SET-B

S.S. PUBLIC SCHOOL

HALIYAPUR SULTANPUR

Class: 12 Subject : Chemistry

PRE BOARD-I EXAMINATION 2024-25

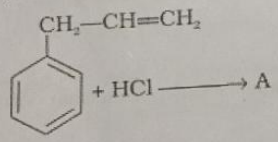
General Instructions:

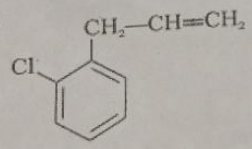
Read the following instructions carefully.

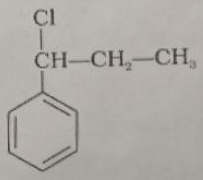
1. There are **33** questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 very short answer questions carrying 2 marks each.
4. SECTION C consists of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. **All questions are compulsory.**
8. **Use of log tables and calculators is not allowed.**

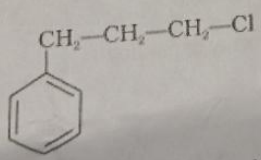
Section A

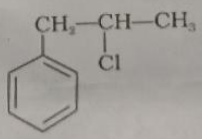
1. What is **A** in the following reaction? **[1]**



a) 

b) 

c) 

d) 

2. Two nucleic acid chains are wound about each other and held together by hydrogen bonds between pairs of bases, this is called **[1]**

a) Secondary structure of DNA
b) Primary structure of DNA
c) Secondary structure of RNA
d) Primary structure of RNA

3. An organic compound X is oxidized by using acidified $K_2Cr_2O_7$. The product obtained reacts with Phenyl hydrazine but does not answer the silver mirror test. The possible structure of X is: **[1]**

a) $(CH_3)_2CHOH$ b) $(CH_4)_2CH_3OH$

c) CH_3CHO d) CH_3CH_2OH

4. The reagent which does not react with both acetone and benzaldehyde.

a) Sodium hydrogensulphite b) Phenyl hydrazine

c) Fehling's solution d) Grignard reagent

5. As temperature increases, the reaction rate: [1]

a) First decreases then increases b) Increases

c) Decreases d) Stays the same

6. Match the items of column I with appropriate entries of column II. [1]

Column I	Column II
(a) K_b	(i) Elevation in boiling point
(b) K_f	(ii) Van't Hoff factor
(c) i	(iii) Cryoscopic constant
(d) $\triangle T_b$	(iv) Ebullioscopic constant

a) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv) b) (a) - (ii), (b) - (i), (c) - (iii), (d) - (iv)

c) (a) - (iii), (b) - (iv), (c) - (i), (d) - (ii) d) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)

7. Racemisation occurs in [1]

a) S_N2 reaction b) S_N2 reaction as well as S_N1 reaction

c) Neither S_N1 nor S_N2 reactions d) S_N1 reaction

8. The magnetic moment is associated with its spin angular momentum and orbital angular momentum. Spin only magnetic moment value of Cr^{3+} ion is _____. [1]

a) 2.87 B.M b) 3.87 B.M

c) 3.57 B.M d) 3.47 B.M

9. The role of a catalyst is to change _____. [1]

a) gibbs energy of reaction b) equilibrium constant

c) enthalpy of reaction d) activation energy of reaction

10. Which is the most suitable reagent for the following conversion? [1]

$$CH_3 - CH = CH - CH_2 - \overset{O}{\overset{\|}{C}} - CH_3 \longrightarrow CH_3 - CH = CH - CH_2 - \overset{O}{\overset{\|}{C}} - OH$$

a) I_2 and NaOH solution b) Tollen's reagent

c) Sn and NaOH solution d) Benzoyl peroxide

11. An organic compound containing oxygen, upon oxidation forms a carboxylic acid as the only organic product with its molecular mass higher by 14 units. The organic compound is _____. [1]

a) a ketone b) a primary alcohol

c) an aldehyde

d) a secondary alcohol

12. Propanamide on reaction with bromine in aqueous NaOH gives: [1]

a) Ethanamine

b) N-Methyl ethanamine

c) Propanamine

d) Propanenitrile

13. **Assertion (A):** D(-)-Ribose on consecutive treatment with $\frac{Br_2}{H_2O}, \frac{H_2O_2}{Fe_2(SO_4)_3}$ gives D(-)-erythrose. [1]

Reason (R): $\frac{Br_2}{H_2O}, \frac{H_2O_2}{Fe^{2+}}$ is used in Ruff degradation method and D(-)-ribose and D(-)-erythrose differ only in one carbon atom.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

14. **Assertion (A):** Carbonyl compounds do not show intermolecular hydrogen bonding. [1]

Reason (R): Boiling points of carbonyl compounds are lower than alkanes.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

15. Alkyl halides are insoluble in water [1]

a) the force of attraction between the alkyl halide and water is weaker and cannot overcome the force of attraction between alkyl halide and alkyl halide as also that of water and water molecules

b) alkyl halides are non polar compounds

c) high energy is released when new attractions are set up between the haloalkane and the water molecules

d) weak hydrogen bonds exist between water molecules

16. **Assertion (A):** Tert. butyl methyl ether is not prepared by the reaction of tert. butyl bromide with sodium methoxide. [1]

Reason (R): Sodium methoxide is a strong nucleophile.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

Section B

17. Give some example showing importance of complexes in biological system? [2]

18. Write balanced equations to represent what happens when [2]

i. Acidified $KMnO_4$ solution reacts with iron (II) ions

ii. Pyrolusite is fused with KOH in the presence of air

19. **Answer the following:** [1]

(a) Give two examples of non-chemical process which obeys the first order kinetics [1]

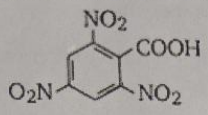
(b) Define half life period of a reaction

20. If the density of some lake water is 1.25 g mL^{-1} and contains 92 g of Na^+ ions per kg of water, calculate the molarity of Na^+ ions in the lake.

OR

Obtain a relationship between relative lowering of vapour pressure and mole fraction of solute?

21. Give the IUPAC name of the following compound :- [2]



Section C

22. Write electrode reactions taking place in Ni - Cd cell. Is it primary or secondary cell? [3]

23. A first order decomposition reaction takes 40 minutes for 30% decomposition, calculate $t_{1/2}$ value for it. [3]

24. Write structures of the compounds whose IUPAC names are as follows: [3]

i. 2, 3 - diethylphenol

ii. 1-Ethoxypropane

iii. 2-Ethoxy-3-methylpentaine

OR

Why is the C-O-H bond angle in alcohols slightly less than the tetrahedral angle whereas the C-O-C bond angle in ether is slightly greater?

25. Write the reactions involved in the following reactions: [3]

i. Clemmensen reduction

ii. Cannizzaro reaction

26. Depict the galvanic cell in which the reaction: [3]

$Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$

takes place. Further show:

i. Which of the electrodes is negatively charged?

ii. The carries of current in the cell.

iii. Individual reaction at each electrode.

27. How the following conversions can be carried out? [3]

i. Ethanol to propanenitrile

ii. Aniline to chlorobenzene

iii. 2-Chlorobutane to 3, 4-dimethylhexane

28. Calculate the emf of the following cell: [3]

Zn (s) | Zn^{2+} (0·01 M) || (0·001 M) $^{Ag+}$ | Ag (s)

Given : $E^{\ominus}_{Zn^{2+}/Zn}$ = -0·76 V and

$E^{\ominus}_{Ag^+/Ag}$ = +0·80 V

[log 2 = 0·3010, log 3 = 0·4771, log 10 = 1]

Section D

29. **Read the following text carefully and answer the questions that follow:** [4]

The transition metals when exposed to oxygen at low and intermediate temperatures form thin, protective oxide films of up to some thousands of Angstroms in thickness. Transition metal oxides lie between the extremes of ionic and covalent binary compounds formed by elements from the left or right side of the periodic table. They

range from metallic to semiconducting and deviate by both large and small degrees from stoichiometry. Since d-electron bonding levels are involved, the cations-exist in various valence states and hence give rise to a large number of oxides. The crystal structures are often classified by considering a cubic or hexagonal close-packed lattice of one set of ions with the other set of ions filling the octahedral or tetrahedral interstices. The actual oxide structures, however, generally show departures from such regular arrays due in part to distortions caused by packing of ions of different size and to ligand field effects. These distortions depend not only on the number of d-electrons but also on the valence and the position of the transition metal in a period or group.

i. Why does copper, which is in first series of transition metal exhibits +1 oxidation state most frequently? (1)

ii. The lowest oxide of transition metal is basic. Why? (1)

iii. The variability in oxidation states of d-block different from that of the p-block elements. Explain. (2)

OR

Crystal structure of oxides of transition metals often show defects. Given reason. (2)

30. **Read the following text carefully and answer the questions that follow:** **[4]**

A raw mango placed in concentrated salt solution loses water via osmosis and shrivel into pickle. Wilted flowers revive when placed in fresh water. A carrot that has become limp because of water loss into the atmosphere can be placed into the water making it firm once again. Water will move into its cells through osmosis. When placed in water containing less than 0.9% (mass/volume) salt, blood cells swell due to flow of water in them by osmosis.

i. People taking a lot of salt or salty food suffer from puffiness or edema. What is the reason behind this?

ii. The preservation of meat by salting and of fruits by adding sugar protects against bacterial action. How?

iii. Why the direction of osmosis gets reversed if a pressure larger than the osmotic pressure is applied to the solution side? Write its one application.

OR

What care is generally taken during intravenous injections and why?

Section E

31. **Attempt any five of the following:** **[5]**

(a) Name the deficiency disease resulting from lack of vitamin A and E in the diet. **[1]**

(b) Differentiate between: **[1]**

i. Peptide linkage and Glycosidic linkage

ii. Nucleoside and Nucleotide

(c) Give an example of fibrous protein. **[1]**

(d) Which vitamin B group can be stored in our body? **[1]**

(e) What is the structural feature characterising reducing sugars? **[1]**

(f) What are any two good sources of vitamin A? **[1]**

(g) Which vitamin is linked with anti-sterility? **[1]**

32. Draw all the isomers of: (geometrical and optical) **[5]**

i. $[CoCl_2(en)_2]^+$

ii. $[Co(NH_3)Cl(en)^2]^{2+}$

iii. $[Co(NH_3)_2Cl_2(en)]^+$

a. i. For the complex $[Fe(H_2O)_6]^{3+}$, write the hybridization magnetic character and spin of the complex. (At. number : Fe = 26).

ii. Draw one of the geometrical isomers of the complex $[Pt(en)_2CI_2]^{2+}$ which is optically inactive.

b. i. Using crystal field theory, write the electronic configuration of iron ion in the following complex ion. Also predict its magnetic behaviour: $[Fe(H_2O)_6]^{2+}$

ii. Write the IUPAC name of the coordination complex: $[CoCl_2(en)_2]NO_3$

33. Write short notes on the following: **[5]**

i. Carbylamine reaction

ii. Diazotisation

iii. Hofmann's bromamide reaction

iv. Coupling reaction

v. Ammonolysis

OR

Give one chemical test to distinguish between the following pairs of compounds:

i. Methylamine and dimethylamine

ii. Secondary and tertiary amines

iii. Ethylamine and aniline

iv. Aniline and benzylamine

v. Aniline and N-methyl aniline