

MODEL QUESTION PAPER SET- 1 : 2021 - 22

MM : 70

CHEMISTRY THEORY

Time : 3 Hrs

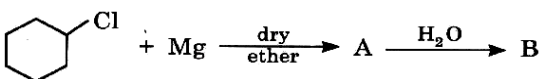
Entire Syllabus

The question paper is divided into Four sections :

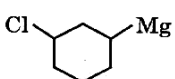
- (1) **Section A :** Q. No. 1 contains Ten multiple choice type of questions carrying One mark each.
Q. No. 2 contains Eight very short answer type of questions carrying One mark each.
- (2) **Section B:** Q. No. 3 to Q. No. 14 contains Twelve short answer type of questions carrying two marks each. Internal choice is provided (Any 8)
- (3) **Section C:** Q. No. 15 to Q. No. 26 contains Twelve short answer type of questions carrying Three marks each. Internal choice is provided (Any 8)
- (4) **Section D:** Q. No. 27 to Q. No. 31 contains Five long answer type of questions carrying Four marks each. Internal choice is provided (Any 3)
- (5) Use log – Table if necessary. Use of Calculator is not allowed.

SECTION A

Q.1 Select & Write the correct Answer 10M

- i. Anisole on heating with concentrated HI gives _____.
- a) iodobenzene b) phenol + methanol
 c) phenol + iodomethane d) iodobenzene + methanol
- ii. Amongst the following, the solubility of which ionic solid decreases with increase in temperature? 1M
- a) KNO_3 b) NaBr
 c) Na_2SO_4 d) KCl
- iii. Number of carbon atoms present in isoprene unit is _____.
- a) 6 b) 5 c) 4 d) 3
- iv. Blood in human body is highly buffered at pH of _____. 1M
- a) 7.4 b) 7.0 c) 6.9 d) 8.1
- v. Most stable oxidation state of titanium is _____.
- a) + 2 b) + 3 c) + 4 d) + 5
- vi.  1M

The product 'B' in the above reaction sequence is _____.

- a)  b) 
 c)  d) 

- vii. Which of the following is NOT correct? 1M
- a) Gibbs energy is an extensive property
 b) Electrode potential or cell potential is an intensive property.
 c) Electrical work = $-\Delta G$
 d) If half reaction is multiplied by a numerical factor, the corresponding E° value is also multiplied by the same factor.

- viii. The product obtained in the following reaction: 1M
 $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CHO} \xrightarrow{\text{H}_2/\text{Ni}} ?$ is
 a) Pent-3-en-1-ol b) Pentan-1-ol c) Pentan-2-ol d) Pentanal
- ix. The rate constant for the reaction $2\text{N}_2\text{O}_{5(g)} \longrightarrow 2\text{N}_2\text{O}_{4(g)} + \text{O}_{2(g)}$ is $4.98 \times 10^{-4} \text{ s}^{-1}$. 1M
 The order of reaction is _____ .
 a) 0 b) 1 c) 2 d) 3
- x. Methyl ketone group is identified by _____. 1M
 a) Iodoform test b) Fehling's solution
 c) Tollens' reagent d) Schiff's reagent
- Q.2 Short Answers (1 Mark Each)** 8M
- i. Give two examples of nonideal solutions 1M
- ii. What is the coordination number of atoms in simple cubic crystal lattice? 1M
- iii. Define the term: Vulcanization. 1M
- iv. Write the name of sugar present in RNA. 1M
- v. Write IUPAC name of the following compounds. 1M

$$\begin{array}{c} \text{CH}_3 - \text{CH} = \text{C} - \text{CH} - \text{Br} \\ | \quad | \\ \text{H}_3\text{C} \quad \text{CH}_3 \end{array}$$
- vi. Write the value of $\frac{2.303RT}{F}$ in Nernst equation. 1M
- vii. What is the coordination number and oxidation state of metal ion in the complex $[\text{Pt}(\text{NH}_3)\text{Cl}_5]^-$? 1M
- viii. In a particular reaction, 2kJ of heat is released by the system and 6kJ of work is done on the system. Calculate ΔU . 1M

SECTION B

- Attempt Any Eight Questions** 16M
- Q.3** In a first order reaction, the concentration of reactant decreases from 20 mmol dm^{-3} to 8 mmol dm^{-3} in 38 minutes. What is the half life of reaction? 2M
- Q.4** Draw the structure of sulphurous acid. Write two uses of helium. 2M
- Q.5** Calculate the spin only magnetic moment of divalent cation of a transition metal with atomic number 25. 2M
- Q.6** How are alkyl halides prepared from alcohols using HI? 2M
- Q.7** A solution of citric acid $\text{C}_6\text{H}_8\text{O}_7$ in 50 g of acetic acid has a boiling point elevation of 1.76 K. If K_b for acetic acid is $3.07 \text{ K kg mol}^{-1}$, what is the molality of solution? 2M
- Q.8** What are bidentate Ligands? Give one example. 2M
- Q.9** What is the standard enthalpy of combustion? Give an example. 2M
- Q.10** What is the action of the following reagent on cumene? 2M
 Alkaline KMnO_4 , dil. HCl and heat.
- Q.11** Derive the relationship between pH and pOH. 2M

- Q.12** How vapour pressure lowering is related to a rise in boiling point of solution? **2M**
- Q.13** The vapour pressure of water at 20 °C is 17 mm Hg. What is the vapour pressure of solution containing 2.8 g urea in 50g of water? **2M**
- Q.14** What is the action of the following on chlorobenzene? **2M**
(i) Methyl chloride in presence of anhydrous AlCl₃
(ii) Fuming H₂SO₄.

SECTION C

Attempt Any Eight Questions **24M**

- Q.15** Write chemical equations involved during manufacture of sulphuric acid by contact process. **3M**
 Write two uses of sulphur dioxide
- Q.16** Cerium and Terbium behaves as good oxidizing agents in +4 oxidation state. Explain. **3M**
- Q.17** Write a note on esterification reaction. **3M**
- Q.18** Derive the integrated rate law for first order reaction. **3M**
- Q.19** Calculate the standard enthalpy of $\text{N}_2\text{H}_{4(g)} + \text{H}_{2(g)} \longrightarrow 2\text{NH}_{3(g)}$ **3M**
 if $\Delta H^0(\text{N}-\text{H}) = 389\text{kJ mol}^{-1}$
 $\Delta H^0(\text{H}-\text{H}) = 435\text{kJ mol}^{-1}$
 $\Delta H^0(\text{N}-\text{N}) = 159\text{kJ mol}^{-1}$
- Q.20** What is meant by LDP and HDP? Mention the basic difference between the same with suitable examples. **3M**
- Q.21** Explain three principles of green chemistry. **3M**
- Q.22** The pH of monoacidic weak base is 11.2. Calculate its percent dissociation in 0.02 M solution. **3M**
- Q.23** Explain SN² reaction mechanism for alkaline hydrolysis of bromomethane. **3M**
- Q.24** What is an impurity defect? What are its types? Explain the formation of vacancies through aliovalent impurity with example. **3M**
- Q.25** Define Cryoscopic constant. **3M**
 Derive the relation between elevation of boiling point and molar mass of solute.
- Q.26** Write reactions to prepare ethanamine from **3M**
(i) acetonitrile
(ii) nitroethane
(iii) propionamide

SECTION D

Attempt Any Three Questions **12M**

- Q.27** State Kohlrausch law of independent migration of ions. **4m**
 Write and explain two applications of electrochemical series.
 Write unit of cell constant.

- Q.28** What is the action of concentrated H_2SO_4 on, **4m**
(i) CaF_2
(ii) Cane sugar
Write reaction for the preparation of polyacrylonitrile (PAN)
- Q.29** Write a note on aldol condensation reaction of ethanal **4m**
Write a reaction involved when benzaldehyde is treated with concentrated caustic potash
- Q.30** Define: **4m**
(i) Intensive property
(ii) Enthalpy of sublimation
2 moles of an ideal gas are expanded isothermally and reversibly from 20 L to 30 L at 300 K. Calculate the work done. ($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$)
- Q.31** **(i)** When 6.0 g of O_2 reacts with ClF as per. **2m**
$$2\text{ClF}_{(g)} + \text{O}_{2(g)} \rightarrow \text{Cl}_2\text{O}_{(g)} + \text{OF}_{2(g)}$$

The enthalpy change is 38.55 kJ. What is standard enthalpy of the reaction?
- (ii)** Explain the preparation of aldehydes from esters. **2m**

Together we will make a difference