

PRACTICE PAPER-2 (CLASS-XII)
CHEMISTRY

Time Allowed: 3 Hours

Maximum Marks: 70

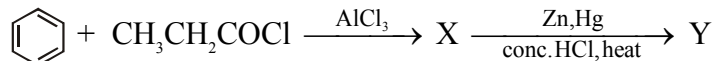
General Instructions :

- There are 35 questions in this question paper with internal choice.
- SECTION A consists of 18 multiple-choice questions carrying 1 mark each.
- SECTION B consists of 7 very short answer questions carrying 2 marks each.
- SECTION C consists of 5 short answer questions carrying 3 marks each.
- SECTION D consists of 2 case-based questions carrying 4 marks each.
- SECTION E consists of 3 long answer questions carrying 5 marks each.
- All questions are compulsory.
- Use of log tables and calculators is not allowed.

SECTION – A

The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.

1. In the following sequence of reactions



The product (Y) is :

- | | |
|---|---|
| (a) PhCOCH ₂ CH ₃ | (b) PhCHOHCH ₂ CH ₃ |
| (c) PhCH ₂ CH ₂ CH ₃ | (d) PhCH = CHCH ₃ |
- Which of the following B group vitamins can be stored in our body ?

(a) Vitamin B ₁	(b) Vitamin B ₂
(c) Vitamin B ₆	(d) Vitamin B ₁₂
 - The pair [Co(NH₃)₄Cl₂]Br₂ and [Co(NH₃)₄Br₂]Cl₂ will show

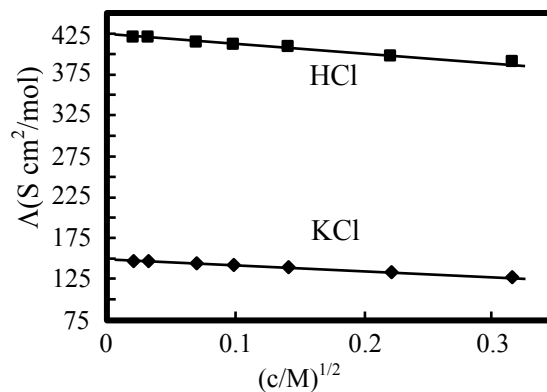
(a) Linkage isomerism	(b) Hydrate isomerism
(c) Ionization isomerism	(d) Coordinate isomerism
 - Which reagent will you use for the following reaction ?

$$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3 \longrightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl} + \text{CH}_3\text{CH}_2\text{CHClCH}_3$$

(a) Cl ₂ / UV light	(b) NaCl + H ₂ SO ₄
(c) Cl ₂ gas in dark	(d) Cl ₂ gas in the presence of iron in dark
 - Which of the following statements is not correct for amines?

(a) Most alkyl amines are more basic than ammonia solution.
(b) pK _b value of ethylamine is lower than benzylamine.
(c) CH ₃ NH ₂ on reaction with nitrous acid releases NO ₂ gas.
(d) None of these

6. Total number of unpaired electrons present in Co^{2+} (Atomic number = 27) is
 (a) 2 (b) 7 (c) 3 (d) 5
7. The major product of acid catalysed dehydration of 1-methylcyclohexanol is:
 (a) 1-methylcyclohexane (b) 1-methylcyclohexene
 (c) 1-cyclohexylmethanol (d) 1-methylenecyclohexane
8. A first order reaction is 50% completed in 1.26×10^{14} s. How much time would it take for 100% completion ?
 (a) 1.26×10^{15} s (b) 2.52×10^{14} s (c) 2.52×10^{28} s (d) infinite
9. 50 mL of an aqueous solution of glucose $\text{C}_6\text{H}_{12}\text{O}_6$ (Molar mass : 180 g/mol) contains 6.02×10^{22} molecules. The concentration of the solution will be
 (a) 0.1 M (b) 0.2 M (c) 1.0 M (d) 2.0 M
10. The molar conductivity of CH_3COOH at infinite dilution is $390 \text{ Scm}^2/\text{mol}$. Using the graph and given information, the molar conductivity of CH_3COOK will be:



- (a) $100 \text{ Scm}^2/\text{mol}$ (b) $115 \text{ Scm}^2/\text{mol}$ (c) $150 \text{ Scm}^2/\text{mol}$ (d) $125 \text{ Scm}^2/\text{mol}$
11. Which of the following is a disaccharide ?
 (a) Starch (b) Maltose (c) Fructose (d) Glucose
12. The correct IUPAC name of $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ is :-
 (a) Diamminedichloridoplatinum (II) (b) Diamminedichloridoplatinum (IV)
 (c) Diamminedichloridoplatinum (0) (d) Dichloridodiammineplatinum (IV)
13. Which one of the following compounds is more reactive towards $\text{S}_{\text{N}}1$ reaction?
 (a) $\text{CH}_2 = \text{CHCH}_2\text{Br}$ (b) $\text{C}_6\text{H}_5\text{CH}_2\text{Br}$
 (c) $\text{C}_6\text{H}_5\text{CH}(\text{C}_6\text{H}_5)\text{Br}$ (d) $\text{C}_6\text{H}_5\text{CH}(\text{CH}_3)\text{Br}$
14. Indicate which nitrogen compound amongst the following would undergo Hoffmann reaction (i.e. reaction with Br_2 and strong KOH) to furnish the primary amine ($\text{R} - \text{NH}_2$)
 (a) RCONHCH_3 (b) $\text{RCO}^{\ominus}\text{O}^{\oplus}\text{NH}_4$
 (c) RCONH_2 (d) $\text{R} - \text{CONHOH}$

(15-18) Given below are two statements labelled as Assertion (A) and Reason (R)

- (a) Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).
 (b) Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).
 (c) Assertion (A) is correct, but Reason (R) is wrong statement.
 (d) Assertion (A) is wrong, but Reason (R) is correct statement.
15. **Assertion :** KCN reacts with methyl chloride to give methyl isocyanide.
Reason : CN^- is an ambident nucleophile.
16. **Assertion (A):** Tertiary amines are more basic than corresponding secondary and primary amines in gaseous state.
Reason (R): Tertiary amines have three alkyl groups which cause +I effect.
17. **Assertion (A) :** Hydrolysis of an ester follows first order kinetics.
Reason (R) : Concentration of water remains nearly constant during the course of the reaction.
18. **Assertion (A) :** Transition metals have low melting points.
Reason (R) : The involvement of greater number of $(n - 1)d$ and ns electrons in the interatomic metallic bonding.

SECTION – B

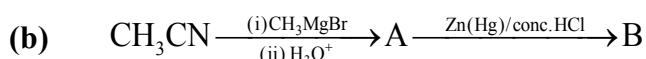
This section contains 7 questions with internal choice in two questions. The following questions are very short answer type and carry 2 marks each.

19. Calculate the mass of ascorbic acid (Molar mass = 176g mol^{-1}) to be dissolved in 75g of acetic acid, to lower its freezing point by 1.5°C . ($K_f = 3.9\text{ K kg mol}^{-1}$)
20. Account for the following:
 (a) There are 5 OH groups in glucose
 (b) Glucose is a reducing sugar

OR

What happens when D – glucose is treated with the following reagents

- (a) Bromine water
 (b) HNO_3
21. Write structures of main compounds A and B in each of the following reactions :

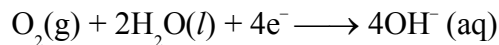


OR

What happens when

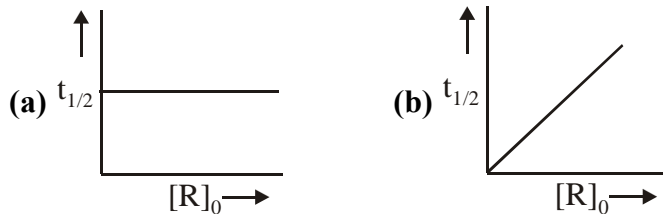
- (a) Propanone is treated with methylmagnesium bromide and then hydrolysed, and
 (b) benzene is treated with CH_3COCl in the presence of anhydrous AlCl_3

22. Write the mechanism for the preparation of alkenes from alcohols.
23. Corrosion is an electrochemical phenomenon. The oxygen in moist air reacts as follows:



Write down the possible reactions for corrosion of zinc occurring at anode, cathode, and overall reaction to form a white layer of zinc hydroxide.

24. Define order of reaction. Predict the order of reaction in the given graphs :



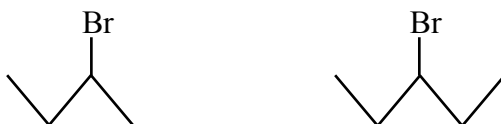
where $[\text{R}]_0$ is the initial concentration of reactant and $t_{1/2}$ is half-life.

25. Account for the following :
- (a) Actinoids show a wide range of oxidation states.
- (b) Transition metals form coloured compounds.

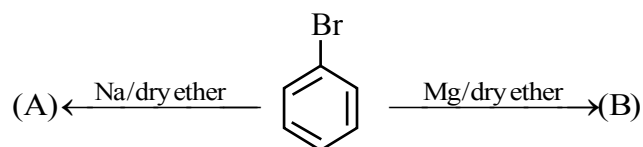
SECTION – C

This section contains 5 questions with internal choice in two questions. The following questions are short answer type and carry 3 marks each.

26. Using Valence bond theory, explain the following in relation to the paramagnetic complex $[\text{Mn}(\text{CN})_6]^{3-}$
- (a) type of hybridization
- (b) magnetic moment value
- (c) type of complex – inner, outer orbital complex
27. (a) Copper (I) compounds are white whereas Copper (II) compounds are coloured.
- (b) Chromates change their colour when kept in an acidic solution.
- (c) Zn, Cd, Hg are considered as d-block elements but not as transition elements.
28. (a) Write the product when D-glucose reacts with conc. HNO_3 .
- (b) Amino acids show amphoteric behaviour. Why ?
- (c) Write one difference between α -helix and β -pleated structures of proteins.
29. **Attempt any three.**
- (a) Write the structure of major alkene formed by β -elimination of 2,2,3-trimethyl-3-bromopentane with sodium ethoxide in ethanol.
- (b) Which one of the compounds in the following pairs is chiral ?



- (c) Identify (A) and (B) in the following :



- (d) What happens when benze diazonium chloride reacts with potassium iodide? (write only equation of the reaction).

30. Give reasons:

- Aniline is acetylated before nitration reaction.
- pK_b of aniline is lower than the m-nitroaniline.
- Although –NH₂ is o/p directing group, yet aniline on nitration gives a significant amount of m-nitroaniline.

OR

Give reasons:

- Primary amine on treatment with benzenesulphonyl chloride forms a product which is soluble in NaOH however secondary amine gives product which is insoluble in NaOH.
- Aniline does not react with methyl chloride in the presence of anhydrous AlCl₃ catalyst.
- Why aromatic primary amines cannot be prepared by Gabriel phthalimide synthesis ?

SECTION – D

The following questions are case-based questions. Each question has an internal choice and carries 4 (1 + 1 + 2) marks each. Read the passage carefully and answer the questions that follow.

31. Passage

When a non-volatile solute is added to a solvent, the freezing point of the formed solution is always lower than that of pure solvent. This difference in freezing point is known as depression in freezing point. If ΔT_f^0 is the freezing point temperature of pure solvent and T_f is the freezing point temperature of the solution when non-volatile solute is dissolved in it, then depression in freezing point (ΔT_f) is given by,

$$\Delta T_f = \Delta T_f^0 - T_f$$

For dilute solution, $\Delta T_f = K_f m$ [where, m = molal concentration of the solution]

- Why the freezing point of solution is always lower than that of pure solvent?
- Write the formula relating depression in freezing point with molar mass of solute.
- Calculate the depression in freezing point of 5% glucose in water. ($K_f = 13.962$)

OR

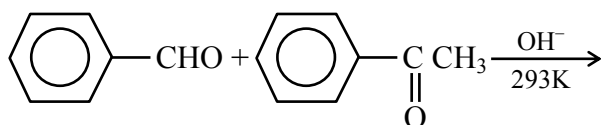
Calculate the freezing point of a solution containing 60 g of glucose.

(Molar mass = 180 g mol⁻¹) in 250 g of water. (K_f of water = 1.86 Kkg mol⁻¹)

32. Passage

Aldehydes and ketones containing atleast one α -H atom undergo a reaction in the presence of dilute alkali as catalyst to form β -hydroxy ketones. β -hydroxy aldehydes are called aldols while β -hydroxyketones are collectively called ketols. When two different aldehydes or ketones combine then mixture of four products are formed. This reaction is called cross-aldol condensation.

- What happens, when aldols readily lose water?
- Write the name and formulae of three carbonyl compounds that do not undergo aldol condensation.
- Write the products formed in the following reaction.



OR

Write the equation involved in aldol condensation using simplest aldehyde.

SECTION – E

The following questions are long answer type and carry 5 marks each. Two questions have an internal choice.

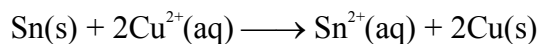
- Out of t-butyl alcohol and n-butanol, which one will undergo acid catalyzed dehydration faster and why ?
 - Carry out the following conversions :
 - Phenol to salicylaldehyde
 - t-butylchloride to t-butyl ethyl ether
 - Propene to Propanol

OR

- Give the mechanism for the formation of ethanol from ethene.
 - Predict the reagent for carrying out the following conversions :
 - Phenol to benzoquinone
 - Anisole to p-bromoanisole
 - Phenol to 2,4,6-tribromophenol
- Why does the cell voltage of a mercury cell remain constant during its lifetime?
 - Write the reaction occurring at anode and cathode and the products of electrolysis of aq KCl.
 - What is the pH of HCl solution when the hydrogen gas electrode shows a potential of -0.59 V at standard temperature and pressure?

OR

- (a) Molar conductivity of substance “A” is 5.9×10^3 S/m and “B” is 1×10^{-16} S/m. Which of the two is most likely to be copper metal and why?
- (b) What is the quantity of electricity in Coulombs required to produce 4.8 g of Mg from molten MgCl_2 ? How much Ca will be produced if the same amount of electricity was passed through molten CaCl_2 ? (Atomic mass of Mg = 24 u, atomic mass of Ca = 40 u).
- (c) What is the standard free energy change for the following reaction at room temperature? Is the reaction spontaneous?



35. (a) Draw the optical isomers of $[\text{PtCl}_2(\text{en})_2]^{2+}$.
- (b) Write the formula of the following complex.
Hexaammineplatinum(II)chloride
- (c) Write the hybridization and geometry of $[\text{Ni}(\text{CN})_4]^{2-}$. (Atomic number of Ni = 28)
- (d) Write the IUPAC name of the following complex : $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
- (e) Why are low spin configurations rarely observed for tetrahedral coordination entities ?