

**FIRST TERM EXAMINATION
CLASS XII
CHEMISTRY THEORY
SET B**

TOTAL NO. OF PRINTED PAGE 3

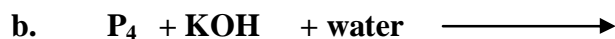
TIME ALLOWED 3 HRS.

MAXIMUM MARKS 70

GENERAL INSTRUCTIONS

- i. All questions are compulsory*
- i. Marks for each questions are indicated against it*
- ii. Question no. 1 to 5 are very short-answer questions, carrying 1 mark each. Answer these in one word or about one sentence each.*
- iii. Question no. 6 to 12 are short answer questions, carrying 2 marks each. Answer these in about 30 words each.*
- iv. Question no. 13 to 24 are short answer question of 3 marks each. Answer these in about 40 words each.*
- v. Question no. 25-27 are long answer questions of 5 marks each. Answer these in about 70 words each.*
- vi. Supply proper diagram in support of your answer*
- vii. 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. How can colloidal solution of sulphur in water be prepared?**
 - 3. Out of Cr^{2+} and Cr^{3+} which is more stable and why?**
 - 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 β particle per atom?**
 - 6. Calculate the wavelength of an object moving with a velocity of 3×10^4 m/sec given the mass of object = 6×10^{-24} kg.**
 - 7. Explain why the bond order of N_2 is greater than N_2^+ ; but the bond order of O_2 is less than O_2^+ ?**
 - 8. Calculate the value of Avogadro constant from the following data:
Density of NaCl = 2.165 gm/ cu.cm. Distance between Na and Cl ion in NaCl = 281 pm.**
 - 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. State the third law of thermodynamics and its implication**
 - 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:**
 - a. $\text{Ca}_3\text{P}_2 + \text{water} \longrightarrow$



13. The Quantised energy of electron in hydrogen atom for the n^{th} energy level is given by:

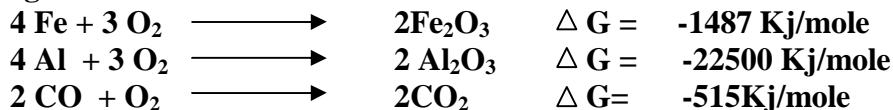
$$E_n = -13.12 \times 10^5 / n^2 \text{ J per mole}$$

- 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. 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 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 effected 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 the term:
- Electrophoresis
 - Coagulation
 - Tyndall effect
19. Give reason for each of the following observation:
- 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:
- Ni^{+2} ion is thermodynamically more stable than Pb^{2+} .
 - Transition metals forms a number of interstitial compounds.
 - Silver halide finds use in photography
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:($\alpha, 2n$) $^{211}\text{At}_{85}$.
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. 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. PH_3 is weaker base than NH_3 .

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
26. a. Predict the product of electrolysis in the following:
 i. An aqueous solution of silver nitrate with silver electrodes
 ii. A dilute solution of sulfuric 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 $0.146 \times 10^{-3} \text{ S/cm}$
27. 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:



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