Question Paper 2006
Outside Delhi Set-1

Class-12 Chemistry

General Instructions

1. All questions are compulsory.
2. Marks for each question are indicated against it.
3. Question numbers 1 to 5 are very short-answer questions, carrying 1 mark each. Answer these in one word or about one sentence each.
4. Question numbers 6 to 12 are short-answer questions, carrying 2 marks each. Answer these in about 30 words each.
5. Question numbers 13 to 24 are short-answer questions of 3 marks each. Answer these in about 40 words each.
6. Question numbers 25 to 27 are long-answer questions of 5 marks each. Answer these in about 70 words each.
7. Use Log Tables, if necessary Use of calculators is not permitted.

1. Name the non-stoichiometric point defect responsible for colour in alkali halides. **[1]**

2. Define 'mole fraction' of a substance in a solution. **[1]**

3. A reaction is 50% complete in 2 hours and 75% complete in 4 hours. What is the order of the reaction? **[1]**

4. Write the IUPAC name of $CH_3COCH_2COCH_3$. **[1]**

5. Give a chemical test to distinguish between a primary and a secondary amine. **[1]**

6. Account for the following: **[2]**

i. N_2 has higher bond dissociation energy than NO.

ii. N_2 and CO both have same bond order but CO is more reactive than N_2.

7. At absolute zero, an exothermic reaction is always spontaneous but at temperatures above absolute zero, we have to consider both enthalpy and entropy before we can predict

spontaneity. Why? **[2]**

8. Write the chemical equations involved in the preparation of the following: **[2]**

i. XeF_4

ii. H_3PO_3

9. Why is the +2 oxidation state of manganese quite stable, while the same is not true for iron? [Mn = 25, Fe = 26]. **[2]**

10. Differentiate between conformation and configuration in open chain molecules by giving one example each. **[2]**

11. Give reasons for the following:

a. Ortho-nitrophenol is more acidic than ortho-methoxyphenol. **[1]**

b. Glycerol is used in cosmetics. **[1]**

12. Write the structures of monomoers used and one use of each of the following polymers: **[2]**

a. Teflon

b. Buna-N

Or

What are biodegradale polymers? Give two examples. **[2]**

13. What is meant by dual nature of electrons? Calculate the energy and wavelength of the photon emitted by hydrogen atom when the electron makes a transition from n =2 to n = 1. Given that the ionization potential is 13.6 eV. $\left[1\ eV = 1.6\times10^{-19}\ J\right]$ **[3]**

14. Calculate the distance between Na^+ and Cl^- ions in NaCl crystal if its density is $2.165\ g\ cm^{-3}$. $[Molar\ mass\ of\ NaCl = 58.5\ g\ mole^{-1};\ N_A = 6.02\times10^{23}\ mol^{-1}]$ **[3]**

15. a. Urea forms an ideal solution in water. Determine the vapour pressure of an aqueous solution containing 10% by mass of urea at 40° C.

(Vapour pressure of water at 40° C = 55.3 mm of Hg) **[2]**

b. Why is freezing point depression of 0.1 M sodium chloride solution nearly twice that of 0.1 M glucose solution? **[1]**

16. How is the concept of coupling reactions useful in explaining the occurrence of nonspontaneous thermochemical reactions? Explain giving an example. **[3]**

17. A certain reaction is 50% complete in 20 minutes at 300 K and the same reaction is again 50% complete in 5 minutes at 350 K. Calculate the activation energy. if it is a first order reaction. $\left[R = 8.314 JK^{-1}mol^{-1}; log4 = 0.602\right]$ **[3]**

18. a. In which of the following does adsorption take place and why? **[1]**
i. Silica gel placed in the atmosphere saturated with water.
ii. Anhydrous $CaCl_2$ placed in the atmosphere saturated with water.

b. How does BF_3 act as a catalyst in industrial process? **[1]**

c. Give an example of shape-selective catalysis. **[1]**

Or

a. What are micelles? How do they differ from ordinary colloidal particles? Give two examples of micelles forming substances. **[2]**
b. State Hardy-Schulze rule. **[1]**

19. a. Write the electronic configuration of the element with atomic number 102. **[1]**
b. What is lanthanoid contraction? What is its effect on the chemistry of the elements which follow the lanthanoids? **[2]**

20. a. Using valence bond theory, predict the shape and magnetic character of $[Ni(CO)_4]$. [Ni=28] **[2]**

b. Give one example of application of coordination compounds in medicine. **[1]**

21. a. State Group Displacement Law. Calculate the number of $\alpha-$ particles and $\beta-$ particles emitted when $^{238}_{92}U$ *changes to* $^{206}_{82}Pb$. **[2]**
b. What is meant by K-capture in nuclear chemistry? **[1]**

22. a. Write the steps and conditions involved in the following conversions:

i. Acetophenone to 2-phenyl-2butanol **[1]**

ii. Propene to acetone. **[1]**

b. Give a chemical test to distinguish between Methyl acetate and Ethyl acetate. **[1]**

23. a. Explain the following giving suitable examples: **[2]**

i. Sandmeyer's reaction

ii. Coupling reaction of a diazonium salt

b. Explain the observed K_b border:

$Et_2NH > ET_3N > EtNH_2$ in aqueous solution **[1]**

24. Define the following and give one example of each: **[3]**

a. Antipyretics

b. Vat dyes

c. Antibiotics

25. a. State two advantages of $H_2 - O_2$ fuel cell over ordinary cell. **[2]**

b. Silver is electrodeposited on a metallic vessel of total surface area $900\ cm^2$ by passing a current of 0.5 amp for two hours. Calculate the thickness of silver deposited.

[Given: Density of silver $= 10.5\ g\ cm^{-3}$, Atomic mass of silver $= 108\ amu$, $F = 96,500\ C\ mol^{-1}$] **[3]**

Or

a. Give reasons for the following: **[2]**

i. Rusting of iron is quicker in saline water than in ordinary water.

ii. Aluminium metal cannot be produced by the electrolysis of aqueous solution of aluminium salt.

b. Resistance of a conductivity cell filled with $0.1\ M\ KCl$ solution is $100\ ohm$. If the resistance of the same cell when filled with $0.02\ M\ K\ Cl$ solution is $520\ ohms$, calculate the conductivity and molar conductivity of $0.02\ M\ K\ Cl$ solution. Conductivity of $0.1\ KCl$ solution is $1.29\ S\ m^{-1}$ **[3]**

26. Give reasons for each of the following:

a. SiF_6^{2-} is known but $SiCl_6^{2-}$ is not known. **[1]**

b. Sulphur in vapour state exhibits paramagnetic behaviour. **[1]**

c. PbO_2 is a stronger oxidizing agent than SnO_2 **[1]**

d. H_3PO_2 acts as a monobasic acid. **[1]**

e. Bond dissociation energy of F_2 is less than that of Cl_2 **[1]**

Or

a. Account for the following:

i. Thermal stability of water is much higher than that of H_2S **[1]**

ii. Anhydrous aluminium chloride acts as a catalyst. **[1]**

iii. White phosphorus is more reactive than red phosphorus. **[1]**

b. Draw the structures of

i. H_3PO_3 and

ii. $XeOF_4$ **[2]**

27. a. What are essential and non-essential amino acids? Give two examples of each. **[2]**

b. What are the two types of photosynthesis in green plants? Give the basic equations of photosynthesis. **[2]**

c. Mention the two products of glycolysis. **[1]**

Or

a. Define the following terms: **[3]**

i. Co-enzymes

ii. Mutation in biomolecules

iii. Nucleotides

b. List four main functions of carbohydrates in organisms. **[2]**