



BOARD QUESTION PAPER : MARCH 2023

CHEMISTRY

Time: 3 Hrs.

Max. Marks: 70

General Instructions:

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 are **Twelve** short answer type of questions carrying **Two** marks each. (Attempt **any Eight**).
- (3) **Section C:** Q. No. 15 to Q. No. 26 are **Twelve** short answer type of questions carrying **Three** marks each. (Attempt **any Eight**).
- (4) **Section D:** Q. No. 27 to Q. No. 31 are **Five** long answer type of questions carrying **Four** marks each. (Attempt **any Three**).
- (5) Use of log table is allowed. Use of calculator is not allowed.
- (6) Figures to the right indicate full marks.
- (7) For each multiple choice type of question, it is mandatory to write the correct answer along with its alphabet. e.g. (a)...../(b)...../(c)...../(d)..... etc.

No mark(s) shall be given, if **ONLY** the correct answer or the alphabet of the correct answer is written. Only the first attempt will be considered for evaluation.

Given:

$$R = 8.314 \text{ J.K}^{-1} \cdot \text{mol}^{-1}$$

$$N_A = 6.022 \times 10^{23}$$


$$F = 96500 \text{ C}$$

SECTION - A

Q.1. Select and write the correct answer for the following multiple choice type of questions: [10]

- i. The relation between radius of sphere and edge length in body centered cubic lattice is given by formula:
(A) $\sqrt{3}r = 4a$ (B) $r = \frac{\sqrt{3}}{a} \times 4$
(C) $r = \frac{\sqrt{3}}{4} a$ (D) $r = \frac{\sqrt{2}}{4} \times a$
- ii. The pH of weak monoacidic base is 11.2, its OH^- ion concentration is:
(A) $1.585 \times 10^{-3} \text{ mol dm}^{-3}$ (B) $3.010 \times 10^{-11} \text{ mol dm}^{-3}$
(C) $3.010 \times 10^{-3} \text{ mol dm}^{-3}$ (D) $1.585 \times 10^{-11} \text{ mol dm}^{-3}$
- iii. Which of the following correctly represents integrated rate law equation for a first order reaction in gas phase:
(A) $k = \frac{2.303}{t} \times \log_{10} \frac{P_i}{P_i - P}$ (B) $k = \frac{2.303}{t} \times \log_{10} \frac{P_i}{2P_i - P}$
(C) $k = \frac{2.303}{t} \times \log_{10} \frac{2P_i}{P_i - P}$ (D) $k = \frac{2.303}{t} \times \log_{10} \frac{P_i - P}{2P_i}$
- iv. The spin only magnetic moment of Mn^{2+} ion is _____.
(A) 4.901 BM (B) 5.916 BM
(C) 3.873 BM (D) 2.846 BM
- v. The correct formula of a complex having IUPAC name Tetraamminedibromoplatinum (IV) bromide is _____.
(A) $[\text{PtBr}(\text{NH}_3)_4] \text{Br}_2$ (B) $[\text{PtBr}_2(\text{NH}_3)_4] \text{Br}$
(C) $[\text{PtBr}_2(\text{NH}_3)_4] \text{Br}_2$ (D) $[\text{PtBr}(\text{NH}_3)_4] \text{Br}$



- vi. The allylic halide, among the following is _____.
- (A) $\begin{array}{c} \text{R} - \text{CH} - \text{R} \\ | \\ \text{X} \end{array}$ (B) $\text{CH}_2 = \text{CH} - \text{X}$
- (C)  (D) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{X}$
- vii. The product of following reaction is
 $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CHO} \xrightarrow[\text{ii) H}_3\text{O}^+]{\text{i) LiAlH}_4}$ _____?
- (A) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{OH}$ (B) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{OH}$
 (C) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{COOH}$ (D) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{COOH}$
- viii. Ozonolysis of 2, 3 dimethyl but-2-ene, followed by decomposition by Zn dust and water gives _____.
- (A) acetaldehyde (B) propionaldehyde and acetone
 (C) acetone (D) acetaldehyde and butyraldehyde
- ix. The glycosidic linkage present in maltose is _____.
- (A) α , β -1, 2-glycosidic linkage (B) α -1, 4-glycosidic linkage
 (C) β -1, 4-glycosidic linkage (D) α -1, 6-glycosidic linkage
- x. The monomer of natural rubber is _____.
- (A) Isoprene (B) Acrylonitrile
 (C) ϵ -Caprolactam (D) Tetrafluoroethylene

Q.2. Answer the following questions:

[8]

- Write the name of the technique used to know geometry of nanoparticles.
- Write the name of the product formed by the action of LiAlH_4 / ether on acetamide.
- Write the structure of the product formed when chlorobenzene is treated with sodium metal in the presence of dry ether.
- Write the chemical composition of cryolite.
- Write the name of platinum complex used in the treatment of cancer.
- Write the SI unit of cryoscopic constant.
- Write the correct condition for spontaneity in terms of Gibbs energy.
- Calculate molar conductivity for 0.5 M BaCl_2 if its conductivity at 298K is $0.01 \Omega^{-1} \text{cm}^{-1}$.

SECTION - B

Attempt any EIGHT of the following questions:

[16]

- Q.3.** Distinguish between lanthanides and actinides.
- Q.4.** Calculate the mole fraction of solute, if the vapour pressure of pure benzene at certain temperature is 640 mmHg and vapour pressure of solution of a solute in benzene is 600 mmHg.
- Q.5.** Define: Green chemistry. Write two advantages of nanoparticle and nanotechnology.
- Q.6.** Explain the following terms:
- Substitutional impurity defect
 - Interstitial impurity defect
- Q.7.** Write the chemical reactions for the following:
- Chlorobenzene is heated with fuming H_2SO_4
 - Ethyl bromide is heated with silver acetate
- Q.8.** Define : Acidic buffer solution. Write the relationship between solubility and solubility product for PbI_2 .



- Q.9.** What is the action of the following reagents on ethyl amine
- Chloroform and caustic potash
 - Nitrous acid
- Q.10.** Calculate standard Gibbs energy change at 25°C for the cell reaction
- $$\text{Cd}_{(s)} + \text{Sn}_{(aq)}^{2+} \longrightarrow \text{Cd}_{(aq)}^{2+} + \text{Sn}_{(s)}$$
- $$E_{\text{cd}}^{\circ} = -0.403\text{V}, E_{\text{sn}}^{\circ} = -0.136\text{V}$$
- Q.11.** Write chemical reaction for the preparation of glucose from sucrose. Write structure of D-ribose.
- Q.12.** Define Extensive property. Calculate the work done during the expansion of 2 moles of an ideal gas from 10 dm³ to 20 dm³ at 298 K in vacuum.
- Q.13.** Write the reactions for the formation of nylon 6,6 polymer.
- Q.14.** Draw structures of the following compounds:
- chloric acid
 - peroxy disulphuric acid

SECTION – C

Attempt any EIGHT of the following questions:

[24]

- Q.15.** Define Osmosis.
How will you determine molar mass of non volatile solute by elevation of boiling point?
- Q.16.** Convert the following:
- Ethyl alcohol into ethyl acetate
 - Phenol into benzene
 - Diethyl ether into ethyl chloride
- Q.17.** A weak monobasic acid is 10% dissociated in 0.05 M solution.
What is percent dissociation in 0.15 M solution?
- Q.18.** Explain dehydrohalogenation reaction of 2-chlorobutane. Write use and environmental effect of CFC.
- Q.19.** 2000 mmol of an ideal gas expanded isothermally and reversibly from 20 L to 30 L at 300 K, calculate the work done in the process ($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$).
- Q.20.** What are interstitial compounds? Give the classification of alloys with examples.
- Q.21.** Draw labelled diagram of H₂ – O₂ fuel cell. Write two applications of fuel cell.
- Q.22.** Explain formation of $[\text{CoF}_6]^{3-}$ complex with respect to
- Hybridisation
 - Magnetic properties
 - Inner / outer complex
 - Geometry
- Q.23.** What is Pseudo first order reaction? Derive integrated rate law equation for zero order reaction.
- Q.24.** Explain Aldol condensation of ethanal.
- Q.25.** Explain anomalous behaviour of oxygen in group 16 with respect to:
- Atomicity
 - Magnetic property
 - Oxidation state
- Q.26.** Write chemical reactions for the following conversions:
- Acetic acid into acetic anhydride
 - Acetic acid into ethyl alcohol
- Write IUPAC name and structure of methylphenylamine.



Attempt any THREE of the following questions:

- Q.27.** Show that, time required for 99.9% completion of a first order reaction is three times the time required for 90% completion.
Give electronic configuration of Gd ($Z = 64$).
Write the name of nano structured material used in car tyres to increase the life of tyres.
- Q.28.** Derive relationship between ΔH and ΔU for gaseous reaction.
Define: Vulcanization
What is peptide bond?
- Q.29.** Silver crystallizes in fcc structure. If edge length of unit cell is 400 pm, calculate density of silver (Atomic mass of Ag = 108).
Write a note on Haloform reaction.
- Q.30.** Define: Distereoisomers.
Give cis and trans isomers of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$.
What is reference electrode?
Give reason: Bleaching action of ozone is also called dry bleach.
- Q.31.** Write Dow process for preparation of Phenol. What is the action of bromine water on phenol?
Give reason: Group 16th elements have lower ionisation enthalpy compared to group 15th elements.
Write two uses of dioxygen.