SAMPLE PAPER QUESTION (2021-22)

CLASS XII TERM – II

CHEMISTRY THEORY (043)

MM:35 Time: 2 Hours

GENERAL INSTRUCTIONS:

Read the following instructions carefully.

1. There are 12 questions in this question paper with internal choice.
2. **SECTION A - Q. No. 1 to 3** are very short answer questions carrying 2 marks each.
3. **SECTION B - Q. No. 4 to 11** are short answer questions carrying 3 marks each.
4. **SECTION C- Q. No. 12** is case based question carrying 5 marks.
5. **All questions are compulsory.**
6. **Use of log tables and calculators is not allowed**

SECTION A

1. Attempt any **TWO** of the following

   Give plausible explanation for each of the following:
   a. Cyclohexanone forms cyanohydrin in good yield but 2,2,6-Trimethylcyclohexanone does not.
   b. There are two $-NH_2$ groups in semicarbazide. However, only one is involved in the formation of semicarbazones. (1x2=2)

2. How does molar conductivity changes with dilution for
   a. Strong electrolyte b. Weak electrolyte
   and why? (1+1)

3. a. Although phenoxide ion has more number of resonating structures than carboxylate ion, carboxylic acid is a stronger acid than phenol. Why?
   b. Give simple chemical tests to distinguish between the following pair of compound.
   Propanal and Propanone. (1+1)

SECTION B

4. a. Why are amines less acidic than alcohols of comparable molecular masses?
   b. Why do primary amines have higher boiling point than tertiary amines?
   c. Why are aliphatic amines stronger bases than aromatic amines? (1x3=3)

   OR

4. a. Why cannot aromatic primary amines be prepared by Gabriel phthalimide synthesis?
   b. Diazonium salts of aromatic amines are more stable than those of aliphatic amines.
   c. Gabriel phthalimide synthesis is preferred for synthesising primary amines. (1x3=3)

5. Answer the following questions:
a. Write the formula for the following coordination compound:
Tetraammineaquachloridocobalt(III) chloride
b. $[NiCl_4]^{2-}$ is paramagnetic while $[Ni(CO)_4]$ is diamagnetic though both are tetrahedral. Why?
c. Explain $[Co(NH_3)_6]^{3+}$ is an inner orbital complex whereas $[Ni(NH_3)_6]^{2+}$ is an outer orbital complex.

(1x3=3)

OR

5. a. How does the magnitude of Δo decide the actual configuration of *d* orbitals in a coordination entity when compared to pairing energy (P)?
b. Write the electronic configuration of d^6 system in octahedral case when
i) Weak field ligand approaches metal/ ion. ii) Strog field ligand approaches metal/ ion.

(1+2=3)

6. a. Why is Cr^{2+} reducing and Mn^{3+} oxidising when both have d^4 configuration?
b. The $E_V(M^{2+}/M)$ value for copper is positive (+0.34V). What is possible reason for this?
c. Why is the E_V value for the Mn^{3+}/Mn^{2+} couple much more positive than that for Cr^{3+}/Cr^{2+} or Fe^{3+}/Fe^{2+}? Explain.

(1x3=3)

7. An organic compound with the molecular formula $C_9H_{10}O$ forms 2,4-DNP derivative, reduces Tollens' reagent and undergoes Cannizzaro reaction. On vigorous oxidation, it gives 1,2-Benzenedicarboxylic acid. Identify the compound.

(3)

8. a. Why does physisorption decrease with the increase of temperature?
b. Why are powdered substances more effective adsorbents than their crystalline forms?
c. Why is adsorption always exothermic? (1x3=3)

9. Convert the following:

a. Ethanoic acid into Methanamine
b. Hexanenitrile into 1-Aminopentane
c. Methanol to Ethanoic acid (1x3=3)

OR

9. a. Write chemical equations for the following reactions:
Reaction of Ethanolic NH_3 with C_2H_5Cl.
b. Complete the following reactions:

i) $C_6H_5NH_2 + CH_3Cl + alc.KOH \longrightarrow$
ii) $C_6H_5NH_2 + H_2SO_4 \longrightarrow$ (1x3=3)

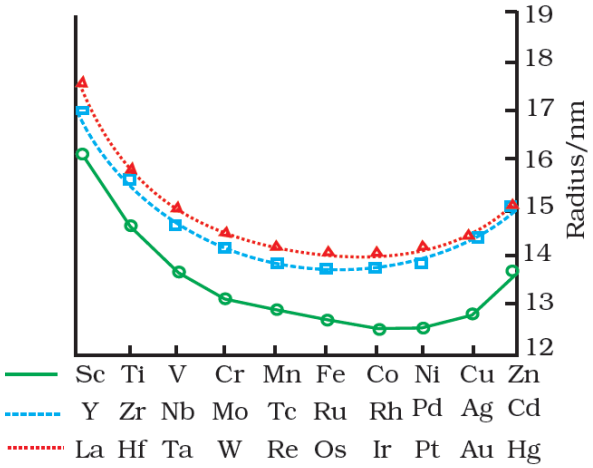
10. Calculate the emf of the cell in which the following reaction takes place:
$Ni(s) + 2Ag^+ (0.002\ M) \longrightarrow Ni^{2+} (0.160\ M) + 2Ag(s)$
Given that (cell) $E_V = 1.05$ V (3)

11. a. Why is the highest oxidation state of a metal exhibited in its oxide or fluoride only?
b. Name a member of the lanthanoid series which is well known to exhibit +4 oxidation state.
c. Actinoid contraction is greater from element to element than lanthanoid contraction. Why?

(1x3=3)

OR

11. On the basis of the figure given below, answer the following questions:



a. At the end of the transition series there is an increment of atomic radius which is visible from the curve given. Why?
b. The difference of atomic radii of corresponding elements 4d and 5d series is quite less. What is the plausible reason for that?
c. In the series Sc (Z = 21) to Zn (Z = 30), the enthalpy of atomization of zinc is the lowest, i.e., 126 kJ mol^{-1}. Why?

(1x3=3)

SECTION C

12 a.

The reaction between A and B is first order with respect to A and zero orde with respect to B. Fill in the blanks in the following table:

Experiment	[A]/ mol L^{-1}	[B]/ mol L^{-1}	Initial rate/ mol L^{-1} min^{-1}
I	0.1	0.1	2.0×10^{-2}
II	–	0.2	4.0×10^{-2}
III	0.4	0.4	–

b.

In a reaction between A and B, the initial rate of reaction (r_0) was measured for different initial concentrations of A and B as given below:

A/ mol L^{-1}	0.20	0.20	0.40
B/ mol L^{-1}	0.30	0.10	0.05
r_0/mol $L^{-1}s^{-1}$	5.07×10^{-5}	5.07×10^{-5}	1.43×10^{-4}

(2+3)