**HIMACHAL PRADESH BOARD OF SCHOOL EDUCATION DHARAMSHALA**
**Model Question Paper- 2024-25**

**Subject: Chemistry** Time 3Hrs
**Class XII** MM 60

**Note:**

i. There will be 28 questions in all.

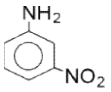
a. Q.N. 1 to 12 are Multiple choice questions and Carry 1 mark each,
b. Q.N. 13 to 19 are Very short answer questions carrying 2 Marks each,
c. Q.N.20 to 24 are short answer questions carrying 3 marks each
d. Q.N. 25 is case study-based question and carries 4 marks
e. Q. 26 to 28 are long answer questions carrying 5 marks each.

ii. All Questions are compulsory however internal choices have been given.

## Section A(MCQ)

1. Which of the following factors does not affect the solubility of a solid solute in a liquid solvent?
   **a)** Temperature **b)** Pressure
   **c)** Nature of the solute and solvent **d)** Particle size of the solute 1
2. In an electrochemical cell reduction takes place at
   a) Cathode b) Anode
   c) Salt bridge d) None of these 1
3. With increase in temperature, the conductivity of ____ increases
   a) Cu b) Wood
   c) Si d) Pt 1
4. The standard electrode potential of a half-cell is measured under standard conditions, which include:
   a) 1 M concentration of solutions, 298 K temperature, and 1 atm pressure
   b) 0.1 M concentration of solutions, 273 K temperature, and 1 atm pressure
   c) 1 M concentration of solutions, 273 K temperature, and 1 atm pressure
   d) 0.1 M concentration of solutions, 298 K temperature, and 1 atm pressure 1
5. The most basic among the following is

   a)  b) $CH_3NH_2$

   c) $CH_3CH_2NH_2$ d) 1 

6. The number of unpaired electrons in $Fe^{3+}$ is
   a. 3 b. 4
   c. 5 d. 6 1
7. In the chlorination of benzene, the role of anhydrous $AlCl_3$ is to:
   **a)** Absorb HCl
   **b)** Act as an oxidizing agent
   **c)** Provide $Cl_2$
   **d)** Act as a catalyst 1
8. Which of the following is the correct IUPAC name for $CH_3$-CHO?
   **a)** Ethanal **b)** Methanal
   **c)** Ethanol **d)** Methanol 1
9. Aldehydes and ketones undergo nucleophilic addition reactions due to the presence of:

**a)** Electron-rich carbonyl carbon
**b)** Electron-deficient carbonyl carbon
**c)** Electron-rich carbonyl oxygen
**d)** Electron-deficient carbonyl oxygen 1

10. The initial conc. in a first order reaction is 32 mol $L^{-1}$ and $t_{1/2}$ is 10 min. the conc. in mol $L^{-1}$ after half an hour will be
    a. 4 b. 3.2
    c. 0.693/32 d. 320 1
11. **Assertion (A):** Carboxylic acids have higher boiling points than aldehydes and ketones of similar molecular weight.
    **Reason (R):** Carboxylic acids form strong hydrogen bonds with themselves, leading to the formation of dimers.
    (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
    (b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
    (c) Assertion (A) is true, but Reason (R) is false.
    (d) Assertion (A) is false, but Reason (R) is true. 1
12. **Assertion (A):** Phenol is more acidic than ethanol.
    **Reason (R):** The phenoxide ion formed after the loss of a proton from phenol is stabilized by resonance, whereas the ethoxide ion is not.
    (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
    (b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
    (c) Assertion (A) is true, but Reason (R) is false.
    (d) Assertion (A) is false, but Reason (R) is true. 1

## Section B (Very Short Answer Questions)

13. Calculate $E_{Cell}$ for given cell if $E^{o}_{Cell}$ is 2.7V
    $Mg|\ Mg^{2+}(0.001M)||\ Cu^{2+}(0.0001M)|Cu$ 2
14. Derive integrated rate equation for first order reaction. 2
15. What is meant by the chelate effect? Explain with an example. 2
16. Explain why ethers are relatively unreactive compared to alcohols.

    *Or*

    Explain a test to distinguish between primary, secondary and tertiary alcohols. 2
17. Aldehydes are more reactive than ketones, why? 2
18. Write a short note on Reimer Tiemann Reaction. 2
19. Explain Secondary Structure of proteins. 2

## Section C (Short Answer Questions)

20. a. Give the IUPAC name of $K_3[Al(C_2O_4)_3]$.
    b. Draw and discuss the structure of $[Co(NH_3)_6]^{3+}$ ion, mentioning hybridization and magnetic character using VBT. 1,2
21. What is fuel cell? Explain the working of $H_2 - O_2$ fuel cell. 1,2

***OR***

a) How much electricity is required to obtain 4g of Calcium by the electrolysis of $CaCl_2$?

b) Give the units of molar conductance. 2,1

22. A first order reaction is 90% complete in 27 minutes, when will the same reaction be 99% complete under similar conditions? 3

23. a. Phenol is more acidic than ethanol, why?

b. What happens when Propan-2-ol is heated with $H_2SO_4$ at 443K? 2,1

24. a. Compare and contrast DNA and RNA in terms of their structure, function, and components.

b Give chemical name of Vitamin D. 2,1

## Section D ( Case study Questions)

25. **Context:**

A researcher is studying the reactivity of different haloalkanes and haloarenes with various reagents. She compares the reaction of chloromethane ($CH_3Cl$) and chlorobenzene ($C_6H_5Cl$) with the following reagents: aqueous sodium hydroxide (NaOH), aqueous silver nitrate ($AgNO_3$), and magnesium in dry ether. She observes distinct differences in reactivity between the haloalkane and haloarene.

**Answer following Questions:**

a. Write the chemical equation for the reaction of chloromethane with aqueous NaOH and what is the type of this reaction? 2

b. Explain why chlorobenzene does not undergo a similar reaction with aqueous NaOH as chloromethane. 2

## Section E (Long Answer Type Questions)

26. a. Write a short note on Coupling Reaction.

b. What happens when propanamide is heated with Bromine in alcoholic KOH?

c. How will you convertAniline to Phenol 2,1,2

**Or**

A compound **X** with the molecular formula $C_3H_7NO$ reacts with nitrous acid ($HNO_2$) to form a compound **Y** which gives a brisk effervescence with $NaHCO_3$. On heating, **X** with a dehydrating agent like $P_2O_5$ produces **Z** with a pleasant odour.

(a) Identify **X**, **Y**, and **Z**.

(b) Write the chemical equations for the reactions involved. 3,2

27. a. A solution is prepared by dissolving 5 grams of sodium chloride (NaCl) in 100 grams of water. Calculate the molality of the solution. (Molar mass of NaCl = 58.5 g/mol)

b. Give four differences between Ideal and non-ideal solutions 3,2

28. a. Why do transition elements form-coloured compounds?

b. What is Lanthanoid contraction? Give its cause.

c. Why do transition elements show variable oxidation states?

d. What happens when Acidified $KMnO_4$ reacts with $FeSO_4$? 1,2,1,1

**ChapterwiseMarksdistributionand<u>BlueprintofXIIChemistry</u>Paper**
**Session2024-25**

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ii. All Questions are compulsory however internal choices have been given.

| S.N. | Chapter | 1 Mark MCQ | 2 Marks | 3 Marks | 4 Marks | 5 Marks | Total |
|---|---|---|---|---|---|---|---|
| 1 | Solutions | 1 | | | | 1 | **6** |
| 2 | Electrochemistry | 3 | 1 | 1 | | | **8** |
| 3 | ChemicalKinetics | 1 | 1 | 1 | | | **6** |
| 4 | Transitionmetals | 1 | | | | 1 | **6** |
| 5 | CoordinationCompounds | | 1 | 1 | | | **5** |
| 6 | HaloalkanesandHaloarenes | 1 | - | | 1 | | **5** |
| 7 | Alcohols,Phenolsandethers | 1 | 1 | 1 | | | **6** |
| 8 | Aldehydes,ketonesandcarboxylicacids | 3 | 2 | | | | **7** |
| 9 | OrganicCompoundscontaining Nitrogen | 1 | | | | 1 | **6** |
| 10 | Biomolecules | | 1 | 1 | | | **5** |
| | **Total Questions** | **12** | **7** | **5** | **1** | **3** | |
| | **Total Marks** | **12** | **14** | **15** | **4** | **15** | **60** |