

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)*	–	4(13)
2.	Chemical Kinetics	–	–	1(5)	
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	–	2(6)#	–	5(13)
7.	Amines	2(4)	1(3)	–	
	Total Questions	3(6)	8(24)	1(5)	12(35)

*It is a choice based question.

#Out of the two questions only one question is choice based.

CHEMISTRY

Time allowed : 2 hours

Maximum marks : 35

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. Write the IUPAC name of the following compounds (*any two*) :
(a) $(\text{H}_3\text{CCH}_2)_2\text{NCH}_3$ (b) $\text{H}_3\text{CNHCH}(\text{CH}_3)_2$
(c) $(\text{H}_3\text{C})_2\text{N}-\text{CH}_2\text{CH}_3$
2. Limiting molar conductivity of an electrolyte cannot be determined experimentally. Why?
3. Arrange the following compounds in increasing order of their basic strength :
(a) Aniline, *p*-nitroaniline and *p*-toluidine (b) $\text{C}_6\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{NHCH}_3$, $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$

SECTION - B

4. Out of hexacyanomanganese(III) and hexachloridomanganese(III) which has maximum number of unpaired electrons. Why?

OR

Explain the bonding in coordination compounds in terms of Werner's postulates.

5. Explain, cyclohexylamine is a stronger base than aniline. Draw resonating structures of aniline.
6. For Freundlich adsorption isotherm, a plot of $\log(x/m)$ (*y*-axis) and $\log p$ (*x*-axis) gives a straight line. The intercept and slope for the line is 0.4771 and 2, respectively. What is the mass of gas, absorbed per gram of adsorbent if the initial pressure is 0.04 atm. ($\log 3 = 0.4771$)

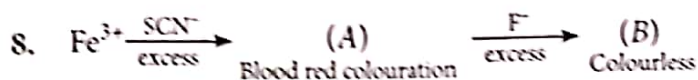
OR

- (a) Why does physisorption decrease with the increase of temperature?
 - (b) Explain how the phenomenon of adsorption find application in the production of vaccum.
 - (c) Write one difference between solution and colloid.
7. What is meant by the following terms? Give an example of the reaction for their formation in each case.
(a) Cyanohydrin (b) Acetal
(c) Semicarbazone

OR

How will you convert ethanal into the following compounds?

- (a) Butane-1,3-diol
- (b) But-2-enal
- (c) But-2-enoic acid



What are (A) and (B)? Give IUPAC name of (A). Find the spin only magnetic moment of (B).

9. The conductivity of 0.20 M solution of KCl at 298 K is 0.0248 S cm^{-1} . Calculate its molar conductivity.

OR

The resistance of a conductivity cell containing 0.001 M KCl solution at 298 K is 1500Ω . What is the cell constant if conductivity of 0.001 M KCl solution at 298 K is $0.146 \times 10^{-3} \text{ S cm}^{-1}$?

10. (a) What is lanthanoid contraction?
(b) Explain the following:
(i) Why is europium(II) more stable than cerium(II)?
(ii) Why is +3 oxidation state of gadolinium ($Z = 64$) and lutetium ($Z = 71$) especially stable?
11. Give plausible explanation for each of the following:
(a) Cyclohexanone forms cyanohydrin in good yield but 2,2,6-trimethylcyclohexanone does not.
(b) There are two $-\text{NH}_2$ groups in semicarbazide. However, only one is involved in the formation of semicarbazones.
(c) During the preparation of esters from a carboxylic acid and an alcohol in the presence of an acid catalyst, the water or the ester should be removed as soon as it is formed.

SECTION - C

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

In a reaction, the rates of disappearance of different reactants or rates of formation of different products may not be equal but rate of reaction at any instant of time has the same value expressed in terms of any reactant or product. Further, the rate of reaction may not depend upon the stoichiometric coefficients of the balanced chemical equation. The exact powers of molar concentrations of reactants on which rate depends are found experimentally and expressed in terms of 'order of reaction.' Each reaction has a characteristic rate constant depends upon temperature. The units of the rate constant depend upon the order of reaction. The following questions are multiple choice questions. Choose the most appropriate answer:

- (a) The rate constant of a reaction is found to be $3 \times 10^{-3} \text{ mol}^{-2} \text{ L}^2 \text{ sec}^{-1}$. What is the order of the reaction?
- (b) In the reaction, $A + 3B \rightarrow 2C$, what is the rate of formation of C?
- (c) Rate of a reaction can be expressed by following rate expression, $\text{Rate} = k[A]^2[B]$, if concentration of A is increased by 3 times and concentration of B is increased by 2 times, how many times rate of reaction increases?
- (d) The rate of a certain reaction is given by, $\text{rate} = k[\text{H}^+]^n$. The rate increases 100 times when the pH changes from 3 to 1. What is the order (n) of the reaction?

OR

In a chemical reaction $A + 2B \rightarrow \text{products}$, when concentration of A is doubled, rate of the reaction increases 4 times and when concentration of B alone is doubled rate continues to be the same. What is the order of the reaction?