

Question Paper 2007 Delhi Set-1
Class-12 Chemistry

Time Allowed: 3 Hours, Maximum Marks: 70

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. What is the number of atoms per unit cell in a body centered cubic structure? [1]

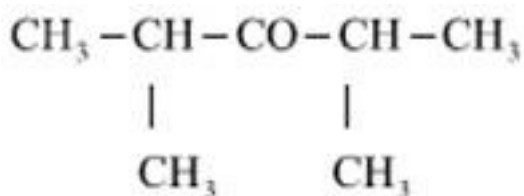
2. Define osmotic pressure. [1]

3. For the reaction [1]



What is the overall order of this reaction?

4. Write the IUPAC name of the compound: [1]



5. Why do nitro compounds have high boiling points in comparison with other compounds of same molecular mass? [1]

6. State 'Pauli's exclusion principle'. Explain giving an example how this principle limits the maximum occupancy of an energy level in an atom. [2]

OR

State 'Aufbau principle' and give the order in which the energies of orbitals increase and hence they are filled in that order. [2]

7. A reaction with $\Delta_r G^\circ < 0$ always has an equilibrium constant value greater than 1. Why? [2]

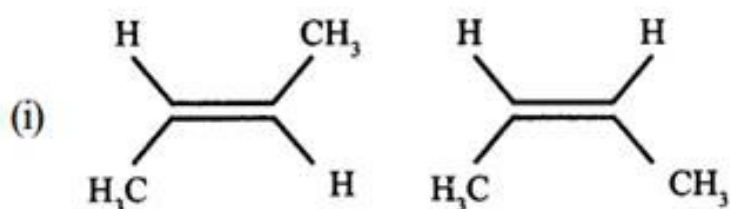
8. Write balanced chemical equations for the following reactions: [2]

- (i) Aluminium dissolves in aqueous hydrochloric acid
- (ii) Tin reacts with a hot alkali solution

9. Write the structures of the following species: [2]

- (i) H_3PO_2
- (ii) H_2SO_5

10. Identify whether the following pairs of compounds are structural or geometrical isomers: [2]



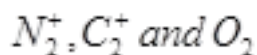
11. How would you account for the following: [2]

- (i) Phenols are much more acidic than alcohols.
- (ii) The boiling points of ethers are much lower than those of the alcohols of comparable molar masses.

12. Draw the structure of the monomer of each of the following polymers: [2]

- (i) Polyvinylchloride (PVC)
- (ii) Nylon-6

13. Write the molecular orbital configurations of the following species and rearrange them in the increasing order of their bond lengths: [3]



14. Explain each of the following with a suitable example: [3]

- (i) Paramagnetism
- (ii) Piezoelectric effect
- (iii) Frenkel defect in crystals

15. In the production of water gas the reaction involved is: [3]

For this reaction $\Delta_r S^\circ$ is $+134 JK^{-1} mol^{-1}$. Find out the spontaneous feasibility of this reaction at

- (i) $25^\circ C$ and
- (ii) $1000^\circ C$.

16. An antifreeze solution is prepared from 222.6g of ethylene glycol ($C_2H_4(OH)_2$) and 200g of water. Calculate the molality of the solution. If the density of this solution be $1.072g\ ml^{-1}$, what will be the molarity of the solution? [3]

17. The decomposition of NH_3 on platinum surface, $2NH_3(g) \xrightarrow{Pt} N_2(g) + 3H_2(g)$ is a zero order reaction with $k = 2.5 \times 10^{-4} Ms^{-1}$. What are the rates of production of N_2 and H_2 ? [3]

18. Explain the following terms giving a suitable example in each case: [3]

- (i) Emulsification
- (ii) Homogeneous catalysis

OR

Define adsorption. Write any two features which distinguish physisorption from chemisorption.

19. How would you account for the following? [3]

- (i) The lower oxidation state becomes more stable with increasing atomic number in Group

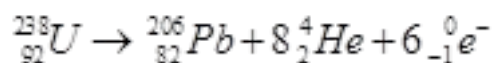
13.

- (ii) Hydrogen fluoride is much less volatile than hydrogen chloride,
- (iii) Interhalogen compounds are strong oxidising agents.

20. Write the name and draw the structure of each of the following complex compounds: [3]

- (i) $[Co(NH_3)_4(H_2O)_2]Cl_3$
- (ii) $[Pt(NH_3)_4][NiCl_4]$

21. The net nuclear reaction of a radioactive decay series is written as: [3]



Write three pieces of information that you get from the above equation.

22. Give chemical tests to distinguish between the following pairs of compounds: [3]

- (i) Propanal and propanone
- (ii) Methyl acetate and ethyl acetate
- (iii) Benzaldehyde and benzoic acid

23. How would you achieve the following conversions: [3]

- (i) Nitrobenzene to aniline
- (ii) An alkyl halide to a quaternary ammonium salt.
- (iii) Aniline to benzonitrile

24. (i) Give an example of a hybrid propellant. [3]

- (ii) What are acid dyes?
- (iii) Name a food preservative which is most commonly used by food producers.

25. (a) Describe the general trends in the following properties of the first series of the transition elements: [3]

- (i) Stability of +2 oxidation state
- (ii) Formation of oxometal ions

(b) Assign reason for each of the following: [2]

- (i) Transition elements exhibit variable oxidation states
- (ii) Transition metal ions are usually coloured.

OR

(a) Write the steps involved in the preparation of: **[3]**

(i) $K_2Cr_2O_7$ from Na_2CrO_4

(ii) $KMnO_4$ from K_2MnO_4

(iii) Calomel from corrosive sublimate

(b) What is meant by lanthanoid contraction? What effect does it have on the chemistry of the elements which follow lanthanoids? **[2]**

26. (a) Calculate the emf of the cell **[3]**



Given : $E^\ominus Cu^{2+} / Cu = +0.34V$, $E^\ominus Mg^{2+} / Mg = -2.37V$,

(b) Explain with examples the terms weak and strong electrolytes. **[2]**

OR

(a) The resistance of a conductivity cell containing $0.001 M KCl$ solution at $298 K$ is 1500Ω . What is the cell constant, if the conductivity of $0.001 M KCl$ solution at $298 K$ is $0.146 \times 10^{-3} S cm^{-1}$? **[3]**

(b) Predict the products of electrolysis in the following: **[2]**

A solution of H_2SO_4 with platinum electrodes.

27. (a) Name the three major classes of carbohydrates and give an example of each of these classes. **[3]**

(b) Answer the following: **[2]**

(i) What type of linkage is responsible for the primary structure of proteins?

(ii) Name the location where protein synthesis occurs in our body.

OR

(a) How are lipids classified? Give an example of each class. **[3]**

(b) Explain the following terms: **[2]**

(i) Mutarotation

(ii) Avitaminosis