

Model Question Paper 2024-25

XI Chemistry

Time Allowed 3 Hours

MM 60

Note:

1. There are 28 questions in all.
 - a. Q.N. 1 to 12 are multiple choice questions and carry 1 mark each,
 - b. Q.N. 13 to 19 are very short answer questions carrying 2 marks each,
 - c. Q.N. 20 to 24 are short answer questions carrying 3 marks each
 - d. Q.N. 25 is a case study-based question and carries 4 marks
 - e. Q. 26 to 28 are long answer questions carrying 5 marks each.
2. All Questions are compulsory however internal choices have been given.
3. Students can use $\log 3 = 0.4771$ where required.

Section A (Multiple Choice Questions)

1. The empirical formula of benzene is
 - a) C_6H_6
 - b) CH
 - c) $C_{12}H_{22}O_{11}$
 - d) $C_6H_{12}O_6$1
2. The angular momentum of an electron in the n th orbit is given by:
 - a) $n \times h$
 - b) $\frac{nh}{2\pi}$
 - c) $\frac{n^2 h}{2\pi}$
 - d) $\frac{nh}{\pi}$1
3. The maximum number of electrons that can be accommodated in a subshell is given by:
 - a) $2l + 1$
 - b) $2n^2$
 - c) $4l + 2$
 - d) $2(2l + 1)$1
4. Which of the following molecules has a linear shape?
 - a) H_2O
 - b) NH_3
 - c) CO_2
 - d) $CH_4$1
5. The equilibrium constant (K) for the reaction $aA + bB \rightleftharpoons cC + dD$ is given by:
 - a) $\frac{[A]^a[B]^b}{[C]^c[D]^d}$
 - b. $\frac{[C]^c[D]^d}{[A]^a[B]^b}$
 - c. $\frac{[A]^c[B]^d}{[C]^a[D]^b}$
 - d. $\frac{[C]^a[D]^b}{[A]^c[B]^d}$1
6. Which of the following is a redox reaction?
 - a) $HCl + NaOH \rightarrow NaCl + H_2O$
 - b) $CuO + H_2 \rightarrow Cu + H_2O$
 - c) $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$
 - d) $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$1
7. The functional group in an alcohol is:
 - a) -CHO
 - b) -COOH
 - c) -OH
 - d) -NH₂1

21. a) Define electron gain enthalpy. Explain why electron gain enthalpy of fluorine is less negative than that of chlorine.
 b) Give the cause of periodicity in periodic properties. 2,1
22. a) Explain Gibbs free energy and its significance in predicting the spontaneity of a reaction.
 b) What will be the sign of ΔS for the reaction $2\text{Cl(g)} \rightarrow \text{Cl}_2\text{(g)}$? 2,1
23. a) Balance the following equation in acidic medium.
 $\text{Cr}_2\text{O}_7^{2-} + \text{C}_2\text{O}_4^{2-} \rightarrow \text{Cr}^{3+} + \text{CO}_2$
 b) Calculate Oxidation number of Cr in $\text{K}_2\text{Cr}_2\text{O}_7$. 2,1
24. a) Write the IUPAC name of $\text{CH}_3\text{-CH=CH-CH}_2\text{OH}$.
 b) Arrange the following in increasing order of acidic strength and give reason for your answer
 Cl_3CCOOH , Cl_2CHCOOH and ClCH_2COOH 1,2

Section D (Case study Questions)

25. Case Study: The Haber Process

The Haber process is used to synthesize ammonia (NH_3) from nitrogen (N_2) and hydrogen (H_2) gases. The balanced chemical equation for the reaction is: $\text{N}_2\text{(g)} + 3\text{H}_2\text{(g)} \rightleftharpoons 2\text{NH}_3\text{(g)}$

In an industrial setup, this reaction is conducted at high pressure (around 200 atmospheres) and high temperature (about 450°C) though forward reaction is exothermic in the presence of a catalyst.

Questions:

- a) Explain how increasing the pressure affects the position of equilibrium in the Haber process.
 b) Predict the effect of increasing the temperature on the equilibrium position of the Haber process.
 c) Describe the role of the catalyst in the Haber process.
 d) Write the equilibrium constant expression for the Haber process. 1,1,1,1

Section E (Long Answer Type Questions)

26. a) What is the Volume occupied by 0.5 mole of nitrogen gas at NTP?
 b) An organic compound contains C = 40% , H = 6.67 % & O = 53.33 % Calculate its empirical formula.
 c) Define Limiting Reagent. 2,2,1
27. a) BH_3 is non polar whereas NH_3 has net dipole moment Why?
 b) Write four differences between sigma(σ) and Pi(π) bond.
 c) Ice floats over water, why? 2,2,1
28. a) Write a short note on Friedel Craft' Reaction.
 b) How will you prepare butane from ethane?
 c) Complete the reaction.
 $\text{CaC}_2 + \text{H}_2\text{O} \rightarrow \text{-----} + \text{-----}$ 2,2,1

Chapter wise Marks distribution and Blueprint of XI Chemistry Paper Session 2024-25

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S.N.	Chapter	1 Mark	2 Marks	3 Marks	4 Marks	5 Marks	Total
1	Some Basic Concepts of Chemistry	1				1	6
2	Structure of Atom	3	1	1			8
3	Classification of elements and periodicity in properties	-	1	1			5
4	Chemical bonding and Molecular structure	1				1	6
5	Chemical Thermodynamics		2	1			7
6	Equilibrium	2	-		1		6
7	Redox Reactions	1	-	1			4
8	Organic Chemistry: Some basic principles and Techniques	2	2	1			9
9	Hydrocarbons	2	1			1	9
	Total Questions	12	7	5	1	3	
	Total Marks	12	14	15	4	15	60