

CBSE Class 12 Chemistry 2008 - Set 56/3 (Delhi)



Question Paper

Conducted by the Central Board of Secondary Education (CBSE)

Time Allowed: 3 Hours

Maximum Marks: 70

General Instructions

- (i) This question paper contains 30 questions. All questions are compulsory.
- (ii) Marks for each question are indicated against it.
- (iii) Questions 1 to 8 are very short-answer questions carrying 1 mark each.
- (iv) Questions 9 to 18 are short-answer questions carrying 2 marks each.
- (v) Questions 19 to 27 are also short-answer questions carrying 3 marks each.
- (vi) Questions 28 to 30 are long-answer questions carrying 5 marks each.
- (vii) Use log tables, if necessary. Use of calculators is not allowed.

Questions

1. What type of substances exhibits antiferromagnetism?

2. Express the relation between conductivity and molar conductivity of a solution.

3. Which has a higher enthalpy of adsorption, physisorption or chemisorption?

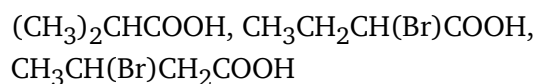
4. Write the IUPAC name of the following compound:



5. In which one of the two structures, NO_2^+ and NO_2^- , the bond angle has a higher value?

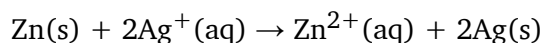
6. Name a substance that can be used as an antiseptic as well as a disinfectant.

7. Arrange the following compounds in an increasing order of their acid strengths:



8. Write a chemical reaction in which the iodide ion replaces the diazonium group in a diazonium salt.

9. Formulate the galvanic cell in which the following reaction takes place:



State:

(i) Which one of its electrodes is negatively charged.

(ii) The reaction taking place at each of its electrodes.

(iii) The carriers of current within this cell.

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

11. State Raoult's law for solutions of volatile liquids. Taking suitable examples explain the meaning of positive and negative deviations from Raoult's law.

OR

11. Define the term osmotic pressure. Describe how the molecular mass of a substance can be determined by a method based on measurement of osmotic pressure.

12. Assign a reason for each of the following statements:

(i) Ammonia is a stronger base than phosphine.

(ii) Sulphur in vapour state exhibits a paramagnetic behaviour.

13. Draw the structures of the following molecules:

(i) SF_4

(ii) XeF_4

14. Explain as to why haloarenes are much less reactive than haloalkanes towards nucleophilic substitution reactions.

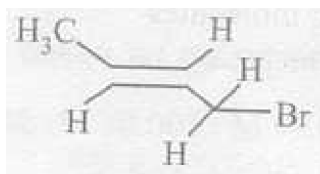
OR

14. Which compound in each of the following pairs will react faster in $\text{S}_{\text{N}}2$ reaction with $-\text{OH}^-$? Why?

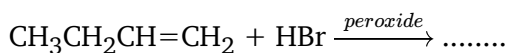
(i) CH_3Br or CH_3I

(ii) $(\text{CH}_3)_3\text{CCl}$ or CH_3Cl

15. (a) State the IUPAC name of the following compound:



(b) Complete the following chemical equation:



16. What are biodegradable and non-biodegradable detergents? Give one example of each class.

17. Define the following terms in relation to proteins:

- (i) Peptide linkage
- (ii) Denaturation

18. List the reactions of glucose which cannot be explained by its open chain structure.

19. How would you account for the following?

- (i) Frenkel defects are not found in alkali metal halides.
- (ii) Schottky defects lower the density of related solids.
- (iii) Impurity doped silicon is a semiconductor.

OR

19. Explain the following properties giving suitable examples:

- (i) Ferromagnetism
- (ii) Paramagnetism
- (iii) Ferrimagnetism

20. Calculate the temperature at which a solution containing 54 g of glucose, ($\text{C}_6\text{H}_{12}\text{O}_6$), in 250 g of water will freeze.

(K_f for water = $1.86 \text{ K mol}^{-1} \text{ kg}$)

21. Explain the basic principles of following metallurgical operations:

- (i) Zone refining
- (ii) Vapour phase refining
- (iii) Electrolytic refining

22. Explain what is observed when:

- (i) an electrolyte, KCl, is added to hydrated ferric oxide sol
- (ii) an electric current is passed through a colloidal solution
- (iii) a beam of strong light is passed through a colloidal solution

23. Write the names and structures of the monomers of the following polymers:

- (i) Buna-S
- (ii) Neoprene
- (iii) Nylon-6

24. Account for the following observations:

- (i) $\text{p}K_b$ for aniline is more than that for methylamine.
- (ii) Methylamine solution in water reacts with ferric chloride solution to give a precipitate of ferric hydroxide.
- (iii) Aniline does not undergo Friedel-Crafts reaction.

25. (a) What is a ligand? Give an example of a bidentate ligand.

(b) Explain as to how the two complexes of nickel, $[\text{Ni}(\text{CN})_4]^{2-}$ and $\text{Ni}(\text{CO})_4$, have different structures but do not differ in their magnetic behaviour. ($\text{Ni} = 28$)

26. Name the reagents which are used in the following conversions:

- (i) A primary alcohol to an aldehyde
- (ii) Butan-2-one to butan-2-ol
- (iii) Phenol to 2, 4, 6-tribromophenol

27. Write chemical equations for the following processes:

- (i) Chlorine reacts with a hot concentrated solution of sodium hydroxide
- (ii) Orthophosphorous acid is heated
- (iii) PtF_6 and xenon are mixed together

28(a). Assign reasons for the following:

- (i) The enthalpies of atomisation of transition elements are high.
- (ii) The transition metals and many of their compounds act as good catalyst.
- (iii) From element to element the actinoid contraction is greater than the lanthanoid contraction.
- (iv) The E° value for the $\text{Mn}^{3+}/\text{Mn}^{2+}$ couple is much more positive than that for $\text{Cr}^{3+}/\text{Cr}^{2+}$.
- (v) Scandium ($Z = 21$) does not exhibit variable oxidation states and yet it is regarded as a transition element.

OR

28(a). What may be the possible oxidation states of the transition metals with the following d electronic configurations in the ground state of their atoms:

$3d^3 4s^2$, $3d^5 4s^2$ and $3d^6 4s^2$. Indicate relative stability of oxidation states in each case.

28(b). Write steps involved in the preparation of (i) Na_2CrO_4 from chromite ore and (ii) K_2MnO_4 from pyrolusite ore.

29. (a) Derive the general form of the expression for the half-life of a first order reaction.

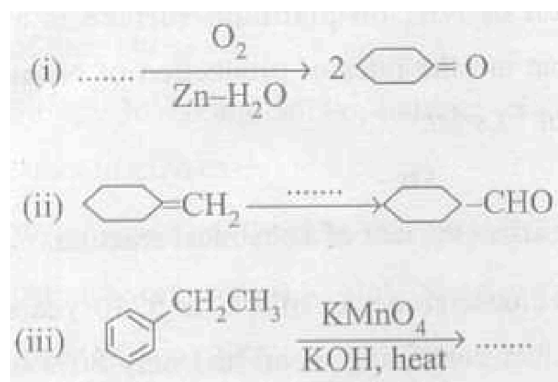
(b) The decomposition of NH_3 on platinum surface is a zero order reaction. What are the rates of production of N_2 and H_2 if $k = 2.5 \times 10^{-4} \text{ mol}^{-1} \text{ L s}^{-1}$?

OR

29. (a) List the factors that affect the rate of a chemical reaction.

(b) The half-life of radioactive decay of ^{14}C is 5730 years. An archaeological artefact containing wood had only 80% of ^{14}C activity found in living tree. Estimate the age of the artefact.

30(a). (a) Complete the following reaction statements by giving the missing starting material, reagent or product as required:



(b) Describe the following reactions:

- (i) Cannizzaro reaction
- (ii) Cross aldol condensation

OR

30(a). How would you account for the following:

- (i) Aldehydes are more reactive than ketones towards nucleophiles.
- (ii) The boiling points of aldehydes and ketones are lower than of the corresponding acids.
- (iii) The aldehydes and ketones undergo a number of addition reactions.

30(b). Give chemical tests to distinguish between:

- (i) Acetaldehyde and benzaldehyde
- (ii) Propanone and propanol

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