

KENDRIYA VIDYALAYA SANGHATHAN
TINSUKIA REGION
CLASS-XII
PRE BOARD (2025-26)
CHEMISTRY THEORY (043)
QP12CHEM01PB25

Max. Marks:70

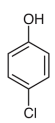
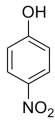
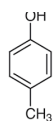
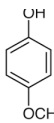
Time: 3 hours

GENERAL INSTRUCTIONS:

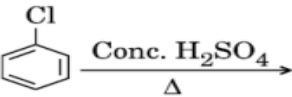
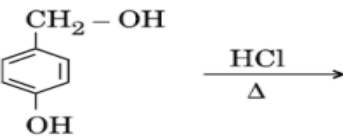
Read the following instructions carefully.

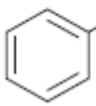
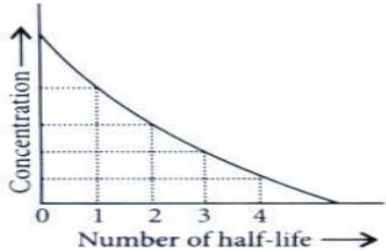
- (a) There are **33** questions in this question paper with internal choice.
- (b) SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
- (c) SECTION B consists of 5 short answer questions carrying 2 marks each.
- (d) SECTION C consists of 7 short answer questions carrying 3 marks each.
- (e) SECTION D consists of 2 case-based questions carrying 4 marks each.
- (f) SECTION E consists of 3 long answer questions carrying 5 marks each.
- (g) All questions are compulsory.
- (h) 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	Which of the following ions show higher spin only magnetic moment value ? a) Ti^{3+} b) Mn^{2+} c) Fe^{2+} d) Co^{3+}	1
2	The compound $[\text{Co}(\text{NH}_3)_5(\text{SO}_4)]\text{Br}$ and $[\text{Co}(\text{NH}_3)_5(\text{Cl})]\text{SO}_4$ represent: a) Linkage isomerism b) Ionization isomerism c) Coordination isomerism d) No isomerism	1
3	Toulene react with a halogen in the presence of iron (III) chloride giving ortho and para halo compounds. The reaction is a) Electrophilic substitution reaction b) Nucleophilic substitution reaction c) Electrophilic elimination reaction d) Free radical addition reaction	1
4	1. An electrochemical cell can behave like an electrolytic cell when _____. (A) $E_{\text{cell}} = 0$ (B) $E_{\text{cell}} > E_{\text{ext}}$ (C) $E_{\text{ext}} > E_{\text{cell}}$ (D) $E_{\text{cell}} = E_{\text{ext}}$	1

5	Which one is an example of allylic alcohol? (A) Prop-2-en-1-ol (B) but-2-en-2-ol (C) Prop-1-en-1-ol (D) Prop-1-en-2-ol	1
6	For the given reaction $2A + B \rightarrow C + D$, the rate constant is $1.5 \times 10^{-4} \text{ s}^{-1}$. What is the order of the reaction? (A) one (B) two (C) zero (D) three	1
7	The correct IUPAC name for $\text{CH}_2=\text{CHCH}_2\text{NHCH}_3$ is a) Allylmethylamine b) 2-amino-4-pentene c) 4-aminopent-1-ene d) N-methyl prop-2-en-1-amine	
8	In a chemical reaction $X \rightarrow Y$, it is found that the rate of reaction doubles when the concentration of X is increased four times. The order of the reaction with respect to X is a) 1 b) 0 c) 2 d) $\frac{1}{2}$	
9	The unit of rate constant for the reaction $2\text{H}_2 + 2\text{NO} \rightarrow 2\text{H}_2\text{O} + \text{N}_2$ which has rate $= K[\text{H}_2]^0[\text{NO}]^1$, is a) $\text{mol L}^{-1} \text{ s}^{-1}$ b) s^{-1} c) $\text{mol}^{-2} \text{ L}^2 \text{ s}^{-1}$ d) mol L^{-1}	
10	Nucleotides are joined together by a) Glycosidic bond b) Peptide linkage c) Hydrogen bond d) Phosphodiester linkage	
11	Arrange the following in decreasing order of acidic character : <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  (I) </div> <div style="text-align: center;">  (II) </div> <div style="text-align: center;">  (III) </div> <div style="text-align: center;">  (IV) </div> </div> (A) $\text{IV} > \text{III} > \text{I} > \text{II}$ (C) $\text{II} > \text{IV} > \text{I} > \text{III}$ (B) $\text{II} > \text{I} > \text{III} > \text{IV}$ (D) $\text{III} > \text{I} > \text{II} > \text{IV}$	
12	The reason for greater range of oxidation states in actinoids is attributed to (A) actinoid contraction (B) 5f, 6d and 7s levels having comparable energies (C) 4f and 5d levels being close in energies (D) the radioactive nature of actinoids.	
	In the following questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices. A. Assertion and Reason both are correct statements and reason is correct	

	<p>explanation for assertion.</p> <p>B. Assertion and Reason both are correct statements but reason is not correct explanation for assertion.</p> <p>C. Assertion is correct statement but reason is wrong statement.</p> <p>D. Assertion is wrong statement but reason is correct statement.</p>	
13	<p>Assertion (A): Aromatic 1⁰ amine can be prepared by Gabriel pthalamide synthesis.</p> <p>Reason (R): Primary Alkylhalide undergoes nucleophilic substitution reaction with anion formed by pthalamide.</p>	1
14	<p>Assertion (A): Primary (1^o) alcohols produce white ppt with Lucas Reagent immediately.</p> <p>Reason (R): Lucas Reagent is a mixture of anhydrous ZnCl₂ and concentrated HCl.</p>	1
15	<p>Assertion(A) : Despite having aldehyde group, glucose does not show schiff's test.</p> <p>Reason (R): The aldehyde group in glucose is used to from the ring structure of glucose.</p>	1
16	<p>Assertion (A) : The complex [Co(NH₃)₃Cl₃] gives no precipitate with AgNO₃ solution.</p> <p>Reason (R): The above complex is non ionizable</p>	1
SECTION B		
	This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.	
17	<p>a. Which component of starch is a branched polymer of D-glucose and insoluble in water?</p> <p>b. Explain denaturation of protein</p>	1 1
18	<p>(a) Calculate the number of unpaired electrons of Ti³⁺ (Z = 22).</p> <p>(b) Magnetic moment (in BM) of Ti³⁺ (Z = 22).</p>	1 1
19	Two elements A and B form compounds having formula AB ₂ and AB ₄ . When dissolved in 20g of benzene (C ₆ H ₆), 1 g of AB ₂ lowers the freezing point by 2.3 K whereas 1.0 g of AB ₄ lowers it by 1.3 K. The molar depression constant for benzene is 5.1 K kg mol ⁻¹ . Calculate atomic masses of A and B.	2
20	Calculate the degree of dissociation (a) of acetic acid if its molar conductivity (Lm) is 39.05 S cm ² mol ⁻¹ . Given L ^o (H ⁺) = 349.6 S cm ² mol ⁻¹ and L ^o (CH ₃ COO ⁻) = 40.9 Scm ² mol ⁻¹ .	2
21	<p>Explain the following with an example:</p> <p>(1) Finkelstein reaction</p> <p>(2) Sandmeyer reaction</p>	1 1
	OR	
	Write the major product in following	1

	<p>(i) </p> <p>(ii) </p>	1
	SECTION C	
	This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.	
22	<p>Give reasons for the following:</p> <p>(i) The transition metals generally form coloured compounds.</p> <p>(ii) E^0 value for $(\text{Mn}^{3+} \text{Mn}^{2+})$ is highly positive than that for $(\text{Cr}^{3+} \text{Cr}^{2+})$ couple.</p> <p>(iii) Zr and Hf have almost similar atomic radii.</p>	1 1 1
23	<p>(i) Complete the following reaction and also write the mechanism</p> <p>$\text{CH}_2=\text{CH}_2 + \text{H}_2\text{O} \xrightarrow{\text{Dil. H}_2\text{SO}_4} ?$</p> <p>(ii) Out of o-nitro phenol and p-nitro phenol which is steam volatile and why.</p>	2 1
	OR	
	<p>How can you convert the following?</p> <p>(i) Phenol to o-hydroxybenzaldehyde.</p> <p>(ii) phenol to benzoquinone</p> <p>(iii) Phenol to salicylic acid</p>	1 1 1
24	<p>(i) Calculate e.m.f. and ΔG for the following cell: $\text{Mg (s) / Mg}^{2+}(\text{0.001 M}) // \text{Cu}^{2+}(\text{0.0001 M}) / \text{Cu (s)}$ Given : $E^0 \text{ Mg}^{2+}/\text{Mg} = -2.37\text{V}$. $E^0 \text{ Cu}^{2+}/\text{Cu} = +0.34\text{ V}$</p> <p>(ii) Write charging reaction of lead storage battery</p>	2 1
25	<p>Among all the isomers of molecular formula $\text{C}_4\text{H}_9\text{Br}$, identify</p> <p>(i) the one isomer which is optically active.</p> <p>(ii) the one isomer which is highly reactive towards $\text{S}_{\text{N}}2$.</p> <p>(iii) the two isomers which give same product on dehydrohalogenation with alcoholic KOH.</p>	1 1 1
26	<p>Write the reactions involved when D-glucose is treated with the following reagents:</p> <p>(i) Br_2 water</p> <p>(ii) $\text{H}_2\text{N}-\text{OH}$</p> <p>(iii) $(\text{CH}_3\text{CO})_2\text{O}$</p>	1 1 1
27	Write the major products:	1 1 1

	<p>(i) $\text{CH}_3-\text{C}(=\text{O})-\text{CH}_3 + \text{H}_2\text{N}-\text{NHCONH}_2 \longrightarrow ?$</p> <p>(ii) $\text{C}_6\text{H}_5-\text{CH}_2-\text{CH}_3 \xrightarrow[\text{(b) H}^+]{\text{(a) KMnO}_4/\text{KOH}, \Delta} ?$</p> <p>(iii)  $\xrightarrow{\text{Conc. HNO}_3/\text{H}_2\text{SO}_4} ?$</p>	
28	<p>(i) Define faraday first law of electrolysis</p> <p>(ii) Predict the product of electrolysis in each of the following</p> <p>(i) An aqueous solution of AgNO_3 using silver electrode</p> <p>(ii) An aqueous solution of NaCl using Pt electrode</p>	<p>1</p> <p>1</p> <p>1</p>
	SECTION D	
	<i>The following questions are case-based questions. Each question has an internal choice and carries 4 (2+1+1) marks each. Read the passage carefully and answer the questions that follow.</i>	
29	<p>Read the passage given below and answer the following questions The half-life of a reaction is the time required for the concentration of reactant to decrease by half, i.e</p> <p>$[A] = [A]/2$ For first order reaction, $t_{1/2} = 0.693/k$ This means $t_{1/2}$ is independent of initial concentration. Figure shows that typical variation of concentration of reactant exhibiting first order kinetics. It may be noted that though the major portion of the first order kinetics may be over in a finite time, but the reaction will never cease as the concentration of reactant will be zero only at infinite time.</p>  <p>(i) The rate of a first order reaction is $0.04 \text{ mol L}^{-1} \text{ s}^{-1}$ at 10 minutes and $0.03 \text{ mol L}^{-1} \text{ s}^{-1}$ at 20 minutes after initiation. The half-life of the reaction is _____</p> <p>(ii) A first order reaction has a rate constant $k = 3.01 \times 10^{-3} \text{ s}^{-1}$. How long it will take to decompose half of the reactant? (A) 2.303 s (B) 23.03 s (C) 230.3 s (D) 2303 s</p> <p>(iii) The rate constant for a first order reaction is $7.0 \times 10^{-4} \text{ sec}^{-1}$. If initial concentration of reactant is 0.080 M, what is the half-life of reaction? (A) 990 s (B) 79.2 s (C) 12375 s (D) 1190 s</p>	<p>2</p> <p>1</p> <p>1</p>
30	<p>Read the passage given below and answer the following questions:</p> <p>A mixture of two aromatic compounds (A) and (B) was separated by dissolving in chloroform followed by extraction with aqueous KOH solution. The organic layer containing compound (A), when heated with alcoholic solution of KOH produce $\text{C}_7\text{H}_5\text{N}$ (C) associated with unpleasant odor.</p>	

	<p>(i) What is A?</p> <p>(a) $C_6H_5NH_2$ (b) $C_6H_5CH_3$ (c) C_6H_5CHO (d) None of these</p>	1
	<p>(ii) The reaction of (A) with alcoholic solution of KOH to produce (C) of unpleasant odor is called</p> <p>(a) Sandmeyer reaction (b) Carbylamine reaction (c) Ullmann reaction (d) Reimer-Tiemann reaction.</p>	1
	<p>(iii) The alkaline aqueous layer (B) when heated with chloroform and then acidified give a mixture of isomeric compounds of molecular formula $C_7H_6O_2$. (B) is</p> <p>(a) C_6H_5CHO (b) C_6H_5COOH (c) $C_6H_5CH_3$ (d) C_6H_5OH</p>	2
	SECTION E	
	The following questions are long answer types and carry 5 marks each. All questions have an internal choice	
31	<p>(i) Define the following term</p> <p>(a) Henry law</p> <p>(b) Abnormal molar mass</p> <p>(ii) Gas (A) is more soluble in water than Gas (B) at the same temperature. Which one of the two gases will have the higher value of K_H (Henry's constant) and why?</p> <p>(iii) Determine the osmotic pressure of a solution prepared by dissolving 25 mg of K_2SO_4 in 2 L of water at 25 °C, assuming that it is completely dissociated.</p>	1 1 1 2
	OR	
	<p>(i) What type of deviation is shown by a mixture of ethanol and acetone? Give reason</p> <p>(ii) The degree of dissociation of $Ca(NO_3)_2$ in dilute aqueous solution containing 7.0 gm of the salt per 100 gm of water at 100° C is 70 percent, if the vapor pressure of the pure water at 100° C is 760 mm, calculate the vapor pressure of the solution.</p>	2 3
32	<p>A) A coordination compound has the formula $[Co(NH_3)_5SO_4]Br$. Write the IUPAC name and mention the ion furnished in the solution.</p> <p>B) i) Draw the geometrical isomers of complex $[Pt(en)_2Cl_2]^{2+}$. Which of them is optically inactive?</p> <p>(ii) On the basis of crystal field theory, write the electronic configuration for d^4 ion (Octahedral), if $\Delta_0 > P$.</p> <p>(iii) Write the hybridization type and magnetic behavior of the complex $[Ni(CN)_4]^{2-}$. (Atomic number of Ni = 28)</p>	2 1 1 1
	OR	
	<p>A) Compare the following complexes with respect to their shape, magnetic behavior and the Hybridisation involved:</p> <p>(i) $[CoF_4]^{2-}$</p> <p>(ii) $[Cu(NH_3)_4]SO_4$</p> <p>(iii) $[Ni(CO)_4]$</p>	1 1

	<p>(At. no.: Co = 27, Cr = 24, Ni = 28)</p> <p>B) Draw the structures of isomers, if any, and write the names of the following complexes:</p> <p>(i) $[\text{Cr}(\text{NH}_3)_4\text{Cl}_2]^+$</p> <p>(ii) $[\text{Co}(\text{en})_3]^{3+}$</p> <p>[Atomic numbers; Cr = 24, Co = 27]</p>	<p>1</p> <p>1</p> <p>1</p>
33	<p>Identify A to D.</p> $\text{CH}_3\text{COOH} \xrightarrow{\text{PCl}_5} \text{A} \xrightarrow{\text{H}_2/\text{Pd}-\text{BaSO}_4} \text{B} \xrightarrow[\text{(ii) H}_3\text{O}^+]{\text{(i) CH}_3\text{MgBr}} \text{C}$ $\text{B} \xrightarrow{\text{LiAlH}_4} \text{D}$ <p>(b) Distinguish between the following by suitable chemical test.</p> <p>(i) $\text{CH}_3\text{COCH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$</p> <p>(ii) Ethanal and ethanoic acid.</p> <p>(c) Write the structure of 4-chloro pentan-2-one.</p>	<p>2</p> <p>1</p> <p>1</p> <p>1</p>
	OR	
	<p>An organic compound (A) on treatment with ethyl alcohol gives a carboxylic acid (B) and compound (C). Hydrolysis of (C) under acidified conditions gives (B) and (D). Oxidation of (D) with KMnO_4 also gives (B). (B) on heating with $\text{Ca}(\text{OH})_2$ gives (E) having molecular formula $\text{C}_3\text{H}_6\text{O}$. (E) does not give Tollens' test and does not reduce Fehling's solution but forms a 2, 4-dinitro phenyl hydrazone. Identify (A), (B), (C), (D) and (E).</p>	5