

## Question Paper 2009 Delhi Set-2

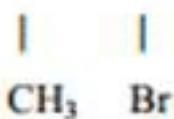
### Class-12 Chemistry

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 8 are very short-answer questions, carrying 1 mark each. Answer these in one word or about one sentence each.
4. Question numbers 9 to 18 are short-answer questions, carrying 2 marks each. Answer these in about 30 words each.
5. Question numbers 19 to 27 are short-answer questions of 3 marks each. Answer these in about 40 words each.
6. Question numbers 28 to 30 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. Which point defect in its crystal units alters the density of a solid? **[1]**
2. Why is the froth flotation method selected for the concentration of Sulphide ores? **[1]**
3. Define the term 'Tyndall effect.' **[1]**
4. Which is a stronger oxidizing agent  $Bi(v)$  or  $Sb(v)$ ? **[1]**
5. Why is an alkylamine more basic than ammonia? **[1]**
6. Write the structure of 3 – oxopentanal. **[1]**
7. Give the IUPAC name of the following compound: **[1]**



**8.** Give an example of elastomers. **[1]**

**9.** Explain the role of **[2]**

(i) Cryolite in the electrolytic reduction of alumina.

(ii) Carbon monoxide in the purification of nickel.

**10.** A reaction is of second order with respect to a reactant. How will the rate of reaction **[2]**

(i) doubled,

(ii) Reduced to half?

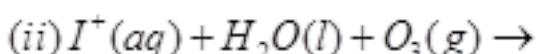
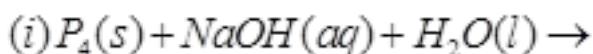
**11.** Differentiate between molality and molarity of solution. What is the effect of change in temperature of a solution on its molality and molarity? **[2]**

**12.** Draw the structures of the following molecules: **[2]**

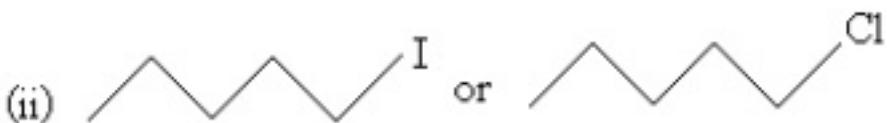
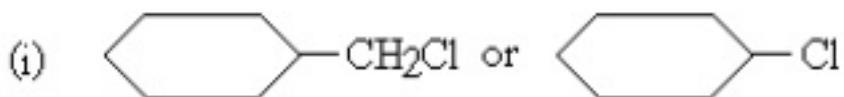
(i)  $\text{XeF}_4$

(ii)  $\text{BrF}_3$

**13.** Complete the following chemical reaction equations: **[2]**



**14.** Which ones in the following Pairs of substances undergoes  $\text{S}_N2$  substitution reaction faster and why? **[2]**

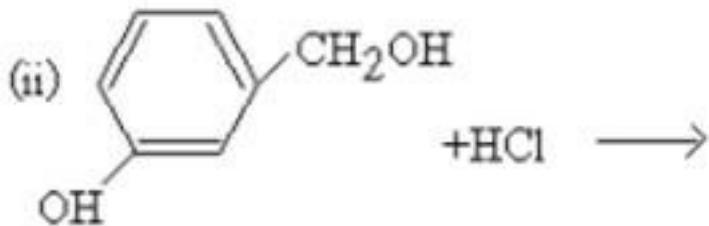
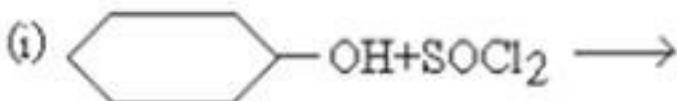


**15.** Explain what is meant by [2]

(i) a peptide linkage

(ii) a glycosidic linkage

**16.** Complete the following reaction equations: [2]



**17.** Draw the structures of the monomers of the following polymers: [2]

(i) Teflon

(ii) Polythene

OR

What is the repeating unit in the condensation polymer obtained by combining *HO<sub>2</sub>CCH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>H (succinic acid)* and *H<sub>2</sub>NCH<sub>2</sub>CH<sub>2</sub>NH<sub>2</sub> (ethylene diamine)*.

**18.** Name two water soluble vitamins, their sources and the diseases caused due to their deficiency in diet. [2]

**19.** 100 mg of a protein is dissolved in just enough water to make 10.0 mL of solution. If

this solution has an osmotic pressure of  $13.3 \text{ mm Hg}$  at  $25^\circ\text{C}$ , what is the molar mass of the protein? [3]

( $R = 0.0821 \text{ L atm mol}^{-1}\text{K}^{-1}$  and  $760 \text{ mm Hg} = 1 \text{ atm}$ .)

20. Iron has a body centred cubic unit cell with a cell edge of  $286.65 \text{ pm}$ . The density of iron is  $7.87 \text{ g cm}^{-3}$ . Use this information to calculate Avogadro's number (*At. Mass of Fe = 56 g mol<sup>-1</sup>*). [3]

21. What is the difference between multimolecular and macromolecular colloids? Give one example of each. How are associated colloids different from these two types of colloids? [3]

22. A first order reaction has a rate constant of  $0.0051 \text{ min}^{-1}$ . If we begin with  $0.10 \text{ M}$  concentration of the reactant, what concentration of reactant will remain in solution after 3 hours? [3]

23. For the complex  $[\text{Fe}(\text{en})_2\text{Cl}_2]\text{Cl}$ , (*en = ethylene diamine*), identify [3]

- (i) the oxidation number of iron,
- (ii) the hybrid orbitals and the shape of the complex,
- (iii) the magnetic behaviour of the complex,
- (iv) the number of geometrical isomers,
- (v) whether there is an optical isomer also, and
- (vi) name of the complex, (At. no. of Fe = 26)

24. Explain the following observations: [3]

- (i) Fluorine does not exhibit any positive oxidation state.
- (ii) The majority of known noble gas compounds are those of Xenon.
- (iii) Phosphorus is much more reactive than nitrogen.

25. Giving an example for each describe the following reactions: [3]

(i) Hofmann's bromamide reaction

(ii) Gatterman reaction

(iii) A coupling reaction

**26.** Explain the mechanism of the following reactions: [3]

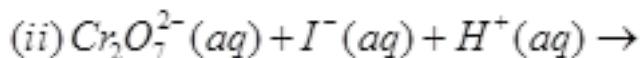
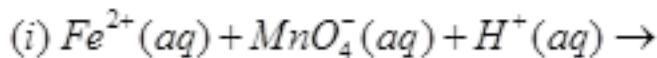
(i) Addition of Grignard's reagent to the carbonyl group of a compound forming an adduct followed by hydrolysis.

(ii) Acid catalysed dehydration of an alcohol forming an alkene.

(iii) Acid catalysed hydration of an alkene forming an alcohol.

**27.** How do antiseptics differ from disinfectants? Give one example of each type. [3]

**28.** (a) Complete the following chemical reaction equations: [5]



(b) Explain the following observations:

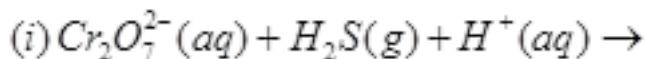
(i) Transition elements are known to form many interstitial compounds.

(ii) With the same  $d^4$  *d-orbital* configuration  $Cr^{2+}$  ion is reducing while  $Mn^{3+}$  ion is oxidising.

(iii) The enthalpies of atomization of the transition elements are quite high.

OR

(a) Complete the following chemical reaction equations:



(b) Explain the following observations:

- (i) Transition metals form compounds which are usually coloured.
- (ii) Transition metals exhibit variable oxidation states.
- (iii) The actinoids exhibit a greater range of oxidation states than the lanthanoids.

**29.** (a) What type of a cell is the lead storage battery? Write the anode and the cathode reactions and the overall reaction occurring in a lead storage battery while operating. [5]

(b) A voltaic cell is set up at  $25^\circ C$  with the half-cells,  $Al | Al^{3+} (0.001 M)$  and  $Ni | Ni^{2+} (0.50 M)$ .

Write the equation for the reaction that occurs when the cell generates an electric current and determine the cell potential.

(Given:  $E_{Ni^{2+}|Ni}^0 = -0.25 V$ ,  $E_{Al^{3+}|Al}^0 = -1.66$ )

OR

(a) Express the relationship amongst cell constant, resistance of the solution in the cell and conductivity of the solution. How is molar conductivity of a solute related to conductivity of its solution?

(b) Calculate the equilibrium constant for the reaction



(Given:  $E_{Cd^{2+}|Cd}^0 = 0.40 V$ ,  $E_{Fe^{2+}|Fe}^0 = -0.44 V$ ).

**30.** (a) Illustrate the following name reactions by giving example: [5]

(i) Cannizzaro's reaction

(ii) Clemmensen reduction

(b) An organic compound A contains 69.77% carbon, 11.63% hydrogen and rest

oxygen. The molecular mass of the compound is 86. It does not reduce Tollen's reagent but forms an addition compound with sodium hydrogen sulphite and gives a positive iodoform test. On vigorous oxidation it yields ethanoic and propanoic acids. Derive the possible structure of compound A.

OR

(a) How are the following obtained?

- (i) Benzoic acid from ethyl benzene.
- (ii) Benzaldehyde from toluene.

(b) Complete each synthesis by giving the missing material, reagent or products:

