

CBSE Class 12 Chemistry 2010 - Set 56/1 (Outside 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.

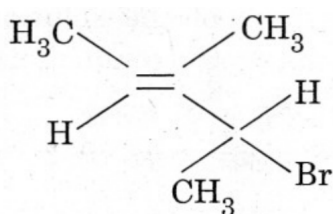
Questions

1. What type of interactions hold the molecules together in polar molecular solids?

2. What is meant by 'limiting molar conductivity'?

3. Fluorine does not exhibit any positive oxidation state. Why?

4. Give the IUPAC name of the following compound:



5. Write the structure of the molecule of a compound whose IUPAC name is 1-phenylpropan-2-ol.

6. What is Tollen's reagent? Write one use of this reagent.

7. What is meant by 'reducing sugars'?

8. What does the designation '6, 6' mean in the name nylon-6,6?

9. Define the terms 'osmosis' and 'osmotic pressure'. What is the advantage of using osmotic pressure as compared to other colligative properties for the determination of molar masses of solutes in solutions?

10. Express the relation among the cell constant, the resistance of the solution in the cell, and the conductivity of the solution. How is the conductivity of a solution related to its molar conductivity?

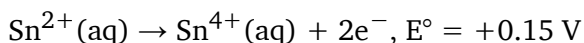
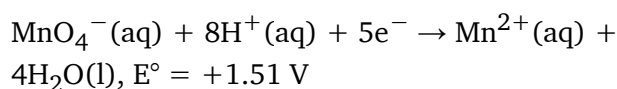
11. Given that the standard electrode potentials (E°) of metals are:

$$\begin{aligned} \text{K}^+/\text{K} &= -2.93 \text{ V}, \text{Ag}^+/\text{Ag} = 0.80 \text{ V}, \text{Cu}^{2+}/\text{Cu} = 0.34 \text{ V}, \\ \text{Mg}^{2+}/\text{Mg} &= -2.37 \text{ V}, \text{Cr}^{3+}/\text{Cr} = -0.74 \text{ V}, \\ \text{Fe}^{2+}/\text{Fe} &= -0.44 \text{ V}. \end{aligned}$$

Arrange these metals in an increasing order of their reducing power.

OR

11. Two half-reactions of an electrochemical cell are given below:



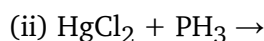
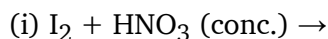
Construct the redox reaction equation from the two half-reactions and calculate the cell potential from the standard potentials, and predict if the reaction is reactant or product favoured.

12. Describe the following:

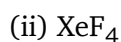
- (i) Tyndall effect
- (ii) Shape-selective catalysis

13. What is meant by coagulation of a colloidal solution? Name any method by which coagulation of lyophobic sols can be carried out.

14. Complete the following chemical reaction equations:



15. Draw the structural formulae of the following compounds:



16. Give the chemical tests to distinguish between the following pairs of compounds:

- (i) Ethylamine and Aniline
- (ii) Aniline and Benzylamine

17. Identify A and B in each of the following processes:

- (i) $\text{CH}_3\text{CH}_2\text{Cl} \xrightarrow{\text{NaCN}} \text{A} \xrightarrow[\text{Ni/H}_2]{\text{reduction}} \text{B}$
- (ii) $\text{C}_6\text{H}_5\text{NH}_2 \xrightarrow{\text{NaNO}_2/\text{HCl}} \text{A} \xrightarrow[\text{OH}^-]{\text{C}_6\text{H}_5\text{NH}_2} \text{B}$

18. Draw the molecular structures of the monomers of

- (i) PVC
- (ii) Teflon

19. The density of copper metal is 8.95 g cm^{-3} . The radius of copper is 127.8 pm. Is the copper unit cell simple cubic, body-centred cubic, or face-centred cubic?

(Given: atomic mass of Cu = 63.54 g mol^{-1} and $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$)

20. What mass of NaCl (molar mass = 58.5 g mol^{-1}) should be dissolved in 65 g of water to lower the freezing point by 7.5°C ? The freezing point depression constant, K_f , for water is $1.86 \text{ K kg mol}^{-1}$. Assume the van't Hoff factor for NaCl is 1.87.

21. Describe the role of the following:

- (i) NaCN in the extraction of silver from a silver ore
- (ii) Iodine in the refining of titanium
- (iii) Cryolite in the metallurgy of aluminium

OR

21. Describe the principle involved in each of the following processes of metallurgy:

- (i) Froth floatation method
- (ii) Electrolytic refining of metals
- (iii) Zone refining of metals

22. Explain the following cases giving appropriate reasons:

- (i) Nickel does not form low spin octahedral complexes.
- (ii) The π -complexes are known for the transition metals only.
- (iii) Co^{2+} is easily oxidized to Co^{3+} in the presence of a strong ligand.

23. How would you differentiate between $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ mechanisms? Give examples of each.

24. How would you convert the following:

- (i) Phenol to benzoquinone
- (ii) Propanone to 2-Methylpropan-2-ol
- (iii) Propene to Propan-2-ol

25. How would you account for the following:

- (i) NCl_3 is an endothermic compound while NF_3 is an exothermic one.
- (ii) XeF_2 is a linear molecule without a bend.
- (iii) The electron gain enthalpy with negative sign for fluorine is less than that for chlorine; still fluorine is a stronger oxidizing agent than chlorine.

26. Amino acids may be acidic, alkaline, or neutral. How does this happen? What are essential and non-essential amino acids? Name one of each type.

27. Explain the following terms with one example in each case:

- (i) Food preservatives
- (ii) Enzymes
- (iii) Detergents

28. (a) Explain the following terms:

- (i) Rate of a reaction
- (ii) Activation energy of a reaction
- (b) The decomposition of phosphine, PH_3 , proceeds according to the following equation:



It is found that the reaction follows the rate equation: $\text{Rate} = k[\text{PH}_3]$

The half-life of PH_3 is 37.9 s at 120°C .

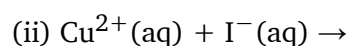
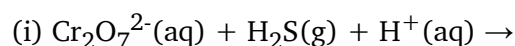
- (i) How much time is required for 3/4th of PH_3 to decompose?
- (ii) What fraction of the original sample of PH_3 remains behind after 1 minute?

OR

28. (a) Explain the following terms:

- (i) Order of a reaction
- (ii) Molecularity of a reaction
- (b) The rate of a reaction increases four times when the temperature changes from 300 K to 320 K. Calculate the energy of activation of the reaction, assuming that it does not change with temperature. ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$)

29. (a) Complete the following chemical equations:

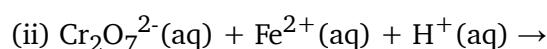
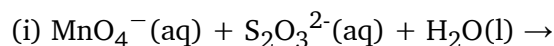


(b) How would you account for the following:

- (i) The oxidising power of oxoanions are in the order $\text{VO}_2^+ < \text{Cr}_2\text{O}_7^{2-} < \text{MnO}_4^-$.
- (ii) The third ionization enthalpy of manganese ($Z = 25$) is exceptionally high.
- (iii) Cr^{2+} is a stronger reducing agent than Fe^{2+} .

OR

29. (a) Complete the following chemical equations:



(b) Explain the following observations giving appropriate reasons:

- (i) The stability of +5 oxidation state decreases down the group in group 15 of the periodic table.
- (ii) Solid phosphorus pentachloride behaves as an ionic compound.
- (iii) Halogens are strong oxidizing agents.

30. (a) Illustrate the following name reactions, giving a chemical equation in each case:

- (i) Clemmensen reaction
- (ii) Cannizzaro's reaction
- (b) Describe how the following conversion can be brought about:
 - (i) Cyclohexanol to Cyclohexan-1-one
 - (ii) Ethylbenzene to Benzoic acid
 - (iii) Bromobenzene to Benzoic acid

OR

30. (a) Illustrate the following name reactions:

- (i) Hell-Volhard-Zelinsky Reaction
- (ii) Wolff-Kishner reduction reaction
- (b) How are the following conversions carried out:
 - (i) Ethyl cyanide to Ethanoic acid
 - (ii) Butan-1-ol to Butanoic acid
 - (iii) Methylbenzene to Benzoic acid

- End of Question Paper -