



SANSKRITI SCHOOL
Dr. S. Radhakrishnan Marg
New Delhi

Academic session- 2013-14
Preboard Examination
Subject - Chemistry
Class XII
Set I

Time: 3 hrs

Max. Marks - 70

No. of printed pages: 5

General Instructions:

- All questions are compulsory.
- Questions nos. 1 to 8 are very short answer questions and carry 1 mark each.
- Questions nos. 9 to 18 are short answer questions and carry 2 marks each.
- Questions nos. 19 to 27 are also short answer questions and carry 3 marks each.
- Question nos. 28 to 30 are long answer questions and carry 5 marks each.
- Use log tables if necessary, use of calculators is not permitted.

- 1 What is shape selective catalysis? Give an example. 1
- 2 In corundum, oxide ions are arranged in hexagonal close packing and aluminium ions occupy $2/3^{\text{rd}}$ of octahedral voids. What is the formula of the corundum and coordination number of Al^{+3} ions? 1
- 3 Why does Phosphinic acid behaves as a monoprotic acid? 1
- 4 Arrange in decreasing order of basic strength: NH_3 , PH_3 , AsH_3 , SbH_3 . Give reason. 1
- 5 Write the IUPAC name of $(\text{CH}_3)_3\text{CCH}_2\text{CH}(\text{Br})\text{C}_6\text{H}_5$. 1
- 6 The extraction of Au by leaching with NaCN involves both oxidation and reduction. Justify giving equations. 1
- 7 Draw the major monohalo products:
 1
- 8 What are the products of Electrolysis if an aqueous solution of AgNO_3 is electrolyzed using Silver electrodes. 1
- 9 For a reaction, energy of activation is zero. What is the value of rate constant at 300K if $k=1.6 \times 10^6 \text{ s}^{-1}$ at 280K? [$R= 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$] 2

- 10 Write Nernst equation to calculate the cell potential of the following cell at 298 K: 2
 $\text{Al(s)} \mid \text{Al}^{3+} (0.001\text{M}) \mid \mid \text{Ni}^{2+} (0.50\text{M}) \mid \text{Ni (s)}$
 (Given: $E^0_{\text{Al}^{3+} \mid \text{Al}} = -1.66 \text{ V}$, $E^0_{\text{Ni}^{2+} \mid \text{Ni}} = -0.25 \text{ V}$). ($\log 8 = 0.9030$)
- 11 (i) Write the structure of the product obtained when glucose is oxidized with 2
 nitric acid.
 (ii) Name the bonding that stabilizes α -helix structure in proteins.
 (iii) Name the vitamin whose deficiency causes pernicious anaemia.
- 12 Explain the mechanism of the following reaction: 2

$$\text{CH}_3\text{CH}_2\text{OH} \xrightarrow[443\text{K}]{\text{H}^+} \text{CH}_2=\text{CH}_2$$
- 13 (i) What are anomers? What is the linkage between the monosaccharides in 2
 carbohydrates?
 (ii) Mention two structural differences between DNA and RNA?
- 14 (i) Arrange the following set of compounds in order of their increasing boiling points: 2
 Pentan-1-ol, n-butane, ethoxy ethane, pentanal
 (ii) Write equation for the preparation of phenol from cumene.
- 15 Blue colour of copper sulphate solution is slowly discharged when an iron rod is 2
 dipped into it. Explain this by calculating ΔG^0 with the help of following data:
 $E^0_{\text{Cu}^{2+}/\text{Cu}} = 0.34 \text{ V}$; $E^0_{\text{Fe}^{2+}/\text{Fe}} = -0.44 \text{ V}$ and $1\text{F} = 96500 \text{ C mol}^{-1}$.

OR

The conductivity of 0.12M solution of KCl at 298K is 0.024 S cm^{-1} . Calculate its molar conductivity.

- 16 Write the names associated with the following reactions: 2
 (i) $\text{RCONH}_2 + \text{Br}_2 + 4\text{NaOH} \longrightarrow \text{RNH}_2 + \text{Na}_2\text{CO}_3 + 2\text{NaBr} + 2\text{H}_2\text{O}$
 (ii) $\text{C}_6\text{H}_5\text{N}_2^+\text{X}^- + \text{C}_6\text{H}_5\text{NH}_2 \xrightarrow{\text{OH}^-} \text{C}_6\text{H}_5\text{N}=\text{NC}_6\text{H}_5\text{NH}_2 + \text{X}^- + \text{H}_2\text{O}$
 (iii) $\text{RNH}_2 + \text{CHCl}_3 + 3\text{KOH} \xrightarrow{\text{Heat}} \text{RNC} + 3\text{KCl} + 3\text{H}_2\text{O}$
 (iv) $\text{ArN}_2^+\text{X}^- \xrightarrow{\text{Cu/HCl}} \text{ArCl} + \text{N}_2 + \text{CuX}$
- 17 (i) Why is zinc not extracted from zinc oxide through reduction using CO? 2
 (ii) Name the method used for refining of Ni . What is the principle involved.
- 18 How will you carry out the following conversions: 2
 (i) Acetone to Propene
 (ii) Benzamide to Toluene.
- 19 In thermal power stations, coal is burnt to produce steam for generation of electricity. 3
 The smoke is passed through electrostatic precipitators. Answer the following questions based on the above information.

- (i) Why is the smoke passed through electrostatic precipitators in thermal power stations? What property of colloidal solution is used in the electrostatic precipitators?
- (ii) What value is promoted through the use of electrostatic precipitators.
- (iii) Which of the following is the most effective electrolyte in coagulation of AgI/Ag⁺ sol and why?
K₂SO₄, MgCl₂, K₄[Fe(CN)₆]
- 20 (i) What are Antioxidants. Give one example. 3
(ii) Name one substance which
a) which can act as both antiseptic and disinfectant
b) which is a non ionic detergent
(iii) Mention the class of drug to which the following belong:
a) Paracetamol
b) Equanil
- 21 Silver metal crystallizes with a face centred cubic lattice. The edge length of the unit cell is found to be 4.0X10⁻⁸cm. Calculate atomic radius and density of silver? Given that its atomic mass is 108u . [N_A = 6.023X10²³] 3
- 22 (i) Give reason for the following: 3
a) NO₂ exists as a dimer.
b) Where R is a alkyl group, R₃P=O exists but R₃N=O does not.
(ii) Draw molecular structure of XeF₄.
- 23 (i) Write name and structure of the monomer of polymer used for making unbreakable crockery. 3
(ii) Arrange the following in decreasing order of intermolecular forces:
PVC , Nylon 6,6 , Natural rubber.
(iii) What are biodegradable polymers? Give an example of a biodegradable aliphatic polyester.
- 24 Write balanced chemical equation for 3
(a) Oxidation of I₂ using conc.HNO₃.
(b) Reaction of Cl₂ with hot and concentrated NaOH. Is it a disproportionation reaction? Justify.
- 25 Nitrogen pentoxide decomposes according to equation : 3
2N₂O₅ (g) → 4NO₂(g) + O₂(g).
This first order reaction was allowed to proceed at 40⁰ C and the data below were collected :
- | <u>[N₂O₅] (M)</u> | <u>Time (Min)</u> |
|---|-------------------|
| 0.400 | 0.00 |
| 0.289 | 20.0 |
| 0.209 | 40.0 |
| 0.151 | 60.0 |

- a) Calculate the rate constant. Include units with your answer. [$\log 4 = 0.6021$, $\log 2.89 = 0.4609$, $\log 3 = 0.3201$]
- b) What will be the half life of the reaction.
- 26 Give reason for the following: 3
- (i) Ethyl iodide undergoes S_N1 reaction faster than Ethyl bromide.
- (ii) C-X bond in halobenzene is smaller than C-X bond in CH_3-X .
- (iii) Alkyl halides though polar are immiscible with water.
- 27 Write down the IUPAC name, electronic configuration in terms of t_{2g} and e_g , and the hybridization of the central atom in the following complexes: 3
- (a) $Cs[FeCl_4]$
- (b) $K_3[Co(C_2O_4)_3]$

OR

A metal ion M^{n+} having d^4 valence electronic configuration combines with three didentate ligands to form a complex compound. Assuming $\Delta_o < P$,

- a. Draw the diagram showing d orbital splitting during this complex formation.
- b. Write the electronic configuration of the valence electrons of the metal M^{n+} ion in terms of t_{2g} and e_g .
- c. What type of hybridization will M^{n+} ion have?
- d. Name the type of isomerism exhibited by this complex.
- 28 (i) State : Raoult's law in its general form in reference to solution. 5
- (ii) A solution prepared by dissolving 8.95mg of a gene fragment in 35.0 ml of water has an osmotic pressure of 4.4×10^{-4} atm at $25^\circ C$. Assuming the gene fragment is a non-electrolyte, determine its molar mass. [given $R = 0.0821 \text{ atm l K}^{-1} \text{ mol}^{-1}$]
- (iii) Explain the following:
- a) Two solutions, 0.1 molal solution of glucose and sodium chloride, do not have the same boiling point. Which one will have higher boiling point?
- b) Aquatic species feel more comfortable in lakes in winter than in summer.

OR

- (i) Explain the following:
- (a) Solution of chloroform and acetone is an example of maximum boiling azeotrope.
- (b) If vapour pressure of liquid A is greater than the vapour pressure of liquid B at $25^\circ C$, then the boiling point of liquid A is lower than the boiling point of liquid B.
- (ii) Calculate the boiling point of a solution containing 0.61 g of benzoic acid in 50 g of CS_2 , assuming 84% dimerisation of acid. The boiling point and K_b of CS_2 are $46.2^\circ C$ and $2.3 K \text{ kg mol}^{-1}$ respectively. [Molar mass of benzoic acid = 122u]
- 29 (i) Describe the steps involved in the preparation of potassium dichromate from chromite ore. 5

- (ii) Assign reason for the following:
- Second and third transition series elements have almost similar atomic radii.
 - Transition metals have high enthalpy of atomization.
 - $\text{Fe}^{+3} | \text{Fe}^{+2}$ couple has less positive electrode potential than $\text{Mn}^{+3} | \text{Mn}^{+2}$ couple.

OR

- (i) Complete the following chemical equations:
- $\text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{S} + \text{H}^+ \rightarrow$
 - $\text{MnO}_4^- + \text{C}_2\text{O}_4^{2-} + \text{H}^+ \rightarrow$
 - $\text{KMnO}_4 \xrightarrow{\text{heated}}$
- (ii) What is lanthanoid contraction? Actinoids exhibit a larger number of oxidation states than the corresponding lanthanoids. Why?
- (iii) Why is Cr^{2+} reducing and Mn^{3+} oxidizing when both have $3d^4$ configuration?
- 30 (i) A compound 'A' on oxidation gives 'B' ($\text{C}_2\text{H}_4\text{O}_2$). 'A' reacts with dil. NaOH and on subsequent heating forms 'C'. 'C' on catalytic hydrogenation gives 'D'. Identify A, B, C, D and write the reactions involved.
- (ii) Give simple chemical tests to distinguish between the following pairs of compounds:
- Ethanal and Propanone
 - Acetophenone and Benzophenone.

OR

- (i) Complete the following reactions:



- (ii) Arrange in increasing order of reactivity towards HCN: Formaldehyde, Acetone, Acetaldehyde, Butanone. Give reason.
- (iii) Which of the two would you expect to be stronger acid and why?

