Indian School Al Wadi Al Kabir
Second Rehearsal Examination (2025-2026)

Class: XII | Subject: Chemistry (043) | Max. Marks: 70
Date: 20/01/2026 | Set - I | Time: 3 hours

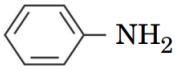
General Instructions:

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 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

Question 1 to 16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

1.	Which of the following is least basic ? (a) $(CH_3)_2NH$ (b) NH_3 (c)  (d) $(CH_3)_3N$	1
2.	Arrange the following in the increasing order of their reactivity towards nucleophilic addition reaction. : CH_3COCH_3, CH_3CHO, HCHO, $C_6H_5COCH_3$ (a) HCHO < CH_3CHO < CH_3COCH_3 < $C_6H_5COCH_3$ (b) CH_3COCH_3 < $C_6H_5COCH_3$ < HCHO < CH_3CHO (c) $C_6H_5COCH_3$ < CH_3COCH_3 < CH_3CHO < HCHO (d) CH_3COCH_3 < CH_3CHO < $C_6H_5COCH_3$ < HCHO	1
3.	Glucose doesn't give 2,4-DNP test (a) because it has an open chain structure but does not have a free − CHO group. (b) because it does not have an open chain structure and hence it does not have a free − CHO group. (c) because it does not have an open chain structure but has a free − CHO group	1

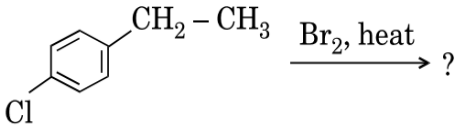
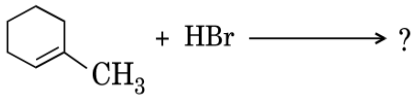
	(d) because it has an open chain structure and hence it has a free − CHO group	
4.	Out of chlorobenzene and benzyl chloride, which one gets easily hydrolysed by aqueous NaOH and why? (a) Benzyl chloride; Due to the steric effect, stable benzyl carbocation cannot be formed. (b) Chlorobenzene; Due to resonance, stable phenyl carbocation is formed. (c) Chlorobenzene; Due to the steric effect, stable phenyl carbocation cannot be formed. (d) Benzyl chloride; Due to resonance, stable benzyl carbocation is formed.	1
5.	From the below options, choose the correct example for gaseous solutions. (a) Oxygen dissolved in water (b) Camphor in nitrogen gas (c) Carbon dioxide dissolved in water (d) Hydrogen in palladium	1
6.	In the following ions : Mn^{3+}, V^{3+}, Cr^{3+}, Ti^{4+} (Atomic no. : Mn = 25, V = 23, Cr = 24, Ti = 22) Which ion is colourless ? Which ion has the highest number of unpaired electrons ? (a) Mn^{3+}; Ti^{4+} (b) V^{3+}; Cr^{3+} (c) Ti^{4+}; Mn^{3+} (d) Cr^{3+}; V^{3+}	1
7.	The correct cell to represent the following reaction is : $Zn + 2Ag^+ \longrightarrow Zn^{2+} + 2Ag$ (a) $2Ag \mid Ag^+ \parallel Zn \mid Zn^{2+}$ (b) $Ag^+ \mid Ag \parallel Zn^{2+} \mid Zn$ (c) $Ag \mid Ag^+ \parallel Zn \mid Zn^{2+}$ (d) $Zn \mid Zn^{2+} \parallel Ag^+ \mid Ag$	1
8.	The best method for the conversion of an alcohol into an alkyl chloride is by treating the alcohol with: (a) $SOCl_2$ in presence of pyridine (b) PCl_3 (c) PCl_5 (d) Dry HCl in the presence of anhydrous $ZnCl_2$	1
9.	The decomposition of NH_3 on platinum surface is zero order reaction. If rate constant (k) is 4×10^{-3} Ms^{-1}, how long will it take to reduce the initial concentration of NH_3 from 0.1 M to 0.064 M. (a) 9s (b) 10s	1

	(c) 11s (d) 8s	
10.	Anisole undergoes bromination with bromine in ethanoic acid even in the absence of iron (III) bromide catalyst (a) Due to the formation of stable carbocation. (b) Due to the activation of benzene ring by the methoxy group. (c) Due to the increase in electron density at ortho and para positions (d) Due to the deactivation of benzene ring by the methoxy group.	1
11.	Which one of the following will show optical isomerism? (a) $[Co(NH_3)_3Cl_3]$ (b) cis-$[Co(en)_2Cl_2]$ Cl (c) trans-$[Co(en)_2Cl_2]$ Cl (d) $[Co(CO)_6]$	1
12.	Iron has a higher enthalpy of atomization than that of copper. (a) Fe has lesser metallic bonding than Cu. (b) Fe has greater ionization enthalpy than Cu. (c) Fe has a lesser number of unpaired electrons than Cu. (d) Fe has a higher number of unpaired electrons than Cu.	1
13.	Given below are two statements labelled as Assertion (A) and Reason (R) Assertion (A): The C-O bonds in ethers are polar. Reason (R): Ethers have a zero dipole moment. 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.	Given below are two statements labelled as Assertion (A) and Reason (R) Assertion (A): Molecular mass of benzoic acid when determined by colligative properties is found high. Reason (R): Dimerization of benzoic acid takes place. 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
15.	Given below are two statements labelled as Assertion (A) and Reason (R) Assertion (A): Fructose is a ketohexose Reason (R): Fructose has a ketone group and six carbon atoms. 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	1

	(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.	
16.	Given below are two statements labelled as Assertion (A) and Reason (R) Assertion (A): Average rate and instantaneous rate of a reaction have the same unit. Reason (R): Average rate becomes an instantaneous rate when the time interval is too small. 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

Section-B

Question No. 17 to 21 are very short answer questions carrying 2 marks each.

17.	a. Radioactive decay follows first - order kinetics. The initial amount of two radioactive elements X and Y is 1 gm each. What will be the ratio of X and Y after two days if their half-lives are 12 hours and 16 hours respectively? b. The hypothetical reaction P + Q → R is half order w.r.t 'P' and zero order w.r.t 'Q'. What is the unit of rate constant for this reaction?	2
18.	What are colligative properties? Write the colligative property which is used to find the molecular mass of macromolecules.	2
19.	**Attempt either option A or B** A. Draw the structures of the major monohalo product for each of the following reactions : (a)  (b)  **OR**	2

	B. (a) Identify the chiral molecule in the following pair :  (i) & (ii) (b) Write the structure of the product when chlorobenzene is treated with methyl chloride in the presence of sodium metal and dry ether.	2
20.	Convert the following: (a) Benzene to m-nitrobenzaldehyde (b) Bromobenzene to benzoic acid	2
21.	Write the cell reaction and calculate the e.m.f. of the following cell at 298 K : Sn (s) $\mid Sn^{2+}$ (0·004 M) $\parallel H^+$ (0·020 M) $\mid H_2$ (g) (1 bar) $\mid$ Pt (s) (Given : $E^{o}_{Sn^{2+}/Sn} = -0{\cdot}14$ V)	2

Section-C

Question No. 22 to 28 are short answer questions, carrying 3 marks each.

22.	(a) Define crystal field splitting energy. On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta_o < P$. (b) $[Ni(CN)_4]^{2-}$ is colourless whereas $[Ni(H_2O)_6]^{2+}$ is green. Why ? (At. no. of Ni = 28)	3
23.	(a) A 5% solution of $Na_2SO_4.10H_2O$ (MW = 322) is isotonic with a 2% solution of non-electrolytic, non-volatile substance X. Find out the molecular weight of X. (b) Draw graphically a solution that shows the negative deviation from Raoult's law.	3
24.	Write the mechanism of the following reaction : $2CH_3CH_2OH \xrightarrow[413\ K]{H^+} CH_3 - CH_2 - O - CH_2 - CH_3 + H_2O$ **OR**	3

	(a) What happens when phenol is treated with: (i) Zinc dust (ii) Bromine water (b) Suggest a method to separate ortho and para nitrophenols in a reaction flask. Justify your answer.	
25.	Write the structures of A, B and C in the following reactions : (i) $CH_3CH_2Cl \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[0\ ^\circ C]{HNO_2} C$ (ii) $CH_3COOH \xrightarrow[\Delta]{NH_3} A \xrightarrow[(b)\ H_2O]{(a)\ LiAlH_4} B \xrightarrow{C_6H_5SO_2Cl} C$	3
26.	**(Attempt any 3)** (a) Write the formula for the following coordination compound: Amminebromidochloridonitrito-N-platinate(II) (b) Write the IUPAC name of the following coordination compound: $K_3[Fe(C_2O_4)_3]$ (c) Give evidence that $[Co(NH_3)_5Cl]SO_4$ and $[Co(NH_3)_5SO_4]Cl$ are ionization isomers. (d) Draw the facial (fac) and meridional (mer) isomers of the octahedral complex: $[Co(NH_3)_3Cl_3]$	3
27.	An organic compound A with the molecular formula $(\pm)C_4H_9Br$ undergoes hydrolysis to form $(\pm)C_4H_9OH$. Give the structure of A and write the mechanism of the reaction.	3
28.	Write the structures of A, B, C, D and E in the following reactions : $C_6H_5NO_2 \xrightarrow{Sn\ /\ HCl} A \xrightarrow[pyridine]{(CH_3CO)_2O} B \xrightarrow[288\ K]{HNO_3 + H_2SO_4} C \xrightarrow{OH^-\ or\ H^+} D$ $A \xrightarrow{H_2SO_4} E$	3

Section D

Question No. 29 & 30 are case-based/data -based questions carrying 4 marks each.

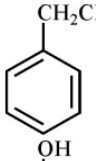
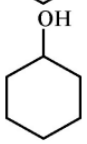
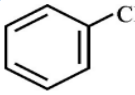
29.	**Read the passage given below and answer the following questions:** Chemical kinetics: The branch of physical chemistry that is concerned with understanding the rates of chemical reactions. It is to be contrasted with thermodynamics which deals with the direction in which a process occurs but in itself tells nothing about its rate. Thermodynamics is time's arrow while chemical kinetics is time's clock. Chemical kinetics relates to many aspects of cosmology, geology, biology, engineering and even psychology and thus has far-reaching	

	implications. The principles of chemical kinetics applied to purely physical processes as well as to chemical reactions. The rate of a chemical reaction is defined in terms of the rates with which the products are formed and the reactants (the reacting substances) are consumed. For chemical systems, it is usual to deal with the concentrations of substances, which is defined as the amount of substances per unit volume. The rate can then be defined as the concentration of a substance that is consumed or produced in unit time. Sometimes it is more convenient to express rates as number of molecules formed are consumed in unit time. (a) A reaction is first order with respect to reactant A. What will be the initial rate, if concentration of reactant is reduced by half? **OR** What is the role of a catalyst towards the rate of the reaction? (b) The first order reaction takes 80 minutes to complete 99.9%. What will be its half-life? ($\log 10^3 = 3\log 10$) (c) Time required to decompose SO_2Cl_2 to half of its initial amount is 60 minutes. If the decomposition is a first order reaction, calculate the rate constant of the reaction.	 1 1 1 2
30.	**Read the passage given below and answer the following questions:** When a protein in its native form, is subjected to physical changes like change in temperature or chemical changes like change in pH, the hydrogen bonds are disturbed. Due to this, globules unfold and helix get uncoiled and protein loses its biological activity. This is called denaturation of protein. The denaturation causes change in secondary and tertiary structures but primary structures remains intact. Examples of denaturation of protein are coagulation of egg white on boiling, curding of milk, formation of cheese when an acid is added to milk. (a) Identify any two changes during denaturation of protein in the above passage. (b) What are two types of secondary structures of protein? (c) (i) Show the formation of Glycylalanine (ii) Write short notes on tertiary structures of protein.	 1 1 2

Section-E

Question No. 31 to 33 are long answer type questions carrying 5 marks each.

31.	**Attempt either A or B** **A. Answer the following questions:** (a) Write the outer shell electronic configuration of the element Cu. (b) Why is the outer electronic configuration of Cr different from the elements that are adjacent to it in the periodic table? (c) Sc^{3+} salts are colourless. Why?	5

	(d) There is a slight dip in the third ionisation enthalpy value of Fe when compared to Mn. Justify. (e) Which is more magnetic Cr^{2+} or Mn^{2+}? Justify. **OR** **B. Answer the following questions:** I. What is actinoid contraction? What causes actinoid contraction? II. Write the ionic equation for the reaction of KI with acidified $KMnO_4$. III. Write electronic configuration of Ce^{4+} (Z = 58) and Th^{4+} (Z = 90) IV. Explain the preparation of Potassium dichromate from its chromite ore.	
32.	**Attempt either A or B** **A. Answer the following questions:** (a) An organic compound 'A', having the molecular formula C_3H_8O on treatment with Cu at 573 K, gives 'B'. 'B' does not reduce Fehling's solution but gives a yellow precipitate of the compound 'C' with I_2/NaOH. Deduce the structures of A, B and C. (b) Write structures of compounds A and B in each of the following reactions : (i)  $\xrightarrow{KMnO_4 - KOH}$ A $\xrightarrow{H_3O^+}$ B (ii)  $\xrightarrow{CrO_3}$ A $\xrightarrow{H_2N-NH-CONH_2}$ B **OR** **B. Answer the following questions:** (a) Complete the following reactions : (i)  $\xrightarrow{NaCN/HCl}$ (ii) $(C_6H_5CH_2)_2Cd + 2CH_3COCl \longrightarrow$ (iii) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COOH \xrightarrow[(ii)\ H_2O]{(i)\ Br_2\ /\ Red\ P_4}$	5

	(b) Write chemical equations for the following reactions: (i) Propanone is treated with dilute $Ba(OH)_2$. (ii) Benzaldehyde is treated with c. KOH.	
33.	**Attempt either A or B** **A. Answer the following questions:** (a) The standard Gibbs energy (ΔrG°) for the following cell reaction is -300 kJ mol^{-1} : $Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$ Calculate E°_{cell} for the reaction. (Given: 1F = 96500 mol^{-1}) (b) Calculate λ°_m for $MgCl_2$ if λ° values for Mg^{2+} ion and Cl^- ion are 106 S cm^2mol^{-1} and 76.3 S cm^2mol^{-1} respectively. **OR** **B. Answer the following questions:** (a) Write the Nernst equation for the following cell reaction : $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$ How will the E_{cell} be affected when concentration of (i) Cu^{2+} ions is increased and (ii) Zn^{2+} ions is increased ? (b) Write the anodic and cathodic reactions involved in the Fuel cells. (c) Identify the product of electrolysis of molten sodium chloride.	5