

MODEL QUESTION PAPER SET- 2 : 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.

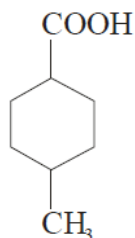
SECTION A

- Q.1 Select & Write the correct Answer 10M**
- i.** $A \rightarrow B$ is a first order reaction with rate 6.6×10^{-5} m/s. When $[A]$ is 0.6 m, rate constant of reaction is _____ **1M**
- a) $1.1 \times 10^{-5} \text{ s}^{-1}$ b) $1.1 \times 10^{-4} \text{ s}^{-1}$
c) $9 \times 10^{-5} \text{ s}^{-1}$ d) $9 \times 10^{-4} \text{ s}^{-1}$
- ii.** 'No machine has an efficiency unity', is stated in - **1M**
- a) First law of thermodynamics
b) Second law of thermodynamics
c) Third law of thermodynamics
d) Hess' law of constant heat summation
- iii.** Consider the half reactions with standard potentials. **1M**
- i. $\text{Ag}_{(\text{aq})}^{+} + \text{e}^{-} \longrightarrow \text{Ag}_{(\text{s})}$ $E^{\circ} = 0.8 \text{ V}$
ii. $\text{I}_{2(\text{s})} + 2\text{e}^{-} \longrightarrow 2\text{I}_{(\text{aq})}^{-}$ $E^{\circ} = 0.53 \text{ V}$
iii. $\text{Pb}_{(\text{aq})}^{2+} + 2\text{e}^{-} \longrightarrow \text{Pb}_{(\text{s})}$ $E^{\circ} = -0.13 \text{ V}$
iv. $\text{Fe}_{(\text{aq})}^{2+} + 2\text{e}^{-} \longrightarrow \text{Fe}_{(\text{s})}$ $E^{\circ} = -0.44 \text{ V}$
- The strongest oxidising and reducing agents respectively are
- a) Ag and Fe^{2+} b) Ag^{+} and Fe c) Pb^{2+} and I^{-} d) I_2 and Fe^{2+}
- iv.** Iodine exists as _____ **1M**
- a) Polar molecular solid b) Ionic solid
c) Non-Polar molecular solid d) Hydrogen bonded molecular solid
- v.** The determination of molar mass elevation in boiling point is called _____ **1M**
- a) Cryoscopy b) Colorimetry
c) Spectroscopy d) Ebullioscopy
- vi.** The group 15 element having electronic configuration as of argon is **1M**
- a) Phosphorus ($Z = 15$) b) Antimony ($Z = 51$)
c) Arsenic ($Z = 33$) d) Nitrogen ($Z = 7$)

- vii. Which of the following has the highest basic strength? 1M
 a) Trimethylamine b) Methylamine c) Ammonia d) Dimethylamine
- viii. Terylene is _____ 1M
 a) polyamide fibre b) polyester fibre
 c) vegetable fibre d) protein fibre
- ix. Tryptophan is called essential amino acid because _____ 1M
 a) it contains aromatic nucleus
 b) it is present in all the human proteins
 c) it cannot be synthesised by human body
 d) it is essential constituent of enzymes
- x. RNA has _____ 1M
 a) A- U base pairing b) P-S-P-S backbone
 c) double helix d) G - C base pairing

Q.2 Short Answers (1 Mark Each) 8M

- i. Define degree of dissociation. 1M
- ii. Define boiling point. 1M
- iii. Write the IUPAC name of benzylamine 1M
- iv. Define enthalpy of sublimation. 1M
- v. Give IUPAC name of 1M



- vi. Draw structure of Buna-S. 1M
- vii. Write any 2 uses of formaldehyde. 1M
- viii. What is a cell constant? What are its units? 1M

SECTION B

Attempt Any Eight Questions 16M

- Q.3 Why salts of Sc^{3+} , Ti^{4+} , V^{5+} are colourless? 2M
- Q.4 Explain atom economy with suitable example. 2M
- Q.5 Write mathematical equations for first law of thermodynamics for following processes. 2M
 a) Adiabatic process
 b) Isochoric process
- Q.6 The conductivity of 0.02 M AgNO_3 at 25°C is $2.428 \times 10^{-3} \Omega^{-1}$. What is its molar conductivity. 2M
- Q.7 Give the reagents and conditions necessary to prepare phenol from 2M
 i. Chlorobenzene ii. Benzene sulfonic acid
- Q.8 What is the action of hydrazine on cyclopentanone in presence of KOH in ethylene glycol? 2M
- Q.9 How is chlorobenzene prepared from aniline? How is chlorobenzene converted into diphenyl? 2M
- Q.10 Write a note on Stephen reaction. 2M

Q.11	Write linkage isomers of a complex having constituents Co^{3+} , 5NH_3 and NO_2^-	2M
Q.12	What are carbohydrates? Write the reaction for the preparation of Nylon-6	2M
Q.13	Explain why phenol is more acidic than ethyl alcohol.	2M
Q.14	Define a) Osmosis b) Freezing point	2M

SECTION C

Attempt Any Eight Questions **24M**

Q.15	Calculate E_{cell}^0 and ΔG^0 for the reaction $2\text{Cu}^+ \longrightarrow \text{Cu}^{2+} + \text{Cu}$. $E_{\text{Cu}^+ \text{Cu}}^0 = 0.52\text{V}$ and $E_{\text{Cu}^{2+},\text{Cu}^+}^0 = 0.16\text{V}$	3M
Q.16	The vapour pressure of pure benzene is 640 mm of Hg. $2.175 \times 10^{-3}\text{kg}$ of non-volatile solute is added to 39 gram of benzene, the vapour pressure of solution is 600 mm of Hg. Calculate molar mass of solute (C = 12, H = 1)	3M
Q.17	Write balanced chemical equation for the following reactions i. Action of phosphorous trichloride on propan-2-ol. ii. Action of mixture of NaI and phosphoric acid on ethanol. iii. Action of Lucas reagent on 3-methylbutan-2-ol.	3M
Q.18	The rate constant of first order reaction are 0.585s^{-1} at 313K & 0.045s^{-1} at 292K. what is the energy of activation for the reaction?	3M
Q.19	How is Nylon 6,6 prepared?	3M
Q.20	Write the structure and IUPAC name of methyl n-propyl ether. What is the action of hot HI on it?	3M
Q.21	Calculate ΔH° for the following reactions $2\text{H}_3\text{BO}_3(\text{aq}) \longrightarrow \text{B}_2\text{O}_3(\text{s}) + 3\text{H}_2\text{O}(\text{l})$ Given that (a) $\text{H}_3\text{BO}_3(\text{aq}) \longrightarrow \text{HBO}_2(\text{aq}) + \text{H}_2\text{O}(\text{l}); \Delta H_1^0 = -0.02\text{kJ}$ (b) $\text{H}_2\text{B}_4\text{O}_7(\text{s}) \longrightarrow 2\text{B}_2\text{O}_3(\text{s}) + \text{H}_2\text{O}(\text{l}); \Delta H_2^0 = -17.3\text{kJ}$ (c) $\text{H}_2\text{B}_4\text{O}_7(\text{s}) + \text{H}_2\text{O}(\text{l}) \longrightarrow 4\text{HBO}_2(\text{aq}); \Delta H_3^0 = -11.58\text{kJ}$	3M
Q.22	How are simple ethers and mixed ethers prepared by williamson's synthesis?	3M
Q.23	Write a note on Cross Cannizzaro reaction.	3M
Q.24	What is the action of 2, 4-dinitrophenyl hydrazine on (1) acetaldehyde (2) acetone?	3M
Q.25	What is standard state of a substance?	3M
Q.26	Explain the structure of ClF_3 . Why is molality of a solution independent of temperature.	3M

SECTION D

Attempt Any Three Questions **12M**

Q.27	a) What are neutral oxides? Explain the nature of zinc oxide with the help of the reactions. b) Define 'Molar conductivity and 'zero order reaction.	2M 2M
Q.28	Calculate C - Cl bond enthalpy from following reaction a) $\text{CH}_3\text{Cl}(\text{g}) + \text{Cl}_2(\text{g}) \longrightarrow \text{CH}_2\text{Cl}_2 + \text{HCl}; \Delta H^0 = -104\text{kJ}$ If C - H; Cl - Cl & H-Cl bond enthalpies are 414, 243 & 431 KJ/mol b) State and explain Henry's Law.	2M 2M

- Q.29** a) Write reaction to Convert methyl bromide into ethyl amine? Also, comment on the number of carbon atoms in the starting compound and the product. **2M**
- b) Identify the compounds 'A' and 'B' in the following reactions: **2M**
- $$'A' \xrightarrow[\text{mixture}]{\text{nitrating}} 'B' \xrightarrow{\text{Sn/conc.HCL}} \text{Aniline}$$
- Q.30** In a first order reaction $x \rightarrow y$, 40% of the given sample of compound remains unreacted in 45 minutes. Calculate rate constant of reaction. **4M**
- Q.31** Give one evidences for the presence of each of the following groups in glucose. **4M**
- i. Aldehyde group ii. Hydroxyl groups iii. Primary alcoholic group

Together we will make a difference