Roll No. ☐☐☐☐☐☐☐☐

Q.P. Code 56/2/1

CHEMISTRY (THEORY)

CBSE Class XII Board Examination 2022 (Term 2)

Time allowed: 2 hours **Maximum Marks: 35**

General Instructions:

1. The paper has 12 questions in three sections (A, B and C); all of them must be answered.
2. Section A: Q1–3, very short answer, 2 marks each.
3. Section B: Q4–11, short answer, 3 marks each.
4. Section C: Q12, a case-based question worth 5 marks.
5. Some questions offer an internal choice (OR). Log tables and calculators are not allowed.

SECTION A

Q1–3 are very short answer questions of 2 marks each.

1. Show how each of the following changes can be brought about (attempt any two): **2**

(i) Propanal → Propane

(ii) Ethanal → But-2-enal

(iii) Ethanoic acid → Ethanamide

2. For the reaction $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$, ammonia is being formed at a rate of 3.6×10^{-4} mol L^{-1} s^{-1}. Find: **2**

(i) the rate of the reaction

(ii) the rate at which $H_2(g)$ is used up.

3. (i) State Kohlrausch's law of independent migration of ions. **2**

(ii) For CH_3COOH, the molar conductivity Λm = 48 S cm^2 mol^{-1} and the limiting molar conductivity $\Lambda°m$ = 400 S cm^2 mol^{-1}. Find its degree of dissociation (α).

SECTION B

Q4–11 are short answer questions of 3 marks each.

4. Give the hybridisation and the magnetic nature of each complex: **3**

(i) $[NiCl_4]^{2-}$

(ii) $[Co(NH_3)_6]^{3+}$

(iii) $[FeF_6]^{3-}$

(Atomic numbers: Ni = 28, Co = 27, Fe = 26)

OR

(i) Give the IUPAC name of $[Co(NH_3)_4(H_2O)Cl]Cl_2$.

(ii) How does an ambidentate ligand differ from a bidentate ligand?

(iii) Which is more stable, $[Fe(NH_3)_6]^{3+}$ or $[Fe(C_2O_4)_3]^{3-}$? Give the reason.

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5. Find the emf of the cell **3**

$Zn(s) \mid Zn^{2+}$ (0.01 M) $\parallel Ag^{+}$ (0.001 M) $\mid Ag(s)$

Given: $E°(Zn^{2+}/Zn) = -0.76$ V, $E°(Ag^{+}/Ag) = +0.80$ V. (log 2 = 0.3010, log 3 = 0.4771, log 10 = 1)

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6. Give the main product of each reaction: **3**

(i) Benzaldehyde treated with $HNO_3 + H_2SO_4$ at 273–283 K

(ii) Sodium cyclohexanecarboxylate ($C_6H_{11}COONa$) heated with NaOH and CaO (soda lime)

(iii) Ethanal (CH_3CHO) treated with hydroxylamine (NH_2OH)

OR

(i) Explain why propanal is oxidised more easily than propanone.

(ii) Suggest a test to tell acetophenone and benzophenone apart.

(iii) Draw the structure of the 2,4-dinitrophenylhydrazone of propanone.

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7. A first-order reaction is 75% complete in 30 minutes. Find its half-life $t_{1/2}$. **3**

(log 2 = 0.3, log 3 = 0.48, log 4 = 0.6, log 5 = 0.7)

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8. Give three points of difference between a lyophobic sol and a lyophilic sol. **3**

OR

(i) Name the dispersed phase and the dispersion medium in milk.

(ii) What causes the Brownian movement of colloidal particles?

(iii) Why does physisorption decrease as the temperature rises?

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9. Standard electrode potentials $E°(M^{2+}/M)$ of some first-row transition metals are: Cr −0.91 V, Mn −1.18 V, Fe −0.44 V, Co −0.28 V, Ni −0.25 V, Cu +0.34 V, Zn −0.76 V. Using these values, answer: **3**

(i) Why is $E°(Mn^{2+}/Mn)$ much more negative than for the other metals?

(ii) What causes the irregular trend in these values?

(iii) Why is $E°(Cu^{2+}/Cu)$ unusually positive?

10. Write one chemical equation for each named reaction: **3**

(i) Rosenmund reduction

(ii) Etard reaction

(iii) Stephen reaction

OR

(i) In each pair, pick the stronger acid and explain:

(I) CH_3COOH or FCH_2COOH

(II) Phenol (C_6H_5OH) or CH_3COOH

(ii) Give a test to distinguish pentan-2-one from pentan-3-one.

11. Give reasons: **3**

(i) Transition metals and their compounds act as good catalysts.

(ii) Zn, Cd and Hg are not regarded as transition elements.

(iii) Zr and Hf have nearly the same atomic radii.

SECTION C

Q12 is a case-based question of 5 marks.

12. Read the passage (summarised here) and answer the questions. **5**

Amines are obtained when one or more H atoms of NH_3 are replaced by alkyl or aryl groups. They are prepared from nitro compounds, halides, amides etc., show hydrogen bonding, and their reactions depend on the lone pair on nitrogen; the number of H atoms on N lets us tell 1°, 2° and 3° amines apart. The reactivity of aromatic amines can be controlled by acylation.

(i) Why does aniline not undergo the Friedel–Crafts reaction? (1)

(ii) Arrange in increasing order of pKb: $C_6H_5NH_2$, NH_3, $C_2H_5NH_2$, $(CH_3)_3N$. (1)

(iii) How would the Hinsberg test distinguish $CH_3CH_2NH_2$ from $(CH_3CH_2)_2NH$? (1)

(iv)(a) Identify A and B: (2)

(I) Nitrobenzene —Sn + HCl→ A —Br_2 water→ B

(II) $CH_3CH_2CONH_2$ —Br_2 / alc. KOH→ A —CH_3COCl, pyridine→ B

OR

(iv) How will you convert:

(b) (I) Benzoic acid → aniline

(II) Aniline → p-bromoaniline

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Questions restated from the CBSE Class XII Board Examination 2022 (set 56/2/1) for practice. Reading passages and map items are described, not reproduced.