

BOARD QUESTION PAPER : FEBRUARY 2020

CHEMISTRY

Time: 3 Hours

Total Marks: 70

General Instructions :

The question paper is divided into **FOUR** sections.

- 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.
- Section B :** Q. No.3 to Q. No. 14 are **Twelve** short answer type of questions carrying **Two** marks each. (Attempt any **Eight**).
- Section C :** Q. No. 15 to Q. No.26 contain **Twelve** short answer type of questions carrying **Three** marks each. (Attempt any **Eight**)
- Section D :** Q. No. 27 to Q. No. 31 are **Five** long answer type of questions carrying **Four** marks each. (Attempt any **Three**)
- Use of log table is allowed. Use of calculator is not allowed.
- Figures to the right indicate full marks.
- For **each MCQ**, correct answer must be written along with its alphabet, e.g. (a) / (b)
(c) / (d) etc.
- Physical constant:
Avogadro's Number = $N_A = 6.022 \times 10^{23}$

Section-A

Q.1. Select and write correct answer of the following questions:

[10][7]

- Identify synthetic polymer amongst the following:
(A) Linen (B) Jute (C) Silk (D) Terylene
- Which among the following hydrides is NOT a reducing agent?
(A) H_2O (B) H_2S (C) H_2Te (D) H_2Se
- During oxidation of ferrous sulphate using mixture of dil. H_2SO_4 and potassium dichromate; oxidation state of chromium changes from _____.
(A) + 6 to + 2 (B) + 6 to + 3 (C) + 6 to + 1 (D) + 6 to + 4
- Identify complex ion in which effective atomic number of the central metal ion is 35.
(Given At. Number of Co = 27, Fe = 26, Zn = 30)
(A) $[Zn(NH_3)_4]^{2+}$ (B) $[Fe(CN)_6]^{4-}$ (C) $[Fe(CN)_6]^{3-}$ (D) $[Co(NH_3)_6]^{3+}$
- Conversion of methyl chloride into methyl fluoride is known as _____.
(A) Finkelstein reaction (B) Swarts reaction
(C) Williamson's synthesis (D) Wurtz reaction
- The number of moles of methyl iodide required to prepare tetramethyl ammonium iodide from 1 mole of methyl amine is/are:
(A) 1 (B) 2 (C) 3 (D) 4
- Name the reagent which on reaction with glucose confirms the presence of five hydroxyl groups in glucose:
(A) Hydroxyl amine (B) Bromine water
(C) Dilute nitric acid (D) Acetic anhydride

- viii. Identify antibiotic drug amongst the following:
- (A) Codeine (B) Equanil
(C) Penicillin (D) Valium
- ix. The number of atoms per unit cell of body centred cube is:
- (A) 1 (B) 2
(C) 4 (D) 6
- x. Calculate the work done during the reactions represented by the following thermochemical equation at 300 K:
- $$\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$$
- (g) (g) (g) (l)
(R = 8.314 JK⁻¹mol⁻¹)
- (A) +4.988 kJ (B) -4.988 kJ
(C) -49.88 kJ (D) +49.88 kJ

Q.2. Answer the following questions :

[8]

- i. What is the concentration of dissolved oxygen at 50°C under pressure of one atmosphere if partial pressure of oxygen at 50°C is 0.14 atm.
(Henry's law constant for oxygen = $1.3 \times 10^{-3} \text{ mol dm}^{-3} \text{ atm}^{-1}$)
- ii. Write structural formula of the alcohol that results when acetaldehyde is reacted with CH₃MgBr in the presence of dry ether and the product is hydrolysed.
- iii. Write balanced chemical reaction for preparation of acetic anhydride using acetic acid.
- iv. Write the chemical reaction involved in the formation of ethylamine using acetaldoxime.
- v. What is electrometallurgy?
- vi. For the reaction:
N₂O₄ → 2NO₂
(g) (g)
(ΔH° = + 57.24 kJ, ΔS° = 175.8 Jk⁻¹)
At what temperature the reaction will be spontaneous?
- vii. The standard e.m.f. of the following cell is 0.463 V
Cu | Cu⁺⁺ || Ag⁺ | Ag
(s) (1M) (1M) (s)
If the standard potential of Ag electrode is 0.800 V, what is the standard potential of Cu electrode?
- viii. Write the mathematical relation between half life of zero order reaction and its rate constant.

Section-B

Attempt any EIGHT of the following questions:

[16]

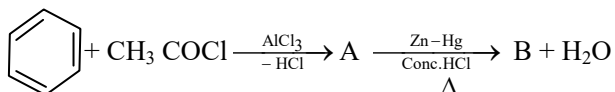
- Q.3.** State and explain Hess's law of constant heat summation.
- Q.4.** Write the cell reaction and calculate E° cell of the following electrochemical cell:
Al | Al³⁺ || Zn²⁺ | Zn
(s) (aq.) (aq.) (s)
(1M) (1M)
E°_{Al} = -1.66 V
E°_{Zn} = -0.76 V

Q.5. Distinguish between order and molecularity of a reaction.

Q.6. Write two uses of each of the following:

- a. Helium
b. Neon

- Q.7.** Write the name and chemical formula of one ore of zinc,
Define: Quaternary ammonium salt.
- Q.8.** What is the action of acidified potassium dichromate on the following:
a. KI
b. H₂S
- Q.9.** Define optical activity. How many optical isomers are possible for glucose?
- Q.10.** Explain continuous etherification process for the preparation of diethyl ether.
- Q.11.** Identify 'A' and 'B' in the following reaction:



- Q.12.** Write Howorth projection formula of α -D-(+)-glucopyranose.
Define hormones.
- Q.13.** Classify the following solids into different types:
(A) Silver (B) P₄
(C) Diamond (D) NaCl
- Q.14.** Define:
a. Molality
b. Osmotic pressure

Section-C

Attempt any EIGHT of the following questions:

[24]

- Q.15.** Define flux.
Write a note on leaching process.
- Q.16.** Draw the structure of sulphurous acid.
Explain why nitrogen does not form pentahalides.
- Q.17.** Write the general electronic configuration of lanthanoids. Why are most of the compounds of transition metals coloured?
- Q.18.** Calculate the effective atomic number (e.a.n) of copper in $[\text{Cu}(\text{NH}_3)_4]^{2+}$. [Z of Cu = 29]
Explain ionisation isomerism in coordination compounds with a suitable example.
- Q.19.** Write the chemical reactions of chlorobenzene with respect to:
a. Sulphonation
b. Acetylation
c. Nitration
- Q.20.** How is ethanol prepared from the following compounds?
a. Ethanal
b. Ethene
c. Bromoethane
- Q.21.** How are primary, secondary and tertiary nitroalkanes distinguished using HNO₂?
- Q.22.** What are monosaccharides? Explain denaturation of proteins.
- Q.23.** Define non-biodegradable polymer.
Write the preparation of terylene.
- Q.24.** What are soaps? How are soaps prepared? Define antiseptic.
- Q.25.** Unit cell of a metal has edge length of 288 pm and density of 7.86 g cm⁻³. Determine the type of crystal lattice. [Atomic mass of metal = 56 g mol⁻¹]
- Q.26.** Define instantaneous rate of reaction. Explain pseudo first order reaction with suitable example.

Section-D

[12]

Attempt any THREE of the following questions:

Q.27. Define the terms:

- Electrochemical series
- Corrosion

Write two applications of electrochemical series.

Q.28. Explain interhalogen compounds. How is oxygen prepared from the following compounds?

- KClO_4
- PbO_2

Q.29. Explain the mechanism of aldol addition reaction. Mention two uses of carboxylic acids.

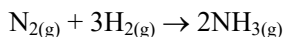
Q.30. Derive the mathematical expression between molar mass of a non-volatile solute and elevation of boiling point.

State and explain van't Hoff-Avogardo's law.

Q.31. Define:

- Reversible process
- Standard enthalpy of combustion

Calculate the enthalpy change for the reaction:



The bond enthalpies are:

Bond	$\text{N} \equiv \text{N}$	$\text{H} - \text{H}$	$\text{N} - \text{H}$
$\Delta H^\circ \text{ kJ mol}^{-1}$	946	435	389