



JAIN COLLEGE, Bangalore  
Mock Paper - 1 January - 2017  
II PUC – Chemistry (34)

Time: 3 Hours 15 Minutes

Max. Marks: 70

- INSTRUCTIONS :** 1. The question paper has four parts: A, B, C and D. All parts are compulsory.  
2. Write balanced chemical equations and draw labeled diagrams wherever required.  
3. Use log tables and the simple calculator if necessary. (Use of scientific calculators is not allowed)

**PART-A**

- I. **Answer ALL of the following. (Each question carries 1 mark)** **10 × 1 = 10**
- What happens when pressure greater than osmotic pressure is applied on the solution separated by a semipermeable membrane from the solvent?
  - What type of deviation from ideal behavior will be shown by the solution of cyclohexane and ethanol?
  - If the reduction potentials of A & B are -0.76 and +0.34, which one between the two will liberate H<sub>2</sub> from dil. H<sub>2</sub>SO<sub>4</sub>
  - Give an example for fractional order reaction.
  - For the coagulation of positive sol, arrange the following ions in the increasing order of flocculating power. Cl<sup>-</sup>, PO<sub>4</sub><sup>-3</sup>, SO<sub>4</sub><sup>-2</sup>, [Fe(CN)<sub>6</sub>]<sup>-4</sup>.
  - Name the depressant used to separate two sulphide ores containing ZnS and PbS.
  - Noble gases have very low boiling point. Why?
  - Give the IUPAC name of tert-butyl bromide.
  - Aldehydes are more reactive than ketones. Give reason.
  - Write the general formula for zwitter ion form of an amino acid.

**PART-B**

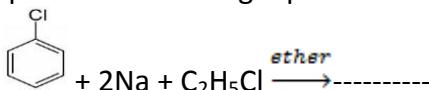
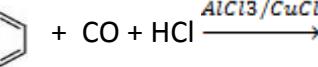
- II. **Answer any FIVE of the following. (Each question carries 2 marks)** **5 × 2 = 10**
- Copper crystallises into a FCC lattice with edge length 3.61 × 10<sup>-8</sup> cm. Calculate the density. (Atomic mass of copper = 63.5 g mol<sup>-1</sup>)
  - State Kohlraush's law of independent migration of ions.
  - Explain the effect of temperature on the rate of reaction by energy distribution curve.
  - Give reason: Transition elements exhibit variable oxidation state.
  - What happens when phenol is treated with Zn dust? Explain with equation.
  - Explain esterification reaction with an example.
  - Give one use of the following; (a) chloramphenicol (b) norethindrone.
  - Explain the terms; (a) enzyme inhibitors (b) competitive inhibitors.

**PART-C**

- III. **Answer any FIVE of the following. (Each question carries 3 marks)** **5 × 3 = 15**
- Explain with equation Van Arkel method for refining of Zirconium.
  - (a) How is phosphine prepared in the lab?  
(b) Which gas is liberated when zinc reacts with dilute HNO<sub>3</sub>?
  - Write any three anomalous properties of oxygen?
  - (a) Which is a stronger acid in aqueous solution. HF or HCl. Why?  
(b) Arrange the oxoacids of halogens in the increasing order of acidic strength.  
HClO<sub>4</sub>, HClO<sub>2</sub>, HClO, HClO<sub>3</sub>
  - (a) Name an important alloy which contains some of the transition metals and mention its use.  
(b) Write the common oxidation state of actinoids.
  - (a) Calculate the magnetic moment of Cr<sup>3+</sup>.  
(b) Which is more stable Fe<sup>3+</sup> or Fe<sup>2+</sup>?

25. Using valence bond theory account for the geometry, hybridisation and magnetic property of  $[\text{Co}(\text{NH}_3)_6]^{3+}$
26. (a) Draw the facial and meridional isomers of  $[\text{Co}(\text{NH}_3)(\text{NO}_2)_3]$   
 (b) Identify the high spin complex in the following.;  $[\text{CoF}_6]^{3-}$ ,  $\text{Ni}(\text{CN})_6^{2-}$

### PART-D

- IV. Answer any THREE of the following. (Each question carries 5 marks)**  **$3 \times 5 = 15$**
27. (a) Calculate the packing efficiency of a body centred cubic crystal. (4+1)  
 (b) Give an example of a solid with anti-ferromagnetism.
28. (a) Vapour pressure of water at 293K is 17.51mm. Lowering of vapour pressure of a sugar solution is 0.0614 mm. Calculate (i) Relative lowering of vapour pressure.(ii) Vapour pressure of solution.  
 (iii) Mole fraction of water (3+2)  
 (b) State Henry's law and mention any one of its application.
29. (a) Find the value of  $\Delta G^\circ$  at  $25^\circ\text{C}$  for the following electrochemical cell. (3+2)  
 $\text{Cu}/\text{Cu}^{2+}_{1\text{M}} // \text{Ag}^+_{1\text{M}}/\text{Ag}; E^\circ \text{Cu} = +0.34 \text{ V}, E^\circ \text{Ag} = +0.8 \text{ V}$   
 (b) Write the equations for the reactions at anode and cathode during the electrolysis of aqueous NaCl.
30. (a) Explain Arrhenius theory of activated complex by using potential energy diagram. (2+2+1)  
 (b) Show that for a first order reaction, half-life period is independent of initial concentration of the reactants  
 (c) The decomposition reaction of ammonia gas on platinum surface has a rate constant  $2.5 \times 10^{-4}$  mol/L/S. What is the order of the reaction?
31. (a) What is Homogeneous catalysis? Give one example. (2+2+1)  
 (b) Write the mathematical expression for Freundlich adsorption isotherms and explain the terms involved.  
 (c) What happens to entropy when a gas is adsorbed on a solid?
- V. Answer any FOUR of the following. (Each question carries 5 marks)**  **$4 \times 5 = 20$**
32. (a) Complete the following equations: (3+2)
- (i) 
- (ii) 
- (b) Haloarenes are less reactive towards nucleophilic substitution than haloalkanes. Give reason.
33. (a) Explain the mechanism involved in dehydration of ethanol to ethene.  
 (b) What is Lucas reagent? What happens when a tertiary alcohol is added to Lucas reagent? (3+2)
34. (a) Complete the following equations:  
 (i)  $\text{CH}_3\text{COOH} + \text{Cl}_2 \xrightarrow{\text{red P/heat}}$   
 (ii)  $\text{CH}_3\text{CHO} + \text{R-OH} \xrightarrow{\text{dry HCl}}$   
 (iii) 
- (b) Arrange the following acids in increasing order of their acidity and justify your answer  
 $\text{CH}_3\text{COOH}, \text{CH}_2\text{FCOOH}, \text{NO}_2\text{CH}_2\text{COOH}$  (3+2)
35. (a) How is methanamine prepared by Gabriel phthalimide synthesis?  
 (b) Give the reaction for the conversion of aniline to p-bromoaniline. (3+2)
36. (a) Write the Haworth structure of  $\beta$ -lactose.  
 (b) Give one example for each of the following;  
 (i) a non-reducing disaccharide, (ii) optically inactive amino acid.  
 (c) Mention the number of peptide bonds in a pentapeptide. (2+2+1)
37. (a) Explain the preparation of high density polythene.  
 (b) What are thermosetting polymers? Give an example  
 (c) Name the polymer used as a substitute for wool for making blankets and sweaters. (2+2+1)



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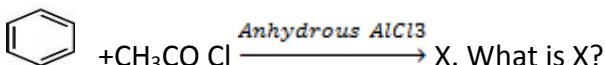
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**PART A**

I. Answer all of the following (each question carries 1 mark)  $10 \times 1 = 10$

1. What happens when a plant cell is kept in a hypertonic solution?
2. State Raoult's law of solution containing a non-volatile solute.
3. What is the quantity of electricity required to liberate one equivalent mass of a substance?
4. The decomposition of ethane to methyl radical is first order reaction with the rate constant of  $5.36 \times 10^{-4} \text{ s}^{-1}$  at  $700^\circ \text{C}$ . Calculate the half-life of the reaction in seconds.
5. Activated charcoal is used in gas mask. Give reason.
6. Which process is employed in refining metals with low melting point?
7. Identify the product A.  $\text{Xe} + 3\text{F}_2 \rightarrow \text{A}$
8. Racemic mixture is optically inactive. Why?
- 9.



10. Name the storage polysaccharide in plants.

**PART –B**

II. Answer any five of the following (each question carries 2 mark)  $5 \times 2 = 10$

11. What is meant by co-ordination number in solids? What is the co-ordination number in a BCC lattice?
12. (a) How is molar conductivity and conductivity related?  
(b) Between 0.1 M KCl and 0.01 M KCl, which has higher molar conductivity?
13. What is a zero order reaction? Give an example.
14. Why do d-block elements form coloured compounds?
15. How is anisole converted to 2-methoxytoluene and 4-methoxytoluene?
16. How do you convert toluene to benzaldehyde? Explain the reaction and name the reaction.
17. What is saponification? Explain with an example.
18. What is (a) drug target (b) receptor.

**PART –C**

III. Answer any five of the following. (Each question carries 3 marks)  $5 \times 3 = 15$

19. (a) Name the reducing agent used in the extraction of zinc from zinc oxide. Give equation.  
(b) What is the principle involved in zone refining of metals.
20. Write the equations involved in the manufacture of ammonia by Haber's process and mention optimum conditions for the maximum yield of ammonia.
21. (a) Give reasons: (i) H<sub>2</sub>S is a gas while H<sub>2</sub>O is a liquid at room temperature.  
(ii) Ozone is a powerful oxidising agent.  
(b) Draw the structure of sulphurous acid.
22. (a) Give reason: When HCl reacts with finely powdered iron, it forms ferrous chloride and not ferric chloride.  
(b) Write the equation for the reaction of MnO<sub>2</sub> with concentrated HCl.
23. (a) What is lanthanoid contraction?  
(b) Explain the formation of interstitial compounds.
24. (a) Write ionic equations for the reaction of dichromate ions with (i) hydroxyl ions (ii) Fe<sup>2+</sup> ions in acidic medium.  
(b) Complete the reaction:  $2\text{MnO}_4^- + \text{H}_2\text{O} + \text{I}^- \rightarrow \text{-----} + \text{-----} + \text{-----}$
25. What is crystal field splitting? Draw the energy level diagram for splitting in octahedral complex.

26. (a) What is co-ordination isomerism? Give an example.  
 (b) Give an application of co-ordination compound in the field of biology.

**PART -D<sub>1</sub>**

**IV. Answer any three of the following (each question carries 5 marks)                    3 × 5 = 15**

27. (a) An element with molar mass  $2.7 \times 10^{-2} \text{ kg mol}^{-1}$  forms a cubic unit cell with edge length 405pm. If its density is  $2.7 \times 10^3 \text{ kg m}^{-3}$ . What is the nature of cubic unit cell? (3+2)  
 (b) A compound is formed by two elements M and N. The element N forms CCP and atoms of M occupy  $\frac{1}{3}$  rd of tetrahedral voids. What is the formula of the compound?
28. (a) A solution of urea in water has a boiling point of  $100.128^\circ\text{C}$ . Calculate the freezing point of the same solution.  $K_f$  and  $K_b$  for water are  $1.86^\circ\text{C}$  and  $0.512^\circ\text{C}$  respectively. (3+2)  
 (b) What happens to the solubility of a gas in liquid with rise in temperature?
29. (a) The resistance of solution of a salt occupying a volume between two platinum electrodes 1.8 cm apart and  $5.4 \text{ cm}^2$  area was found to be 32 ohms. Calculate the conductivity of the solution. (3+2)  
 (b) Write the differences between metallic and electrolytic conductors.
30. (a) Derive an expression for velocity constant for a first order reaction (3 + 2)  
 (b) Explain the effect of catalyst on the rate of reaction.
31. (a) Write any three differences between Physisorption and Chemisorption. (3 + 2)  
 (b) Mention any 2 methods for the coagulation of lyophobic sol

**PART D<sub>2</sub>**

**V. Answer any four of the following questions (each question carries 5 marks)                    4 × 5 = 20**

32. (a)  $\text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{thionyl chloride/pyridine}} \text{X} \xrightarrow[\text{2Na}]{\text{chlorobenzene/dry ether}} \text{Y}$ . Name X and Y and name both the reactions  
 (b) What are enantiomers? Give example. (4+1)
33. (a) How is phenol prepared from cumene? Explain with reactions.  
 (b) What happens when phenol is treated with  $\text{CO}_2$  and  $\text{NaOH}$  at high temperature and pressure? Explain with equation. (3+2)
34. (a) What are the products formed when acetophenone reacts with benzaldehyde in the presence of dilute  $\text{NaOH}$ ? Name the reaction and explain with equation. (3+2)  
 (b) What is haloform reaction? Explain with an example.
35. (a) Complete the following reaction  
 (i)  $\text{C}_6\text{H}_5\text{NO}_2 \xrightarrow{\text{Fe/HCl}} \text{_____}$  (3+2)  
 (ii)  $\text{CH}_3\text{NH}_2 \xrightarrow{\text{Sodium nitrite + HCl (room temp)}} \text{_____}$   
 (iii)  $\text{C}_2\text{H}_5\text{NH}_2 + \text{CHCl}_3 + \text{KOH}_{(\text{alc})} \xrightarrow{\Delta} \text{_____}$   
 (b) (i) Give the IUPAC name of trimethyl amine.  
 (ii) Name the product formed when aniline reacts with Con.  $\text{H}_2\text{SO}_4$
36. (a) (i) Name the water-soluble component of starch (3+2)  
 (ii) Mention the base which is present only in DNA and not in RNA  
 (iii) Mention the disorder caused by the deficiency of Vitamin-B12  
 (b) What is isoelectric point of an amino acid? Give an example for acidic amino acid.
37. (a) Name the type of attractive forces present in elastomers and fibrous polymers. (2+2+1)  
 (b) Mention 2 uses of the following polymers (i) neoprene (ii) terylene  
 (c) Give an example for biodegradable polymer.

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