

केन्द्रीय विद्यालय संगठन, बेंगलुरु संभाग  
KENDRIYA VIDYALAYA SANGATHAN BENGALURU REGION  
प्रथम प्री बोर्ड परीक्षा 2024-2025

FIRST PRE-BOARD EXAMINATION: 2024-2025

CLASS: XII  
SUBJECT: CHEMISTRY

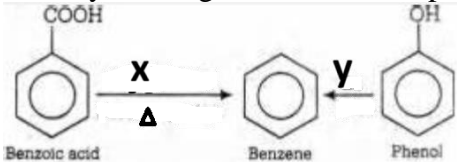
MAX MARKS: 70  
TIME: 3 HOURS

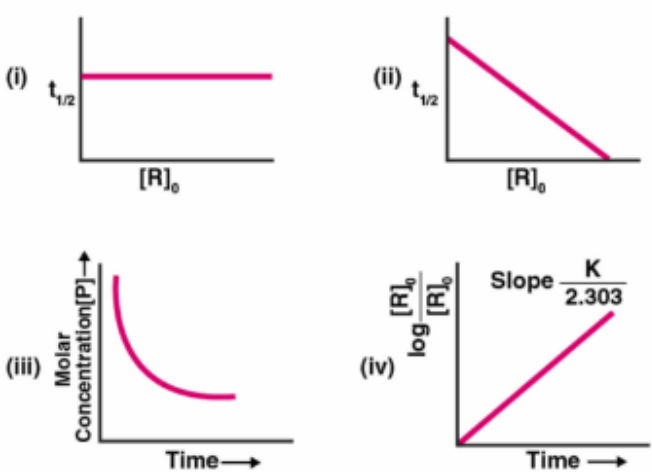
**GENERAL INSTRUCTIONS :**

- (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 reactions is used to prepare pure form of primary alkyl amines in high yield? (a) Hofmann degradation (b) Gabriel phthalimide synthesis (c) Ammonolysis (d) Reduction of nitro compound	1
2	Which of the following haloalkanes would react most rapidly with aqueous NaOH? (a) $\text{CH}_3\text{CH}_2\text{Cl}$ (b) $(\text{CH}_3)_2\text{CHCl}$ (c) $\text{CH}_2 = \text{CHCl}$ (d) $\text{C}_6\text{H}_5\text{Cl}$	1
3	Which of the following elements does not show variable oxidation states? (a) Fe (b) Cu (c) Mn (d) Zn	1
4	Which one of the following will react with $\text{NaHCO}_3$ to give $\text{CO}_2$ gas and sodium salt? (a) Acetic acid (b) N-hexanol (c) Acetic acid & phenol (d) Phenol	1
5	For a pseudo first order reaction of the type $\text{A} + \text{H}_2\text{O} \rightarrow \text{products}$ , find the rate of the reaction in $\text{mol L}^{-1} \text{s}^{-1}$ when $[\text{A}] = 0.75 \text{ M}$ , $k = 0.02 \text{ s}^{-1}$ . (a) 0.077. (b) 0.085 (c) 0.015 (d) 0.026	1
6	Identify the reagents X and Y respectively in the following reactions.  <p style="text-align: center;">(a) Sodalime &amp; Copper (b) Zinc dust &amp; NaOH (c) Copper &amp; Sodalime (d) Sodalime &amp; Zinc dust</p>	1

7	Which of the following is a bidentate ligand? (a) Br (b) CH <sub>3</sub> NH <sub>2</sub> (c) C <sub>2</sub> O <sub>4</sub> <sup>2-</sup> (d) CH <sub>3</sub> CN	1
8	Starch and Cellulose are the compounds made up of many units of _____ (a) Simple sugar (b) Fatty acid (c) Glycerol (d) Amino acid	1
9	$\text{Cr}_2\text{O}_7^{2-} \xrightarrow{\text{pH}=x} \text{CrO}_4^{2-} \xrightarrow{\text{pH}=y} \text{Cr}_2\text{O}_7^{2-}$ pH values x and y can be: (a) 4 and 5 (b) 4 and 8 (c) 8 and 9 (d) 8 and 4	1
10	Which of the following graphs represents a first order reaction?   (a) (i) & (ii) (b) (i) & (iii) (c) (i) & (iv) (d) (ii) & (iii)	1
11	What is the decreasing order of the basicity of 1°, 2° and 3° amines and ammonia in aqueous medium? (a) NH <sub>3</sub> >C <sub>2</sub> H <sub>5</sub> NH <sub>2</sub> >(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> NH>(C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> N (b) (C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> N>(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> NH>C <sub>2</sub> H <sub>5</sub> NH <sub>2</sub> >NH <sub>3</sub> (c) (C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> NH>C <sub>2</sub> H <sub>5</sub> NH <sub>2</sub> >(C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> N>NH <sub>3</sub> (d) (C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> NH>(C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> N>C <sub>2</sub> H <sub>5</sub> NH <sub>2</sub> >NH <sub>3</sub>	1
12	The compound that does not give a positive iodoform test is (a) Pentan-2 one (b) Ethanol (c) Ethanal (d) Pentan-3-one	1
13	Assertion (A): When ethane-1,2-diamine(en) is progressively added to a solution containing [Ni(H <sub>2</sub> O) <sub>6</sub> ] <sup>2+</sup> complex, colour changes from pale blue to violet. Reason (R): Ethane-1,2-diamine(en) is a chelating ligand.  Select the most appropriate answer from the options given below: (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.	1

14	<p>Assertion (A): Metallic conductance decreases with increase in temperature. Reason (R): As temperature increases, there is increase in resistance of metal.</p> <p>Select the most appropriate answer from the options given below: (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.</p>	1
15	<p>Assertion (A): Glucose gets oxidized to gluconic acid on reaction with a strong oxidising agent like nitric acid. Reason (R) : Glucose has six carbon atoms linked in a straight chain.</p> <p>Select the most appropriate answer from the options given below: (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.</p>	1
16	<p>Assertion (A): According to collision theory of reaction rates, reactant species must collide with proper orientation. Reason (R): Proper orientation will give the activation energy needed to form products.</p> <p>Select the most appropriate answer from the options given below: (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.</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>State Henry's Law. Discuss any one application of the Law.</p> <p style="text-align: center;"><b>OR</b></p> <p>State Raoult's Law .Give an example of a pair of liquids that nearly form an ideal solution.</p>	2
18	<p>(i) Write the formula of the complex Tetraamminediaquacobalt(III) chloride (ii) Write the IUPAC name of the complex <math>K_2[Ni(CN)_4]</math></p>	2
19	<p>(i)Which fuel cell was used in the Apollo space rocket? (ii)Write one advantage of fuel cell.</p>	2
20	<p>Complete the following reactions by writing the major and minor product in each case (<b>any 2</b>)</p> <p>(i)</p> $\begin{array}{c} \text{CH}_3 \\   \\ \text{C} = \text{CH}_2 \\   \\ \text{CH}_3 \end{array} + \text{HBr} \xrightarrow{\text{Peroxide}}$ <p>(ii)</p> $\text{H}_3\text{C}-\overset{\text{Br}}{\underset{ }{\text{CH}}}-\text{CH}_2-\text{CH}_3 \xrightarrow{\text{Alc KOH}}$ <p>(iii)</p> $\text{C}_6\text{H}_5\text{Cl} + 2\text{CH}_3\text{Cl} \xrightarrow[\Delta]{\text{Anhyd. AlCl}_3}$	2

21	(i) What are anomers? (ii) Give two evidences for cyclic structure of glucose.	2
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	(i) State Kohlrausch's law. (ii) Calculate the limiting molar conductivity of CH <sub>3</sub> COOH. The molar conductivities of CH <sub>3</sub> COONa, HCl and NaCl at infinite dilution are 90.1 S cm <sup>2</sup> /mol, 426.16 S cm <sup>2</sup> /mol and 126.45 S cm <sup>2</sup> /mol respectively.	3
23	(i) How is potassium permanganate prepared? (ii) Complete the reaction $2\text{KMnO}_4 \xrightarrow{\Delta}$	3
24	(i) Arrange the following compounds in increasing order of their property as indicated. (a) CH <sub>3</sub> CHO, C <sub>6</sub> H <sub>5</sub> CHO, HCHO (reactivity towards nucleophilic addition reaction). (b) HCOOH, ClCH <sub>2</sub> COOH, CF <sub>3</sub> COOH, CCl <sub>3</sub> COOH (acidic character). (ii) Predict the product of the following reaction: $\text{CH}_3-\underset{\text{CH}_3}{\text{C}}=\text{O} \xrightarrow[\text{(ii) KOH/Glycol, } \Delta]{\text{(i) H}_2\text{N}-\text{NH}_2} ?$ <p style="text-align: center;">OR</p> (i) Predict the products of the following reactions: (a) $\text{CH}_3-\underset{\text{CH}_3}{\text{C}}=\text{O} \xrightarrow{\text{H}_2\text{N}-\text{NH}_2}$ (b) $\text{C}_6\text{H}_5-\text{CH}_3 \xrightarrow[\text{(b) H}^+]{\text{(a) KMnO}_4/\text{KOH}}$ (ii) What happens when acetaldehyde is treated with Tollen's reagent & heated? Mention the role of Tollen's reagent.	3
25	(i) What products are expected when lactose is hydrolysed? (ii) What is the difference between a nucleotide and nucleoside? (iii) What are essential and non-essential amino acids? Give one example of each.	3
26	(i) Write the IUPAC name of the given compound: $\text{CH}_2=\underset{\text{CH}_3}{\text{C}}-\text{CH}_2-\text{OH}$ (ii) Give reasons for the following: (a) p-nitrophenol is more acidic than p-methylphenol. (b) (CH <sub>3</sub> ) <sub>3</sub> C—Br on reaction with sodium methoxide (NaOCH <sub>3</sub> ) gives alkene as the main product and not an ether.	3

27	<p>(i) Arrange the following compounds in increasing order of their boiling points.</p> <p style="text-align: center;">           (a) <math>\begin{array}{c} \text{CH}_3 \\ \diagdown \\ \text{CH}-\text{CH}_2\text{Br} \\ \diagup \\ \text{CH}_3 \end{array}</math>    (b) <math>\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}</math>    (c) <math>\begin{array}{c} \text{CH}_3 \\   \\ \text{H}_3\text{C}-\text{C}-\text{CH}_3 \\   \\ \text{Br} \end{array}</math> </p> <p>(ii) What is racemization in optically active alkyl halide undergoing nucleophilic substitution? Explain with an example.</p>	3
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28	<p>(i) Define conductivity of a solution.</p> <p>(ii) Given below are conductivity measurements of hydrochloric acid of different concentrations. Explain the variation observed in conductivity when HCl is diluted.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Conc of HCl (mol L<sup>-1</sup>)</th> <th>Conductivity (mScm<sup>-1</sup>)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">2.5</td> <td style="text-align: center;">170</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">86</td> </tr> <tr> <td style="text-align: center;">0.5</td> <td style="text-align: center;">46</td> </tr> </tbody> </table> <p>(iii) Write the relation among cell constant, resistance of a solution in the cell and conductivity of the solution.</p>	Conc of HCl (mol L <sup>-1</sup> )	Conductivity (mScm <sup>-1</sup> )	2.5	170	1	86	0.5	46	3
Conc of HCl (mol L <sup>-1</sup> )	Conductivity (mScm <sup>-1</sup> )									
2.5	170									
1	86									
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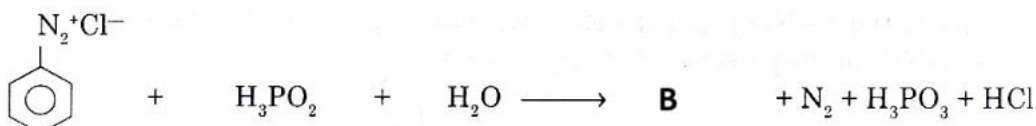
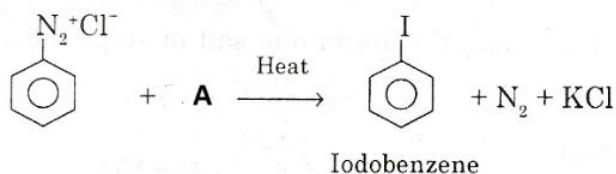
#### SECTION D

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.

29	<p><b>Order and Molecularity of Reaction –</b></p> <p>The rate of a chemical reaction is calculated considering the rate determining step. Some chemical reactions have only one step, but some reactions occur in several steps. In that case, the <a href="#">rate of the reaction</a> is determined by the slowest step. Molecularity and order of reaction are two terms used regarding the rate of reactions. The main difference between molecularity and order of reaction is that molecularity is a theoretical concept whereas order of reaction can be determined experimentally. The slowest step is considered as the rate determining step because the whole reaction rate would be increased if the rate of the slowest step is increased.</p> <p>(i) How long will it take for the initial concentration of A to fall from 0.10 M to 0.075, if the rate constant for a reaction of zero-order in A is 0.0030 mol L<sup>-1</sup> s<sup>-1</sup>.</p> <p>(ii) What is meant by molecularity of a reaction?</p> <p style="text-align: center;"><b>OR</b></p> <p>Define half-life of a chemical reactant.</p> <p>(iii) A reaction is second order in A and first order in B. Write the differential rate equation.</p>	4
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30	<p>Diazonium salts are a versatile and important class of compounds in organic chemistry. They have played a significant role in the development of the chemical industry, particularly in the production of dyes and pharmaceuticals. The discovery of diazonium salt is attributed to the German chemist Peter Griess, who first synthesized it in 1858. Since then, the compound has been extensively studied and used in a wide range of chemical reactions and applications. If temperature is increased in aqueous benzene diazonium chloride, it decomposes to phenol. Therefore, benzene diazonium is prepared when it is required for some purpose. Benzene diazonium chloride exists as a colourless solid. There is no melting or boiling point values because it decomposes readily. Aniline gives benzenediazonium chloride with aqueous nitrous acid (HNO<sub>2</sub>) at lower temperatures such as 0-5°C. Benzene diazonium is only stable in low temperatures.</p>	4
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(i)(a) Identify the reagent A and the product B in the following reactions of Benzene diazonium chloride.

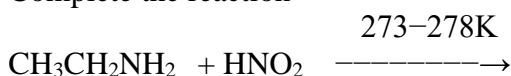


(b) Write a distinction test for Ethylamine and Aniline

(ii) Convert nitrobenzene to Aniline

**OR**

Complete the reaction



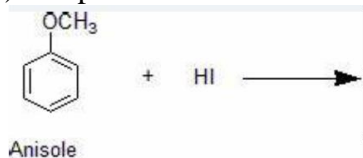
(iii) Give reason: Aniline does not undergo Friedel crafts reaction.

### SECTION E

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

31	<p>(i) Account for the following</p> <p>(a) Transition metals their compounds are used as catalysts</p> <p>(b) Transition metals form alloys</p> <p>(ii)</p> <p>(a) Explain on the basis of valence bond theory that <math>[\text{Ni}(\text{CN})_4]^{2-}</math> ion is diamagnetic (Ni - Z = 28). Also predict the shape on the basis of hybridization.</p> <p>(b) Draw the structures of the isomers of the complex <math>[\text{Pt}(\text{NH}_3)(\text{H}_2\text{O})\text{Cl}_2]</math>.</p> <p style="text-align: center;"><b>OR</b></p> <p>(i) Account for the following</p> <p>(a) Transition metals ions form many complexes</p> <p>(b) Transition metals form coloured compounds.</p> <p>(ii)</p> <p>(a) Give evidence that <math>[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4</math> and <math>[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Cl}</math> are ionisation isomers.</p> <p>(b) Account for the paramagnetism of the octahedral complex <math>[\text{FeF}_6]^{3-}</math> on the basis of valence bond theory.</p>	5
32	<p>(i) Convert Acetone to 2-methylpropan-2-ol</p> <p>(ii) Complete the reaction</p> $\text{CH}_3-\text{CH}=\text{CH}_2 \xrightarrow[\text{(ii) H}_2\text{O}_2/\text{OH}^-]{\text{(i) B}_2\text{H}_6}$ <p>(iii) What is Kolbe reaction? Write the reaction.</p> <p>(iii) Write the structures and names of A and B.</p> $\text{CH}_3\text{COOH} \xrightarrow{\text{PCl}_5} \text{A} \xrightarrow{\text{H}_2/\text{Pd-BaSO}_4} \text{B}$ <p style="text-align: center;"><b>OR</b></p> <p>(i) What happens when</p> <p>(a) ethanol is treated with Cu at 573 K,</p> <p>(b) phenol is treated with <math>\text{CH}_3\text{COCl}</math>/anhydrous <math>\text{AlCl}_3</math>,</p>	5

i) Complete the reaction



(iii)

(a) Arrange the following in increasing order of their boiling points.

$C_2H_5OH, CH_3CHO, CH_3COOH$

(b) What is Hell Volhard Zelinsky reaction ? Write the reaction.

33

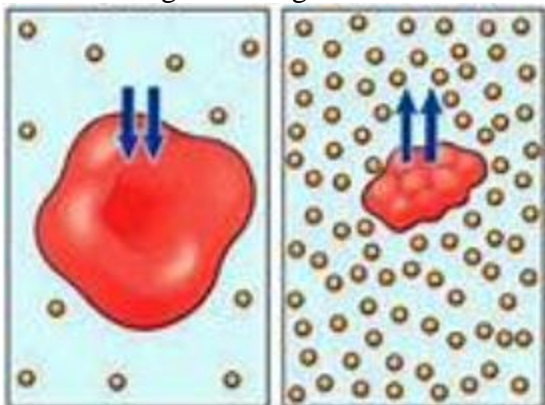
(i) What would be the elevation in boiling point of a 0.1 m NaCl solution? (Assume that NaCl dissociates completely) ( $K_b = 0.512 \text{ } ^\circ\text{C kg mol}^{-1}$ )

(ii) How does salt help in clearing away snow from roads in extreme winters?

(iii) At constant temperature, two liquids A and B form a binary ideal solution. At equilibrium, the mole-fraction of liquid B is 0.4 and vapour state mole-fraction of B is 0.25. If the vapour pressure of pure liquid 'B' is 40 mm, then at the same temperature, what will be the vapour pressure of pure liquid 'A' ?

**OR**

(i) Red Blood cells are placed in salt solutions of different concentrations. figure A shows the cells swelling while figure B shows the cell shrinking. Explain the observations.



A

B

(ii) Write any one application of reverse osmosis.

(iii) The osmotic pressure of a solution containing 5g of a solute per litre is 0.025 atm at  $27^\circ\text{C}$ . Find the molecular weight of the substance.

5