

SAMPLE QUESTION PAPER

BLUE PRINT

Time Allowed : 2 hours

Maximum Marks : 35

S. No.	Chapter	Section-A (2 Marks)	Section-B (3 Marks)	Section-C (5 Marks)	Total
1.	Electrochemistry	1(2)	1(3)	–	5(13)
2.	Chemical Kinetics	1(2)	1(3)*	–	
3.	Surface Chemistry	–	1(3)	–	
4.	d- and f-Block Elements	–	1(3)	–	3(9)
5.	Coordination Compounds	–	2(6)*	–	
6.	Aldehydes, Ketones and Carboxylic Acids	1(2)	1(3)	1(5)	4(13)
7.	Amines	–	1(3)*	–	
	Total Questions	3(6)	8(24)	1(5)	12(35)

*It is a choice based question.

CHEMISTRY

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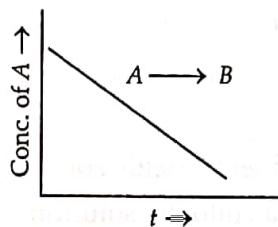
General Instructions :

Read the following instructions carefully.

1. There are 12 questions in this question paper with internal choice.
2. SECTION A - Q. No. 1 to 3 are very short answer questions carrying 2 marks each.
3. SECTION B - Q. No. 4 to 11 are short answer questions carrying 3 marks each.
4. SECTION C - Q. No. 12 is case based question carrying 5 marks.
5. All questions are compulsory.
6. Use of log tables and calculators is not allowed.

SECTION - A

1. For a general reaction $A \longrightarrow B$, plot of concentration of A vs time is given in Figure.



Answer the following question on the basis of this graph (any two).

- (a) What is the order of the reaction?
 - (b) What will be the new $t_{1/2}$ if concentration of A is doubled?
 - (c) What are the units of rate constant?
2. Illustrate the following name reactions giving a chemical equations in each case :
- (a) Clemmensen reaction
 - (b) Cannizzaro reaction
3. Depict the electrochemical cell and calculate the E° for each cell.
- (a) $2\text{Ag}^+ + \text{Cd} \longrightarrow \text{Ag} + \text{Cd}^{2+}$
 - (b) $\text{Cl}_2(\text{g}) + 2\text{I}^- \longrightarrow 2\text{Cl}^- + \text{I}_2(\text{s})$
- (Given : $E^\circ_{\text{Ag}^+/\text{Ag}} = 0.80 \text{ V}$, $E^\circ_{\text{Cd}^{2+}/\text{Cd}} = -0.40 \text{ V}$, $E^\circ_{\text{Cl}_2/\text{Cl}^-} = 1.36 \text{ V}$, $E^\circ_{\text{I}_2/\text{I}^-} = 0.54 \text{ V}$)

SECTION - B

4. Give one chemical test to distinguish between the compounds of the following pairs:
- (a) CH_3NH_2 and $(\text{CH}_3)_2\text{NH}$
 - (b) Aniline and ethanamine
 - (c) $(\text{CH}_3)_2\text{NH}$ and $(\text{CH}_3)_3\text{N}$

OR

Account for the following :

- Methylamine in water reacts with ferric chloride to precipitate hydrated ferric oxide.
- Gabriel phthalimide synthesis is preferred for synthesising primary amines.
- Aniline is a weaker base than cyclohexylamine.

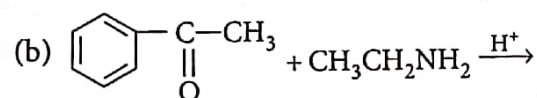
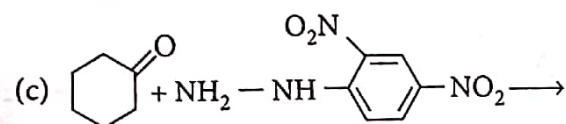
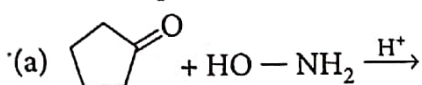
5. Answer the following questions :

- Write the IUPAC name of $[\text{Pt}(\text{NH}_3)\text{BrCl}(\text{NO}_2)]^-$.
- Compare the magnetic behaviour of the complex entities $[\text{Fe}(\text{CN})_6]^{4-}$ and $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$.

OR

- Co^{2+} is easily oxidised to Co^{3+} in presence of a strong field ligand. Give reason.
- On the basis of crystal field theory, write the electronic configuration of d^4 ion if $\Delta_o < P$.

6. Predict the products of the following reactions :



7. Explain what is observed when :

- NaCl solution is added to hydrated ferric oxide sol.
- Electric current is passed through a colloidal solution.
- a freshly prepared precipitate of $\text{Fe}(\text{OH})_3$ is shaken with a small amount of FeCl_3 solution.

8. How would you account for the following :

- Metal-metal bonding is more extensive in the $4d$ and $5d$ series of transition elements than the $3d$ series.
- $\text{Mn}(\text{III})$ undergoes disproportionation reaction easily.
- Most of the transition metal ions exhibit characteristic colours in aqueous solutions.

9. Using valence bond theory explain out of $[\text{CoF}_6]^{3-}$ and $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$, which complex is

- diamagnetic
- more stable
- outer orbital complex

OR

Explain the following :

- Low spin octahedral complexes of nickel are not known.
- CO is a stronger ligand than NH_3 for many metals.
- $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ is green and becomes violet when ethane 1, 2-diamine is added to it.

10. For the cell,



(a) Write the oxidation and reduction half-reactions.

(b) Calculate the cell potential at 25°C.

(Given : $E_{\text{Zn}^{2+}/\text{Zn}}^{\circ} = -0.76 \text{ V}$; $E_{\text{Cu}^{2+}/\text{Cu}}^{\circ} = +0.34 \text{ V}$)

11. The following initial rate data were obtained at 300 K for the reaction : $2A + B \rightarrow C + D$.

	[A]/mol L ⁻¹	[B]/mol L ⁻¹	Rate/mol L ⁻¹ s ⁻¹
I.	0.2	0.1	6.0×10^{-2}
II.	0.4	0.1	2.4×10^{-1}
III.	0.2	0.2	1.2×10^{-1}

(a) Deduce the rate law.

(b) If half-life of reaction is independent of initial concentration of the reactant, what is the order of the reaction?

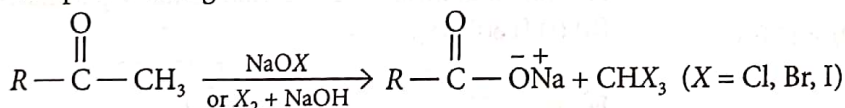
OR

During nuclear explosion, one of the products is ^{90}Sr with half-life of 28.1 years. If 1 μg of ^{90}Sr was absorbed in the bones of a newly born baby instead of calcium, how much of it will remain after 10 years if it is not lost metabolically?

SECTION - C

12. Read the passage given below and answer the questions that follow.

Aldehydes and ketones having acetyl group $\left(\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \right)$ are oxidised by sodium hypohalate (NaOX) or halogen and alkali ($\text{X}_2 + \text{OH}^-$) to corresponding sodium salt having one carbon atoms less than the carbonyl compound and give a haloform.

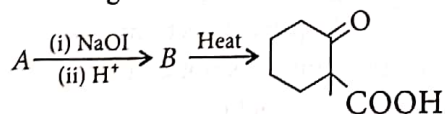


Sodium hypoiodite (NaOI) when treated with compounds containing $\text{CH}_3\text{CO}-$ group gives yellow precipitate of iodoform. Haloform reaction does not affect a carbon-carbon double bond present in the compound.

(a) Amongst propionaldehyde and isopropyl alcohol which will give positive iodoform test.

(b) Write the iodoform reaction of acetone.

(c) For the given reaction,

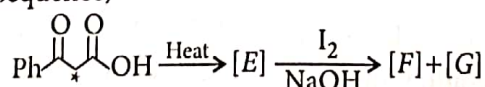


Identify the starting compound A.

(d) An organic compound 'A' has the molecular formula $\text{C}_3\text{H}_6\text{O}$. It undergoes iodoform test. Give the IUPAC name of A.

OR

In the following reaction sequence,



(* implies ^{13}C labelled carbon)

What are the structures of E, F and G?