

KENDRIYA VIDYALAYA TINSUKIA REGION
PRE-BOARD-2025-26
CHEMISTRY THEORY (043)
QP12CHEM02PB25
CLASS XII

Time:3hrs

Max Marks: 70

General Instructions:

Read the following instructions carefully and follow them:

- (i) This question paper contains 33 questions. All questions are compulsory.
(ii) This question paper is divided into five sections -Section A, B, C, D and E
(iii) Section-A: Question numbers 1 to 16 are multiple choice type questions. Each question carries 1 mark.
(iv) Section-B: Question numbers 17 to 21 are very short answer type questions. Each question carries 2 marks.
(v) Section-C: Question numbers 22 to 28 are short answer questions. Each question carries 3 marks.
(vi) Section-D: Question numbers 29 and 30 are case-based questions. Each question carries 4 marks.
(vii) Section-E: Question numbers 31 to 33 are long answer type questions. Each question carries 5 marks.
(viii) There is no overall choice given in the question paper. However, an internal choice has been provided in few questions in all the Sections except section A.
(ix) Use of calculator is not allowed.

SECTION-A [16×1=16]

Question No. 1 to 12 are multiple choice type questions carrying 1 mark each.		
Q. 1	The unit of molar conductivity is: A. $S\text{ cm}^2\text{ mol}^{-1}$ B. $S\text{ cm}^{-2}\text{ mol}^{-1}$ C. $S\text{ m}^{-2}\text{ mol}^{-1}$ D. Both (B) and (C)	1
Q.2	The overall order of a reaction which has the rate expression Rate = $k[A]^{1/2}[B]^{3/2}$ is A. 1 B. 2 C. 3 D. 4	1
Q.3	For a first order reaction, half-life period is A. constant B. increased with the increase of initial concentration of the reactant C. decreased with the increase of initial concentration of the reactant D. either increased or decreased with the increase of initial concentration of the reactant	1
Q.4	Which of the following statements is incorrect? A. A catalyst provides an alternate pathway or reaction mechanism by reducing the activation energy. B. A catalyst does not alter gives energy . C. A catalyst does not change the equilibrium constant D. None of the above.	1
Q.5	Which of the following is not a transition metal? A. Zn	1

	B. Cd C. Hg D. All of the above	
Q.6	Which of the following ions is diamagnetic? A. Co^{2+} B. Ni^{2+} C. Cu^{2+} D. Zn^{2+}	1
Q.7	Which of the following compounds can show coordination isomerism? A. $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ B. $[\text{Co}(\text{NH}_3)_5(\text{SO}_4)]\text{Br}$ C. $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2 \cdot \text{H}_2\text{O}$ D. $\text{Cis-}[\text{CrCl}_2(\text{ox})_2]^{3-}$	1
Q.8	Which of the following reagents is used in Finkelstain reaction? A. NaCl B. NaBr C. NaI D. NaOH	1
Q.9	The product of the Reimer-Tiemann reaction of phenol is: A. Salicylic acid B. Salicylaldehyde C. Catechol D. Hydroquinone	1
Q.10	Which of the following compounds gives a positive Lucas test on heating only? A. Ethanol B. 2-Propanol C. Acetone D. Propan-2-ol	1
Q. 11	Amongst the following, which one is the strongest base in aqueous medium ? A. CH_3NH_2 B. NCCH_2NH_2 C. $(\text{CH}_3)_2\text{NH}$ D. $\text{C}_6\text{H}_5\text{NHCH}_3$	1
Q. 12	Which of the following acids is a vitamin? A. Aspartic acid B. Ascorbic acid C. Adipic acid D. Saccharic acid	1
<p>Fir question No. 13 to 16 , two statements are given-- one labelled as Assertion(A) and the other labelled as Reason (R) . Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.</p> <p>(A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason is not the correct explanation of Assertion (A). (C) Assertion (A) is true, Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.</p>		
Q. 13	Assertion (A): Chelating ligands form more stable complexes than monodentate ligands. Reason (R): Chelating complexes have a ring structure which reduces the chance of dissociation.	1
Q. 14	Assertion (A): The carbon oxygen bond in phenols is slightly stronger than that in methanol. Reason(R): There is only single bond character between C-O in phenol .	1

	II. Give the major products that are formed by heating $\text{CH}_3\text{-O-CH}_2\text{-CH}_3$ with HI.	
Q.27	Arrange the following compounds in increasing order of their boiling points. CH_3CHO , $\text{CH}_3\text{CH}_2\text{OH}$, CH_3OCH_3 , $\text{CH}_3\text{CH}_2\text{CH}_3$ II. Describe the following: Cannizzaro reaction III. Which acid of the following pair shown here would you expect to be stronger? $\text{CH}_3\text{CO}_2\text{H}$ or $\text{CH}_2\text{FCO}_2\text{H}$	1 1 1
Q.28	I. What are reducing sugars? II. What happens when D-glucose is treated with HNO_3 ? III. Define : Peptide linkage	1 1 1

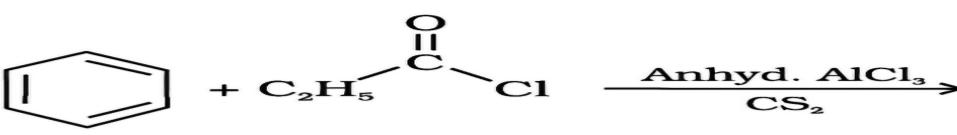
SECTION-D (2×4=8)

The following questions are case based questions. Read the passage carefully and answer the questions that follow.

Q.29	<p>Chemical kinetics is the study of chemical reactions with respect to reaction rates, effect of various variables, rearrangement of atoms and formation of intermediates.</p> <p>A number of factors such as temperature, concentration of reactants, catalyst, affect the rate of a reaction. It has to be determined experimentally and cannot be predicted. Order of a reaction with respect to a reactant is the power of its concentration which appears in the rate law equation. The order of a reaction is the sum of all such powers of concentration of terms for different reactants. Rate constant and order of a reaction can be determined from rate law or its integrated rate equation. Molecularity is defined only for an elementary reaction. Temperature dependence of rate constants is described by Arrhenius equation.</p> <p>A. Mention the factors that affect the rate of a chemical reaction.</p> <p>B. Identify the reaction order from the following rate constant : $K = 2.3 \times 10^{-5} \text{ L mol}^{-1} \text{ s}^{-1}$</p> <p>C. Calculate the half-life of a first order reaction from the rate constant given below: 200 s^{-1}</p>	1 1 2										
Q.30	<p>A student's chemistry project involves studying the applications of amines in pharmaceuticals. She learns that aniline is used in the preparation of paracetamol, ethanamine is used in the manufacture of painkillers, and trimethylamine is used in the synthesis of choline (important for brain function). She also studies the basicity of different amines in aqueous solution.</p> <p>The following data was observed for pK_b values of some amines:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Compound</th> <th>pK_b value</th> </tr> </thead> <tbody> <tr> <td>NH_3 (Ammonia)</td> <td>4.75</td> </tr> <tr> <td>CH_3NH_2 (Methylamine)</td> <td>3.36</td> </tr> <tr> <td>$(\text{CH}_3)_3\text{N}$ (Trimethylamine)</td> <td>4.19</td> </tr> <tr> <td>$\text{C}_6\text{H}_5\text{NH}_2$ (Aniline)</td> <td>9.30</td> </tr> </tbody> </table> <p>Answer the following questions:</p> <p>(I) Which compound is the strongest base among the given amines?</p> <p>(II) Arrange these base in increasing order of K_b values.</p> <p>(III) Write one chemical test to distinguish between Aniline and methyl amine.</p> <p style="text-align: center;">OR</p> <p>(III) Why pK_b value of aniline is higher than methyl amine?</p>	Compound	pK _b value	NH_3 (Ammonia)	4.75	CH_3NH_2 (Methylamine)	3.36	$(\text{CH}_3)_3\text{N}$ (Trimethylamine)	4.19	$\text{C}_6\text{H}_5\text{NH}_2$ (Aniline)	9.30	1 1 2
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SECTION-E (3×5=15)

Q.31.A	(I) Are equimolar solution of sodium chloride and urea isotonic?	1
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	(II) State the condition for reverse osmosis and one application of reverse osmosis.	2						
	(III) Which will have higher osmotic pressure of a solution containing 3.42g of cane sugar or 3.42g of NaCl in 1 litre solution at 27°C. (MM of cane sugar = 342g and MM of NaCl = 58.5g)	2						
	OR							
Q.31.B	I. 18 g of glucose, C ₆ H ₁₂ O ₆ , is dissolved in 1 kg of water in a saucepan. At what temperature will water boil at 1.013 bar? K _b for water is 0.52 K kg mol ⁻¹ .	2						
	(II) A compound undergoes complete tetramerization in a given organic solvent. What will be its van't Hoff factor?	1						
	(III) Define minimum and maximum boiling azeotrope with example.	2						
32. A	I. Write the formula for the following coordination compound: Tetraammineaquachloridocobalt (III) chloride	1						
	II.							
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f08080;"> <th style="padding: 5px;">Formula</th> <th style="padding: 5px;">Moles of AgCl precipitated per mole of the compounds with excess AgNO₃</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">(i) PdCl₂.4NH₃</td> <td style="padding: 5px; text-align: center;">2</td> </tr> <tr> <td style="padding: 5px;">(ii) NiCl₂.6H₂O</td> <td style="padding: 5px; text-align: center;">2</td> </tr> </tbody> </table>	Formula	Moles of AgCl precipitated per mole of the compounds with excess AgNO ₃	(i) PdCl ₂ .4NH ₃	2	(ii) NiCl ₂ .6H ₂ O	2	2
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(i) PdCl ₂ .4NH ₃	2							
(ii) NiCl ₂ .6H ₂ O	2							
	On the basis of the above observations made with aqueous solutions, assign secondary valences to metals (Pd and Ni) in							
	III. Indicate the types of stereoisomerism exhibited by the following complexes and draw the structures for these isomers: [Pt(NH ₃) ₂ Cl ₂]	1+1						
	OR							
32.B.	I. Write the IUPAC names of the following coordination compound: [CoCl ₂ (en) ₂]Cl	1						
	II. [NiCl ₄] ²⁻ is paramagnetic while [Ni(CO) ₄] is diamagnetic though in both cases Ni has same coordination number. Why?	2						
	III. Explain why [Ti(H ₂ O) ₆] ³⁺ shows colour property on the basis of crystal field theory.	2						
33.A	I. Write the structures of products of the following reactions: a.							
		1						
	$\text{H}_3\text{C}-\text{C}\equiv\text{C}-\text{H} \xrightarrow{\text{Hg}^{2+}, \text{H}_2\text{SO}_4}$	1						
	b.	1						
	II. Arrange the following compounds in increasing order of their boiling points. CH ₃ CHO, CH ₃ CH ₂ OH, CH ₃ OCH ₃ , CH ₃ CH ₂ CH ₃	2						
	III. Give simple chemical test to distinguish between the following pair of compounds: (a) Propanal and Propanone (b) Acetaldehyde and benzaldehyde							
	OR							
33.B	I. Arrange the following compounds in increasing order of their acid strength: (1) CH ₃ CH ₂ CH(Br)COOH, CH ₃ CH(Br)CH ₂ COOH, (CH ₃) ₂ CHCOOH, CH ₃ CH ₂ CH ₂ COOH	1						
	II. How will you convert ethanal into the Butane-1,3-diol? (2)	2						
	III. Describe the following:	2						

	(a) Cannizzaro reaction (b) Rosenmund Reduction	
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