EEE CONSORTIUM
PREBOARD EXAMINATION (2021-22)

Subject: CHEMISTRY   **Max. Marks:35**

Grade: XII   **Time:2 Hrs**

Name: **Section:**   **Roll No:**

General Instructions:

- 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	Arrange the following compounds in increasing order of their reactivity in a nucleophilic addition reaction: (i) Ethanal, propanal, propanone, Butanone. (ii) Benzaldehyde, , p−Nitrobenzeldehyde, Acetophenone.	2
2	Represent the cell in which the following reaction takes place $Mg(s) + 2Ag^+(0.0001M) \rightarrow Mg^{2+}(0.130M) + 2Ag(s)$; Calculate its (E_{cell}) if $E^o_{cell} = 3.17$ V. (Given log $0.130 = \bar{1}.1139$)	2

3	Give chemical tests to distinguish between the following pairs of compounds.
	   i. Propanal and Benzaldehyde
	   ii. Acetophenone and benzophenone
		2

SECTION B

4	Account for the following: (i) Direct nitration of aniline yields significant amount of meta derivative. (ii) Primary aromatic amines cannot be prepared by Gabriel phthalimide synthesis. (iii) mixture of Chloroform and sodium hydroxide is added to test tube (I) with ethanamine and test tube (II) with N-methyl ethanamine, only test tube leads to formation of unbearable foul smell. Why?	3

5	How will you convert
	   i. Ethanoic acid into Methanamine
	   ii. Hexane nitrile into 1-Aminopentane
	   iii. Chlorobenzene to p-Chloroaniline
		3

6 Write the hybridisation and magnetic behaviour of the following complex : 3

(i) $[CoF_6]^{3-}$

(ii) $[Ni(CN)_4]^{2-}$
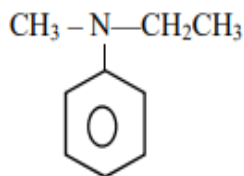
(iii) Write the IUPAC name of $[Mn(H_2O)_6]SO_4$.

OR

(i)

Write the IUPAC name and hybridisation of the complex $[Fe(CN)_6]^{3-}$.
        (Given : Atomic number of Fe = 26)

(ii) Arrange the following in increasing order of crystal field splitting energy

$[Cr(CN)_6]^{3-}$, $[Cr(NH_3)_6]^{3+}$, $[CrCl_6]^{3-}$

(iii) Write the hybridization and magnetic behaviour of the complex $[Ni(CO)_4]$
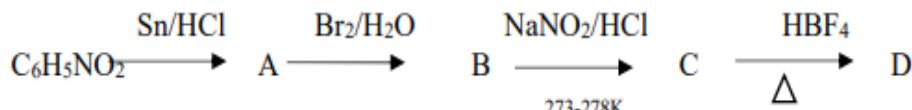
        (At.no. of Ni = 28)

7 An organic compound (A) (molecular formula $C_8H_{16}O_2$) was hydrolyzed with dilute 3
sulphuric acid to give a carboxylic acid (B) and an alcohol (C). Oxidation of (C) with
chromic acid also produced (B). On dehydration (C) gives but-l-ene. Identify A, B&C.
Write the equations for the reactions involved.

8 Account for the following: 3
i) Ammonia is easily adsorbed in comparison to oxygen.
ii) Explain using thermodynamic parameters as to why adsorption is always exothermic.

9 What happens when reactions: 3

 a. N-ethylethanamine reacts with benzenesulphonyl chloride.

 b. Benzylchloride is treated with ammonia followed by the reaction with Chloromethane.

 c. Aniline reacts with chloroform in the presence of alcoholic potassium hydroxide

OR

a. Write the IUPAC name for the following organic compound:

$CH_3 - N - CH_2CH_3$

b.Complete the following:

$C_6H_5NO_2 \xrightarrow{\text{Sn/HCl}} A \xrightarrow{\text{Br}_2/\text{H}_2\text{O}} B \xrightarrow[\text{273-278K}]{\text{NaNO}_2/\text{HCl}} C \xrightarrow[\Delta]{\text{HBF}_4} D$

10 Calculate the degree of dissociation of 0.0024 M acetic acid if conductivity of this solution 3
is 8.0×10^{-5} S cm^{-1} .

Given $\lambda^o_{H^+} = 349.6\,S\,cm^2\,mol^{-1}$; $\lambda^o_{CH_3COO^-} = 40.9\,S\,cm^2\,mol^{-1}$

11   Give reasons for the following :   3

(i)   Transition metals form alloys.

(ii)   Zinc has lowest enthalpy of atomization.

(iii)   Manganese shows higher oxidation state of +4 with Fluorine but shows +7 with Oxygen.

OR

Give reasons for the following :

(a)   The only oxidation state shown by Scandium is +3.

(b) $[Ti(H_2O)_6]^{4+}$ is colourless.

(c)   MnO is basic while Mn_2O_7 is acidic.

SECTION C

12   **Read the passage given below and answer the following questions:**   5

Rate of reaction depends upon the experimental conditions such as concentration of reactants (pressure in case of gases), temperature and catalyst. The number of reacting species (atoms, ions or molecules) taking part in an elementary reaction, which must collide simultaneously in order to bring about a chemical reaction is called molecularity of a reaction. The reaction can be unimolecular when one reacting species is involved, for example, decomposition of ammonium nitrite. Order of a reaction is an experimental quantity. It can be zero and even a fraction but molecularity cannot be zero or a non integer. Order is applicable to elementary as well as complex reactions whereas molecularity is applicable only for elementary reactions. For complex reaction molecularity has no meaning. for a first order reaction, half-life period is constant, i.e., it is independent of initial concentration of the reacting species. The half-life of a first order equation is readily calculated from the rate constant and vice versa. For zero order reaction $t_{1/2} \propto [R]_0$. For first order reaction $t_{1/2}$ is independent of $[R]_0$.

(a) What is pseudo unimolecular reaction?

(b) The reaction $2A + B + C \rightarrow D + 2E$; is found to be first order in A; second order in B and zero order in C.

  (i) Give the rate law for the above reaction in the form of a differential equation.

 (ii) What is the effect on the rate of increasing the concentration of A, B and C two times?

(c) The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at a constant volume. $SO_2Cl_2 (g) \rightarrow SO_2 (g) + Cl_2 (g)$

Experiment	Time/s^{-1}	Total pressure / atm
1.	0	0.5
2.	100	0.6

Calculate the rate of the reaction when total pressure is 0.65 atm. Given log 1.25=0.0969

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