

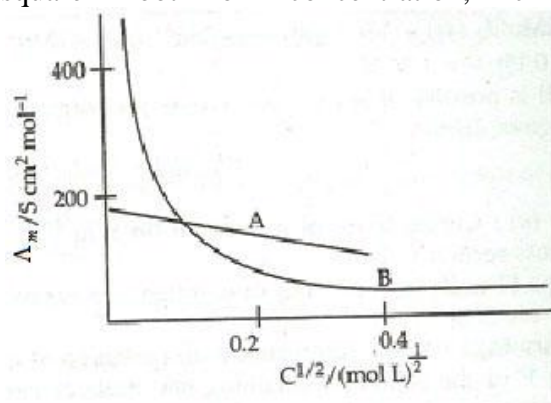
SAMPLE QUESTION PAPER
CLASS XII
CHEMISTRY

Time: 3 hrs

MM: 70

GENERAL INSTRUCTIONS:

1. All the questions are compulsory.
 2. Q. No. 1 to 5 are very short answer type, carrying 1 mark each.
 3. Q. No. 6 to 10 are short answer type, carrying 2 marks each.
 4. Q. No. 11 to 22 are short answer type, carrying 3 marks each.
 5. Q.No.23 is a value based question carrying 4 marks.
 6. Q. No. 24 to 26 are long answer type, carrying 5 marks each.
 7. Use of calculators is not allowed, use log tables wherever required.
1. Name the non stoichiometric point defect responsible for colour in alkali metal halides.
 2. What is shape selective catalysis?
 3. Amongst the isomeric alkanes of molecular formula C_5H_{12} , identify the one that on photochemical chlorination yields a single monochloride.
 4. Give the IUPAC name and structure of the amine obtained when 3-chlorobutanamide undergoes Hoffmann –bromamide reaction.
 5. How many ions are produced from the complex, $[Co (NH_3)_6]Cl_2$ in solution?
 6. Will the elevation in boiling point be same if 0.1 mol of Sodium chloride or 0.1 mol of sugar is dissolved in 1L of water? Explain.
 7. The following curve is obtained when molar conductivity (Λ_m) is plotted against the square root of concentration, $c^{1/2}$ for two electrolytes A and B



- (a) How do you account for the increase in the molar conductivity of the electrolyte A on dilution.

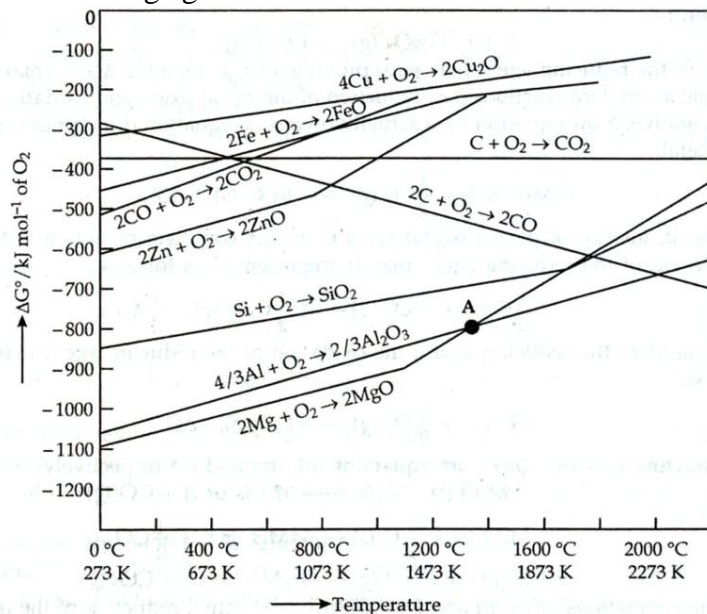
- (b) As seen from the graph, the value of limiting molar conductivity (Λ_m°) for electrolyte B cannot be obtained graphically. How can this value be obtained?
8. Name the following:
- A transition metal which does not exhibit variation in oxidation state in its compounds.
 - A compound where the transition metal is in the +7 oxidation state.
 - A member of the lanthanoid series which is well known to exhibit +4 oxidation state.
 - Ore used in the preparation of Potassium dichromate.
9. Arrange the following in order of property indicated for each set:
- F_2 , Cl_2 , Br_2 , I_2 – increasing bond dissociation enthalpy
 - PH_3 , AsH_3 , BiH_3 , SbH_3 , NH_3 – increasing base strength
10. (a) Predict the major product of acid catalysed dehydration of 1-Methylcyclohexanol.
 (b) You are given benzene, conc. H_2SO_4 , NaOH and dil.HCl. Write the preparation of phenol using these reagents.

OR

Draw the structures of any two isomeric alcohols (other than 1° alcohols) having molecular formula $C_5H_{12}O$ and give their IUPAC names.

11. An element occurs in the bcc structure with cell edge of 288 pm. The density of the element is 7.2 g cm^{-3} . How many atoms of the element does 208g of the element contain?
12. Calculate the boiling point of a 1M aqueous solution (density 1.04 g mL^{-1}) of Potassium chloride (K_b for water = $0.52 \text{ K kg mol}^{-1}$, Atomic masses: K=39u, Cl=39.9u)
 Assume, Potassium chloride is completely dissociated in solution
13. A galvanic cell consists of a metallic zinc plate immersed in 0.1M $Zn(NO_3)_2$ solution and metallic plate of lead in 0.02M $Pb(NO_3)_2$ solution. Calculate the emf of the cell. Write the chemical equation for the electrode reactions and represent the cell.
 (Given: $E^\circ_{Zn^{2+}/Zn} = -0.76V$; $E^\circ_{Pb^{2+}/Pb} = -0.13V$)
14. Answer the following questions:
- What happens when a freshly precipitated $Fe(OH)_3$ is shaken with a little amount of dilute solution of $FeCl_3$?
 - Why are lyophilic colloidal sols more stable than lyophobic colloidal sols?
 - What form Freundlich adsorption equation will take at high pressure?

15. What chemical principle is involved in choosing a reducing agent for getting the metal from its oxide ore? Consider the metal oxides, Al_2O_3 and FeO and justify the choice of reducing agent in each case.



OR

Account for the following facts:

- the reduction of a metal oxide is easier if the metal formed is in the liquid state at the temperature of reduction.
- Limestone is used in the manufacture of pig iron from haematite.
- Pine oil is used in the froth floatation process used to concentrate sulphide ores.

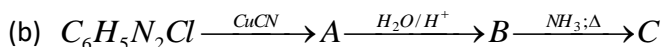
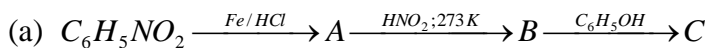
16. (i) For M^{2+}/M and $\text{M}^{3+}/\text{M}^{2+}$ systems, E° values for some metals are as follows:
- | | |
|---|--|
| $\text{Cr}^{2+}/\text{Cr} = -0.9\text{V}$ | $\text{Cr}^{3+}/\text{Cr}^{2+} = -0.4\text{V}$ |
| $\text{Mn}^{2+}/\text{Mn} = -1.2\text{V}$ | $\text{Mn}^{3+}/\text{Mn}^{2+} = +1.5\text{V}$ |
| $\text{Fe}^{2+}/\text{Fe} = -0.4\text{V}$ | $\text{Fe}^{3+}/\text{Fe}^{2+} = +0.8\text{V}$ |

Use this data to comment upon

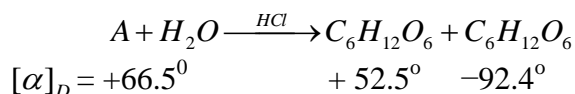
- the stability of Fe^{3+} in acid solution as compared to that of Cr^{3+} and Mn^{3+}
 - the ease with which iron can be oxidised as compared to the similar process for either Cr or Mn metals
- (ii) What can be inferred from the magnetic moment of the complex $\text{K}_4[\text{Mn}(\text{CN})_6]$ Magnetic moment: 2.2 BM?
17. (i) Describe the type of hybridisation for the complex ion $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$.
- (ii) Write the IUPAC name of the ionisation isomer of the coordination compound $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$. Give one chemical test to distinguish between the two compounds.

18. (a) Explain why the dipole moment of chlorobenzene is lower than that of cyclohexyl chloride.
 (b) An optically active compound having molecular formula $C_7H_{15}Br$ reacts with aqueous KOH to give a racemic mixture of products. Write the mechanism involved in this reaction.

19. Give the structures of A, B and C in the following reactions:



20. (a) A non reducing disaccharide 'A' on hydrolysis with dilute acid gives an equimolar mixture of D-(+)-glucose and D-(-)-Fructose.



Identify A. What is the mixture of D-(+)- glucose and D-(-)-Fructose known as? Name the linkage that holds the two units in the disaccharide.

- (b) α -amino acids have relatively higher melting points than the corresponding halo acids. Explain.
21. (a) Pick out the odd one from among the following on the basis of their medicinal properties mentioning the reason: Luminal, Seconal, Phenacetin, Equanil.
 (b) Give an example of a substance that can act as a disinfectant as well as antiseptic depending upon its concentration. (Specify concentration)
 (c) Name any two macromolecules chosen as drug targets.
22. The following is not an appropriate reaction for the preparation of tert.-butyl ethyl ether:
- $$C_2H_5ONa + (CH_3)_3C-Cl \rightarrow (CH_3)_3C-OC_2H_5$$
- (i) What would be the major product of the given reaction?
 (ii) Write a suitable reaction for the preparation of tert.-butyl ethyl ether, specifying the names of reagents used.
 Justify your answer in both cases.

23. Study the given passage carefully and answer the questions that follow:

Shalini studied a chapter on Polymers in school and came across the following paragraph:

The durability, strength, low cost, water and chemicals resistance, welding properties, lesser energy, fewer atmosphere emissions and light weight are advantages of plastic bags.

Shalini is confused as she has been reading in the newspaper about the ban on the usage of plastic substances.

She further finds that despite the durability, the use of these materials has presented mankind with serious waste disposal problem as these materials do not disintegrate by themselves. In view of this, certain polymers are being developed which are broken down rapidly by microorganisms. Shalini feels relaxed that such kinds of biomaterials are being developed.

- (a) Name the class of these useful polymers which do not harm the environment.
- (b) Give any one example of these polymers and name its monomers.
- (c) Comment on the qualities of Shalini.

24. (a) Give a plausible explanation for each one of the following:

- (i) Although phenoxide ion has more number of resonating structures than carboxylate ion, carboxylic acid is a stronger acid than phenol.
- (ii) There are two -NH_2 groups in semicarbazide. However, only one is involved in the formation of semicarbazones.

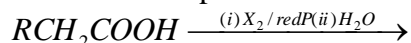
(b) Carry out the following conversions in not more than two steps:

- (i) Phenyl magnesium bromide to benzoic acid.
- (ii) Acetaldehyde to But-2-enal.
- (iii) Benzene to m-Nitroacetophenone

OR

(a) Give a simple chemical test to distinguish between the pair of organic compounds:
Ethanal and Propanal

(b) Name and complete the following chemical reaction:



(c) Draw the structures of the following derivatives:

- (i) The 2,4-Dinitrophenylhydrazone of benzaldehyde
- (ii) Acetaldehydedimethyl acetal
- (iii) Cyclopropanone oxime

25. (a) Write the rate law for a first order reaction. Justify the statement that half life for a first order reaction is independent of the initial concentration of the reactant.

(b) For a first order reaction, show that the time required for 99% completion of a first order reaction is twice the time required for the completion of 90%.

OR

- (a) For the reaction $A \rightarrow B$, the rate of reaction becomes twenty seven times when the concentration of A is increased three times. What is the order of the reaction?
- (b) The activation energy of a reaction is 75.2 kJmol^{-1} in the absence of a catalyst and it lowers to 50.14 kJmol^{-1} with a catalyst. How many times will the rate of reaction grow in the presence of a catalyst if the reaction proceeds at 25°C ?
26. (a) Write balanced chemical equations for the following:
- Complete hydrolysis of XeF_6 .
 - Disproportionation reaction of orthophosphorus acid.
- (b) Draw the structure of a noble gas species which is isostructural with BrO_3^- .
- (c) Considering the parameters such as bond dissociation enthalpy, electron gain enthalpy and hydration enthalpy, compare the oxidising power of F_2 and Cl_2 .
- (d) Why is $K_{a_2} \ll K_{a_1}$ for H_2SO_4 in water?

OR

Explain the following:

- Hydrogen fluoride is a weaker acid than hydrogen chloride in aqueous solution..
- PCl_5 is ionic in nature in the solid state.
- SF_6 is inert towards hydrolysis.
- H_3PO_3 is diprotic.
- Out of noble gases only Xenon is known to form established chemical compounds.