

**FIRST TERM EXAMINATION  
CLASS XII  
CHEMISTRY THEORY**

**SET A**

**TOTAL NO. OF PRINTED PAGE 3**

**TIME ALLOWED 3 HRS.**

**MAXIMUM MARKS 70**

**GENERAL INSTRUCTIONS**

- i. All questions are compulsory*
  - ii. Marks for each questions are indicated against it*
  - iii. Question no. 1 to 5 are very short-answer questions, carrying 1 mark each. Answer these in one word or about one sentence each.*
  - iv. Question no. 6 to 12 are short answer questions, carrying 2 marks each. Answer these in about 30 words each.*
  - v. Question no. 13 to 24 are short answer question of 3 marks each. Answer these in about 40 words each.*
  - vi. Question no. 25-27 are long answer questions of 5 marks each. Answer these in about 70 words each.*
  - vii. Supply proper diagram in support of your answer*
  - viii. Use Log Tables, if necessary. Use of calculators is not permitted.*
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- 1. If three elements A, B and C crystallize in a cubic solid lattice with A atoms at the corner, B atoms at the cube center and C atoms at the edges, then what is the formulae of the crystal?**
- 2. What is meant by the term peptisation?**
- 3. Why Zn, Cd and Hg are not considered as transition element?**
- 4. Give the IUPAC name of  $\text{Na}_3[\text{Co}(\text{NO}_2)]$ ?**
- 5. An isotope of an element is present in group 18 and 5 th period of the periodic table. What will be the position occupied by its daughter element in the periodic table if it emits one  $\beta$  particle per atom?**
- 6. Calculate the wavelength of an object moving with a velocity of  $3 \times 10^4$  m/sec given the mass of object =  $6 \times 10^{-24}$  kg.**
- 7. Explain why the bond order of  $\text{N}_2$  is greater than  $\text{N}_2^+$ ; but the bond order of  $\text{O}_2$  is less than  $\text{O}_2^+$ ?**
- 8. An element has a body centered cubic(BCC) structure with a cell- edge of 288 pm. The density of the element is 7.2 gm/cc. How many atoms are present in 208 gm of the element?**
- 9. 1.00 gm of a nonelectrolyte solute dissolved in 50.5 gm of benzene lowered the freezing point of the benzene by 0.40 K . The freezing point depression constant of benzene is 5.12 K kg / mol. Find the molecular mass of the solute and the atomicity of the molecule, if the atomic mass of the solute is 32.**
- 10. Predict in which of the following case the entropy will increase or decrease:**
  - a. a liquid crystallizes into solid**
  - b. The temperature of the crystalline solid changes from 0 K to 115 K**

11. How would you explain the sharp increase in molar conductivity of a weak electrolyte on dilution? How is the molar conductivity related to the degree of dissociation of a sparingly soluble salt?
12. Write the balanced equation for the following reactions:
- $\text{Ca}_3\text{P}_2 + \text{water} \longrightarrow$
  - $\text{P}_4 + \text{KOH} + \text{water} \longrightarrow$
13. The Quantized energy of electron in hydrogen atom for the  $n^{\text{th}}$  energy level is given by:
- $$E_n = -13.12 \times 10^5 / n^2 \text{ J per mole}$$
- Calculate the minimum energy required to remove the electron completely from hydrogen atom when its quantised energy level  $n$  equals 2. What should be the wavelength of light that can be used to cause this transition?
14. Aluminium crystallises in a cubic close packed structure. Its metallic radius is 125 pm.
- What is the length of the side of the unit cell
  - How many unit cells are there in 1.00 cubic cm of Aluminium
15. Two elements A and B form compounds having molecular formula  $\text{AB}_2$  and  $\text{AB}_4$ . When dissolved in 20 gm. of benzene 1 gm of  $\text{AB}_2$  lowers the freezing point by 2.3 K, while 1.0 gm of  $\text{AB}_4$  lowers it by 1.3 K. The molar depression constant for benzene is 5.1 K/g per mole. Calculate the atomic mass of A and B?
16. A reaction is first order in A and second order with respect to B:
- Write differential rate equation
  - How is the rate affected if the concentration of B is tripled
  - How is the rate affected when the concentration of both A and B are doubled.
17. The activation energy of a reaction is 75.2 KJ/mole in the absence of a catalyst and 50.14 kJ/mole in presence of the catalyst. How many times will the rate of reaction grow in the presence of the catalyst if the reaction proceeds at 25°C? ( $R=8.314 \text{ J/K/mole}$ )
18. Explain what is observed:
- when a beam of light is passed through a colloidal sol
  - an electrolyte of NaCl is added to ferric hydroxide sol
  - electric current is passed through a colloidal sol.
19. Give reason for each of the following observations:
- Noble gases are mostly chemically inert
  - Nitrogen does not form pentahalide
  - Bismuth is a strong oxidizing agent in pentavalent state
20.  $\text{Ni}^{+2}$  ion is thermodynamically more stable than  $\text{Pb}^{2+}$ .
- Most of the transition metal ions are coloured in solution
  - Transition metals are well-known to form complexes.
21. Describe the preparation of Potassium Dichromate from chromite ore with chemical equation and the structure of dichromate ion.

22. Draw a sketch to show the splitting of d-orbitals in an octahedral crystal field. State for a  $d^6$  ion how the actual configuration of the split d-orbitals in an octahedral crystal field is decided by the relative values of  $\Delta_o$  and P.
23. a. How can the course of a reaction be known by using radioisotopes.  
 b. Describe the principle of breeder reactor.  
 c. Complete the following equation:  $\dots\dots(\alpha,2n) \text{ }^{211}\text{At}_{85}$ .
24. a. Identify and indicate the presence of center of chirality, if any, in the following molecules: i. 2-aminobutane ii. 1,2-dichloropropane  
 b. Employing Cahn-Ingold-Prelog sequence rule indicate the priority sequence: -methyl, -ethyl, -isopropyl, -terbutyl.
25. a. What is meant by an entropy driven reaction? How can a reaction with positive enthalpy and entropy changes can be made entropy driven.  
 b. Calculate the standard Gibb's energy change for the formation of propane  $\text{C}_3\text{H}_8$  at 298 K.  
 Given :enthalpy of formation of propane: -103.85 kJ/mole, molar entropy of propane, Hydrogen and Carbon : 270.2, 130.68, 5.74 J/K/mole respectively
26. i. Explain the mechanism of Corrison.  
 ii. The resistance of 0.01 M acetic acid solution is observed to be 2220 ohm when measured with a cell of cell constant 0.366 per cm. calculate the degree of dissociation of acetic acid at this concentration. Also find the dissociation constant of acetic acid. Given: conductance of  $\text{H}^+$  = 349.1 /ohm/cm.sq/mole and of  $\text{CH}_3\text{COO}^-$  = 40.9 /ohm/cm.sq/mole
27. Explain the following statement:  
 a. Sulphur exhibits greater tendency for catenation than selenium  
 b. Tin (II) is a reducing agent where as Pb (II) is oxidising agent.  
 c. Silicon is an insulator but silicon doped with phosphorous acts as a semi-conductor.  
 d. Trisilyl ammine is planar but trimethylamine is pyramidal.  
 e.  $\text{PH}_3$  is weaker base than  $\text{NH}_3$ .

Or

- a. Assign a reason for each of the following statement:  
 i. Anhydrous  $\text{AlCl}_3$  acts as a catalyst in many organic reaction  
 ii. All the bonds in a molecule of  $\text{PCl}_5$  are not equal  
 iii. Hydrogen Fluoride is a weaker acid than hydrogen chloride in aquaous solution
- b. Write structure for the following:  
 i.  $\text{IF}_5$  ii.  $\text{XeOF}_2$