

**FIRST TERM EXAMINATION
CLASS XII
CHEMISTRY THEORY**

SET C

TOTAL NO. OF PRINTED PAGE 3

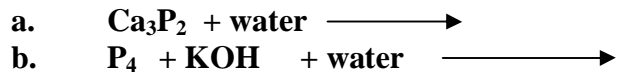
TIME ALLOWED 3 HRS.

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 crystallise in a cubic solid lattice with A atoms at the corner, B atoms at the cube centre and C atoms at the edges, then what is the formulae of the crystal?**
 - 2. Why do colloidal solution exhibit tyndall effect?**
 - 3. How many unpaired electrons are there in Ni²⁺ ?**
 - 4. Give the IUPAC name of Na₃[Co(NO₂)]?**
 - 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 β particle per atom?**
 - 6. Calculate the wavelength of an object moving with a velocity of 3 X 10⁴ m/sec given the mass of object = 6 x 10⁻²⁴ kg.**
 - 7. Explain why the bond order of N₂ is greater than N₂⁺; but the bond order of O₂ is less than O₂⁺?**
 - 8. If the radius of the octahedral void is r and radius of the atoms in close packing is R derive the relationship between r and R?**
 - 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. How is the concept of coupling of reactions is useful to explain the occurrence of a nonspontaneous reaction?**
 - 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:**



13. The Quantised energy of electron in hydrogen atom for the n^{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. Analysis shows that nickel oxide has formulae $\text{Ni}_{0.98}\text{O}_{1.00}$. What fractions of nickel exist as Ni^{+2} and Ni^{+3} ?
15. Two elements A and B form compounds having molecular formula AB_2 and AB_4 . When dissolved in 20 gm. of benzene 1 gm of AB_2 lowers the freezing point by 2.3 K, while 1.0 gm of 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 the 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. What is meant by shape selective catalysis. How is it used in obtaining gasoline from alcohol? Name the catalyst used in this process.
19. Give reason for each of the following observations:
- Noble gases are mostly chemically inert
 - Nitrogen does not form pentahalide
 - Bismuth is a strong oxidising agent in pentavalent state
20. Account for the following:
- The transition elements exhibit high enthalpies of atomization
 - Ni^{+2} ion is thermodynamically more stable than Pb^{2+} .
 - A transition element forms alloy with other transition element.
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 Δ_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: $\dots\dots(\alpha, 2n) {}^{211}\text{At}_{85}$.
24. a. Identify and indicate the presence of centre 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. Predict the product of electrolysis in the following:

- i. An aqueous solution of silver nitrate with silver electrodes
 - ii. A dilute solution of sulphuric acid with platinum electrodes
 - iii. An aqueous solution of CuCl_2 with platinum electrodes.
 - b. The resistance of a conductivity cell containing 0.001 M KCl solution at 298 K is 1500 ohm. What is the cell constant if the conductivity of 0.001 M KCl solution at 298 K is $0.146 \times 10^{-3} \text{ S/cm}$
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- a. Assign a reason for each of the following statement:
 - i. Anhydrous AlCl_3 acts as a catalyst in many organic reaction
 - ii. All the bonds in a molecule of PCl_5 are not equal
 - iii. Hydrogen Fluoride is a weaker acid than hydrogen chloride in aqueous solution
 - b. Write structure for the following:
 - i. IF_5
 - ii. XeOF_2

Or

- a. Assign a reason for the following statements:
 - i. SF_6 is easily hydrolysed.
 - ii. In solid PCl_5 exists as an ionic compound
 - iii. CO_2 and SiO_2 are not isostructural.
 - b. Arrange the following in the decreasing order of the property indicated
 - i. H_2O , H_2S , H_2Se , H_2Te -- boiling point
 - ii. F, Cl, Br, and I --- Bond energy
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- a. Give reason:
 - i. Many thermodynamically feasible reactions do not occur under ordinary condition.
 - ii. An exothermic reaction is sometimes not spontaneous.
 - b. The standard Gibbs energy Change values at 1773 K are given for the following reactions:

$4 \text{ Fe} + 3 \text{ O}_2$	\longrightarrow	$2\text{Fe}_2\text{O}_3$	$\Delta G =$	-1487 Kj/mole
$4 \text{ Al} + 3 \text{ O}_2$	\longrightarrow	$2 \text{ Al}_2\text{O}_3$	$\Delta G =$	-22500 Kj/mole
$2 \text{ CO} + \text{ O}_2$	\longrightarrow	2CO_2	$\Delta G =$	-515Kj/mole

Find out the possibility of reducing Fe_2O_3 and Al_2O_3 with CO at this temperature.