# SURANA IND. PU COLLEGE
## MODEL QUESTION PAPER - III
### II PU CHEMISTRY (34)

**Duration: 3hours 15min**                                                                 **Max. Marks: 70**

**Instructions:**

   a)   The question paper has four parts A, B, C and D. All the parts are compulsory.
   b)   Write balanced chemical equations and draw labelled diagrams wherever asked.
   c)   Use log tables and simple calculator if necessary [Use of scientific calculator is not allowed]

## PART – A

**I. Answer ALL of the following: Each question carries ONE mark:**                   **[10 X 1 = 10]**

1. Name any one concentration term which is independent of temperature.
2. 10 mL of the liquid 'A' is mixed with 10 mL of liquid 'B', the volume of the resultant solution is19.9mL. what type of the deviation expected from Raoult's law?
3. Why does the conductivity of a solution decrease with dilution?
4. A chemical reaction has the rate expression, Rate = K $[A]^2$ [B].What is its overall order?
5. Out of physisorption and chemisorptions which one has lower enthalpy of adsorption?
6. Which type of ore is concentrated by froth flotation?
7. Name the main commercial source of helium.
8. In aryl halides, what is the hybridisation of carbon atom to which halogen is attached?

9.  $\xrightarrow{H_2, Pd-BaSO_4}$ X. What is X? (An organic compound)
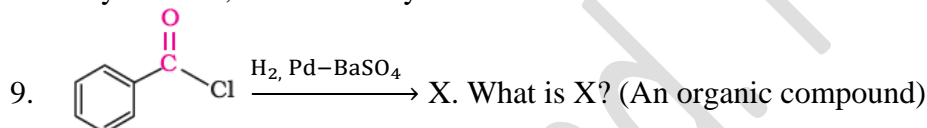
10. Give an example for fat soluble vitamin.

## PART – B

**II. Answer any FIVE of the following. Each question carries TWO marks:**          **[5 X 2 = 10]**

11. Which type of extrinsic semiconductor is formed when silicon is dopped with phosphorus? Mention the major charge carrier in it.
12. Draw a neat labeled diagram of standard hydrogen electrode (SHE). Write its half cell reaction.
13. Write Arrhenius equation and explain the terms.
14. Give reasons: (i) actinoids show variable oxidation states
                 (ii) Zr and Hf have almost identical radii
15. How does phenol react with conc. nitric acid? Give equation.
16. A carboxylic acid is treated with alcohol in presence of conc. $H_2SO_4$. Name the reaction. Give its general equation.
17. What are tranquilizers? Give an example.
18. What is the role of the following chemicals in food?
    (a) Sodium benzoate      (b) Saccharin.

## PART – C

**III. Answer any FIVE of the following. Each question carries THREE marks:** [5 X 3 = 15]

19. Draw a labeled diagram for the extraction of aluminium from purified alumina by Hall-Heroult process. Write the overall reaction taking place in the cell. What is the role of $Na_3AlF_6$ in the above process?

20. For the manufacture of ammonia by Haber's process,
    (i) Draw the flow chart
    (ii) Write the chemical equation for the reaction involved and
    (iii) Name the catalyst used in the reaction.

21. (a) What happens when potassium chlorate is heated in the presence of $MnO_2$? Write the reaction.
    (b) Write the structure of hypo phosphorous acid. [2+1]

22. Complete the following equations:
    (i) $2F_2 + 2H_2O \longrightarrow$
    (ii) $H_2S + Cl_2 \longrightarrow$
    (iii) $8NH_3 \text{ (excess)} + 3Cl_2 \longrightarrow$

23. Write the balanced equation in the manufacture of $K_2Cr_2O_7$ from chromite ore.

24. (a) What are interstitial compounds? Write any one of their characteristics.
    (b) Out of the following elements, identify the element which does not exhibit variable oxidation state: Cr, Co & Zn. [2+1]

25. Using Valence bond theory account for the geometry and magnetic property of complex ion $[Ni(CN)_4]^{2-}$ (Given: Atomic Number of Ni = 28)

26. (a) What is coordination isomerism? Give an example.
    (b) Write the IUPAC name of the complex: $[Ag(NH_3)_2] [Ag(CN)_2]$ [2+1]

## PART – D

**IV. Answer any THREE of the following. Each question carries FIVE marks:** [3 X 5 = 15]

27. (a) Calculate the packing efficiency in a simple cubic lattice.
    (b) Give two differences between Schottky and Frenkel defects in ionic solids. [3+2]

28. (a) 1.0g of a non electrolyte solute dissolved in 50g of benzene lowered the freezing point of benzene by 0.4K. Find the molar mass of the solute. (Freezing point depression constant of benzene is 5.12 K kg mol$^{-1}$).
    (b) Write any two differences between ideal and non ideal solution. [3+2]

29. (a) Calculate EMF of the cell represented below.
    Zn / Zn$^{+2}$ (0.1M) || Cu$^{+2}$ (1M) | Cu at 25°C.
    Given: $E^0_{Cu}$= +0.34V and $E^0_{Zn}$ = 0.76 V
    (b) How solubility of a gas in liquid varies with i) pressure and ii) Temperature? [3+2]

30. (a) Derive an integrated rate equation for the rate constant of first order reaction.
    (b) Draw a graph of potential energy versus reaction coordinate to show the effect of catalyst on activation energy. [3+2]

31. (a) What is shape selective catalysis? Give an example of such type of catalyst.
    (b) What are emulsions? Give an example of oil dispersed in water (o/w) type emulsion.
    (c) Mention any one application of adsorption. [2+2+1]

**V. Answer any FOUR of the following. Each question carries FIVE marks:** [4 X 5 = 20]

32. (a) How do you convert a aryl halide to diphenyl? Write the equation and name the reaction.
    (b) Write $SN^2$ mechanism for the conversion of methyl chloride to methyl alcohol. [3+2]

33. (a) Explain the mechanism of acid catalysed dehydration of ethanol into ethene.
    (b) How is phenol manufactured from cumene? [3+2]

34. (a) Write the chemical equation for the following conversions.

    (i) Ethanoic acid to ethanoic anhydride

    (ii) Ethanoic acid to acetamide

    (iii) Benzoic acid to m-nitrobenzoic acid

    (b) Explain Clemmensen's reduction with an example. [3+2]

35. (a) Give equations to synthesize methanamine by Gabriel phthalimide synthesis .
    (b) Explain carbylamines reaction with an example.
    (c) What is Hinsberg's reagent? [2+2+1]

36. (a) What are reducing sugars? Is sucrose a reducing sugar? Give reason.
    (b) Write the Zwitter ion form of an $\alpha$-amino acid
    (c) Name the naturally occurring -amino acid that is not optically active [3+1+1]

37. (a) What is copolymerization? Give an example with equation.
    (b) Write the partial structure of
        (i) PVC        (ii) Neoprene
    (c) What is vulcanization of rubber? [2+2+1]

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