hydrogen electrode (SHE). Write it's half cell reaction.
19) λ^0 for NaCl, HCl and NaAc (CH_3COONa) are 126.4,425.9 and 91.0 S cm^2 mol^{-1} respectively. Caluculate λ^0 for HAc [CH_3COOH]
20) Explain Mond's process for refining of nickle.
21) a) Complete the reaction. $XeF_6 + H_2O \longrightarrow$ _____ + 2HF **[1M]**

    b) Name the radio active noble gas obtained as a decay product of $^{226}_{88}Ra$ **[1M]**

(P.T.O.)

22) Explain Wurtz-Fittig reaction with an example.

23) a) Name the major product formed when benzene diazonium chloride reacts with KI. **[1M]**

b) Give reason "Methyl amine is stronger base than aniline". **[1M]**

24) Give an example for a) Artificial sweetening agent.

b) Antibiotic drug

25) What are anionic detergents ? Give an example.

PART - C

III Answer any FIVE of the following. Each question carries 3 marks. **5x3=15**

26) Write the chemical equations involved in the leaching of pure alumina from bauxite ore.

27) How is ammonia manufactured by Haber's process ?

28) a) Write any two anomalous behaviour of Oxygen. **[2M]**

b) Write the structure of H_2SO_3. **[1M]**

29) Complete the following reactions :

i) $Cl_2 + 3F_2$ (Excess) $\xrightarrow{573K}$

ii) $NH_3 + 3Cl_2$ (Excess) $\longrightarrow$ _____ + 3HCl

iii) $2NaOH + Cl_2 \longrightarrow NaCl +$ _____ $+ H_2O$

30) Write the balanced equation in the manufacture of Potassium dichromate from chromite ore.

31) a) Calculate magnetic moment of Fe^{2+} ion. **[2M]**

b) Name the metal which posses maximum number of Oxidation state. **[1M]**

32) What is Lanthanoid contraction? Mention any two consequences of it.

33) Using valence bond theory (VBT), Explain hybridisation, geometry and magnetic property of $[Co(NH_3)_6]^{+3}$ complex ion ['Z' for Co = 27]

34) Write any three postulates of Werner's theory of Coordination compounds.

35) a) Explain ionisation isomerism with example. **[2M]**

b) Write the IUPAC name of $[Co(NH_3)_4H_2OCl]Cl_2$ **[1M]**

PART - D

IV Answer any THREE of the following. Each question carries 5 marks. **3x5=15**

36) a) Calculate the packing efficiency in Simple cubic lattice. **[3M]**

b) Silver forms ccp lattice and X-ray studies of it's crystals show that the edge length of it's unit cell is 408.6 pm. Calculate the density of silver. (atomic mass = 107.9u) **[2M]**

37) a) Vapour pressure of benzene is 200mm of Hg. When 2g of a non-volatile solute dissovled in 78 gram of benzene. Benzene has vapour pressure of 195 mm of Hg. Calculate the molar mass of the solute [Molar mass of benzene is 78 g mol^{-1}] **[3M]**

b) (i) What type of deviation from Raoult's law is exhibited by a solution of phenol and aniline. **[1M]**

(ii) What are isotonic solutions ? **[1M]**

38) a) Calculate emf of the cell for the reaction

$Mg_{(S)} + Cu^{2+}$ (0.0001 M) $\longrightarrow Mg^{2+}$ (0.001M) $+ Cu_{(s)}$

Given that $E^{\circ}_{Mg^{2+}/Mg} = -2.37$ V, $E^{\circ}_{Cu^{2+}/Cu} = +0.34$ V. **[3M]**

b) What is corrosion ? Name one method to prevent it. **[2M]**

39) a) Derive an integrated rate equation for the rate constant of a first order reaction. **[3M]**

b) The rate constant of first order reaction is $1.15\times10^{-3}s^{-1}$. Calculate it's half-life period. **[2M]**

(P.T.O.)

40) a) Draw the graph showing effect of catalyst on the activation energy of a chemical reaction. **[2M]**

b) The rate of a reaction quadruples when the temperature changes from 293K to 313 K. Calculate the energy of activation of the reaction. [R=8.314 $Jmol^{-1}K^{-1}$] **[2M]**

c) Give an example for pseudo first order reaction. **[1M]**

41) a) Give any three differences between physisorption and chemisorption. **[3M]**

b) What is shape selective catalysis ? Name the Zeolite catalyst used to convert alcohols to gasoline in petroleum industry. **[2M]**

V Answer any FOUR of the following. Each question carries 5 marks. 4x5=20

42) a) Explain S_N1 mechanism using tert-butyl bromide as an example. Mention it's order. **[3M]**

b) "Aryl halides are less reactive towards nucleophilic substitution reactions". Give any two reasons. **[2M]**

43) a) Write the three steps involved in the mechanism of acid catalysed dehydration of ethanol to ethene. **[3M]**

b) Explain Kolbe's reaction with an example. **[2M]**

44) a) How is phenol manufactured from cumene process. **[3M]**

b) How does anisole react with methyl chloride. Write two equation.

45) a) Complete the following :

i) $C_6H_5COCl + H_2 \xrightarrow{Pd/BaSO_4}$

ii) $CH_3CHO + NH_2OH \longrightarrow$

iii) $>C = O \xrightarrow[\text{conc HCl}]{\text{Zn-Hg}}$

b) Write the equation for the reaction between acetaldehyde and dil NaOH solution. Name the reaction. **[2M]**

46) a) How is acetic and prepared from CH_3MgI **[2M]**

b) Explain Hell Volhard Zelinsky reaction with an example. **[2M]**

c) Name the product formed when benzoic acid is heated with ammonia. **[1M]**

47) a) Explain Hoffmann's bromamide reaction with an example. **[2M]**

b) What is the action of bromine water on benzenamine (aniline) at room temperature. **[2M]**

c) Write the IUPAC name of $(CH_3)_2NC_2H_5$. **[1M]**

48) a) Write Haworth structure of Sucrose. **[2M]**

b) Write reactions to show that

i) Glucose contains six carbon atoms in straight chain.

ii) Glucose contains five –OH groups. **[2M]**

c) Mention one water soluble vitamin. **[1M]**

49) a) Explain denaturation of proteins, with example.

b) Write the zwitter ion structure of Glycine.

c) Name the harmone which regulates blood sugar level in the body.

d) Mention the base present only in DNA.

50) a) Name the monomers present in the following

i) Natural Rubber.

ii) Polystyrene.

b) What are biodegradable polymers? Give an example.

c) What is Vulcanization?

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