JEE MAIN Sample Paper Chemistry

Duration: 1 Hour **Maximum Marks: 100**

Instructions

1. This paper contains TWO sections: Section I and Section II.
2. Section I contains 20 Multiple Choice Questions (MCQs).
3. Section II contains 5 Numerical Value Questions.
4. All questions are compulsory.
5. Each correct answer carries **+4 marks**.
6. Each incorrect answer carries **-1 mark**.
7. No negative marking for unattempted questions.

Section I — Multiple Choice Questions (20 MCQs)

Q1. Which of the following is the correct order of increasing field strength of ligands in the spectrochemical series?

(A) $Cl^- < F^- < C_2O_4^{2-} < CN^-$

(B) $CN^- < C_2O_4^{2-} < F^- < Cl^-$

(C) $F^- < Cl^- < CN^- < C_2O_4^{2-}$

(D) $C_2O_4^{2-} < F^- < Cl^- < CN^-$

[2024]

Q2. The major product P of the reaction

$$\text{Anisole} \xrightarrow{\text{HI, }\Delta} P$$

is:

(A) Phenol + Methyl iodide

(B) Iodobenzene + Methanol

(C) Phenol + Methanol

(D) Iodobenzene + Methyl iodide

[2023]

Q3. Which of the following is a "Polar Molecular Solid"?

(A) HCl

(B) Ar

(C) H_2O (Ice)

(D) CCl_4

[2022]

Q4. For a cell reaction $Cu(s) + 2Ag^+(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$, the log of the equilibrium constant $\log K_c$ is given by:

(A) $\frac{nE^\circ_{cell}}{0.059}$

(B) $\frac{E^\circ_{cell}}{0.059}$

(C) $\frac{0.059}{nE^\circ_{cell}}$

(D) $\frac{nFE^\circ_{cell}}{RT}$

[2025]

Q5. Which of the following oxides of Nitrogen is a blue solid and acidic in nature?

(A) N_2O_3

(B) N_2O

(C) NO_2

(D) N_2O_5

[2024]

Q6. The S_N1 reaction of (R)-2-bromooctane with OH^- ions gives:

(A) (S)-octan-2-ol with partial racemization

(B) (R)-octan-2-ol with complete inversion

(C) (S)-octan-2-ol with 100% inversion

(D) A 1 : 1 mixture of (R) and (S) octan-2-ol

[2021]

Q7. Which of the following hormones contains Iodine?

(A) Thyroxine

(B) Insulin

(C) Adrenaline

(D) Testosterone

[2023]

Q8. The calculated spin-only magnetic moment of Cr^{2+} ion is:

(A) 4.90 BM

(B) 3.87 BM

(C) 5.92 BM

(D) 2.84 BM

[2022]

Q9. The IUPAC name of the compound $CH_3 - CH(Cl) - CH(Br) - CH_3$ is:

(A) 2-bromo-3-chlorobutane

(B) 3-bromo-2-chlorobutane

(C) 2-chloro-3-bromobutane

(D) 1-bromo-2-chlorobutane

[2025]

Q10. Which of the following will show the highest osmotic pressure?

(A) 0.1 M Na_2SO_4

(B) 0.1 M Glucose

(C) 0.1 M $MgCl_2$

(D) 0.1 M $Al_2(SO_4)_3$

[2024]

Q11. In the presence of a catalyst, the activation energy of a reaction:

(A) Decreases

(B) Increases

(C) Remains the same

(D) Becomes zero

[2021]

Q12. Which of the following is not a condensation polymer?

(A) Neoprene

(B) Melamine

(C) Glyptal

(D) Dacron

[2023]

Q13. The most acidic hydrogen among the following is present in:

(A) Ethyne

(B) Ethene

(C) Ethane

(D) Benzene

[2022]

Q14. The molar conductivity of a 0.05 M solution of $MgCl_2$ is 190 S cm^2 mol^{-1}. Its conductivity (κ) is:

(A) 0.0095 S cm^{-1}

(B) 9.5 S cm^{-1}

(C) 0.095 S cm^{-1}

(D) 0.95 S cm^{-1}

[2025]

Q15. Which of the following is a "Narrow spectrum" antibiotic?

(A) Penicillin G

(B) Chloramphenicol

(C) Vancomycin

(D) Ofloxacin

[2024]

Q16. The shape of XeF_4 is:

(A) Square planar

(B) Tetrahedral

(C) Octahedral

(D) Pyramidal

[2021]

Q17. Which reagent is used in the "Gattermann Reaction" for the synthesis of haloarenes?

(A) Cu powder / HCl

(B) Cu_2Cl_2/HCl

(C) $Cl_2/FeCl_3$

(D) $NaNO_2/HCl$

[2023]

Q18. The process of converting an ore into its oxide by heating it strongly in the absence of air is:

(A) Calcination

(B) Roasting

(C) Smelting

(D) Refining

[2022]

Q19. Gold number is a measure of:

(A) The protective power of a lyophilic colloid

(B) The purity of gold

(C) The coagulation power of an electrolyte

(D) The amount of gold in a solution

[2025]

Q20. Benzoyl chloride on reduction with $H_2/Pd - BaSO_4$ gives:

(A) Benzaldehyde

(B) Benzyl alcohol

(C) Benzoic acid

(D) Toluene

[2024]

Section II — Numerical Value Questions (5 Questions)

Q21. For a cubic unit cell, the density is 10 g cm^{-3} and the edge length is 200 pm. If the atomic mass is 48 g mol^{-1}, the number of atoms per unit cell (Z) is: *[2024]*

Q22. A first-order reaction has a rate constant $k = 1.15 \times 10^{-3}$ s^{-1}. The time required for 5 g of this reactant to reduce to 3 g is x seconds. Find $x/100$ (Take $\log_{10} 1.67 = 0.22$). *[2023]*

Q23. The number of P–OH bonds in cyclic trimetaphosphoric acid $(HPO_3)_3$ is: *[2025]*

Q24. In the complex $[Co(en)_2(H_2O)_2]^{3+}$, the coordination number of Cobalt is: *[2022]*

Q25. The total number of sp^2 hybridized carbons in one molecule of Aspirin (Acetylsalicylic acid) is: *[2024]*

Answer Key

Section I — MCQs

1.(A)	2.(A)	3.(A)	4.(A)	5.(A)
6.(A)	7.(A)	8.(A)	9.(A)	10.(D)
11.(A)	12.(A)	13.(A)	14.(A)	15.(A)
16.(A)	17.(A)	18.(A)	19.(A)	20.(A)

Section II — Numericals

21. 1	22. 4	23. 3	24. 6	25. 8