FACULTY RECRUITMENT TEST
CATEGORY-C
Formal School Education/XI, XII
CHEMISTRY
PAPER – A

Time: 60 Minutes.   *Maximum Marks: 40*

Name:	**Marks:**	
Subject:		

Instructions:

☞ Attempt all questions.

☞ This question paper has two **Parts, I and II.** Each question of **Part I carries 2 marks** and of **Part II carries 5 marks.**

☞ Calculators and log tables are not permitted

PART – I

1.   75% of 1st order reaction was completed in 32 minutes. When was 50% of the reaction completed?

2.   What is the attacking electrophile in Reimer Tiemann reaction when phenol is treated with $CHCl_3$ & KOH?

3.   What is the pH of 10^{-2} (M) acetic acid? pka of acetic acid = 4.74

4.   A halide $C_5H_{11}X$ on treating with alc. KOH gives pentene-1. What is the halide?

5.   A colourless inorganic salt (A) decomposes completely at about 250°C to give only two products, (B) and (C), leaving no residue. The oxide (C) is a liquid at room temperature and neutral to moist litmus paper while the gas (B) is a neutral oxide. White phosphorus burns in excess of (B) to produce a strong white dehydrating agent. Write balanced equations for the reactions involved in the above process.

6.   The standard oxidation potential of Ni/Ni^{+2} electrode is 0.236 V. If this is combined with a hydrogen electrode in acid solution, at what pH of the solution will the measured emf be zero at 25°C. Assume $[Ni^{+2}] = 1M$.

7.   Element (A) burns in nitrogen to give ionic compound (B). Compound (B) reacts with water to give (C) and (D). A solution of (C) becomes milky on bubbling CO_2. Identify (A), (B), (C) and (D).

8.   A metal wire carries a current of 1 ampere. How many electrons pass through a point in the wire in 1 second?

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9. For the reaction, $2CO + O_2 \longrightarrow 2CO_2$; $\Delta H = -560$ kJ. Two moles of CO and one mole of O_2 are taken in a container of volume 1 L. They completely form two moles of CO_2, the gases deviate appreciably from ideal behaviour. If the pressure in the vessel changes from 70 to 40 atm, find the magnitude (absolute value) of ΔU at 500 K.
    (1 L atm = 0.1 kJ)

10. Arrange the following as stated
    (i) n-butane, n-butanol, n-butyl chloride, isobutane in increasing order of boiling point.
    (ii) benzene, toluene, methoxybenzene, chlorobenzene in increasing order of reactivity towards sulphonation with fuming sulphuric acid.

PART – II

1. An organic compound (A), C_4H_9Cl on reacting with aqueous KOH gives (B) and on reaction with alcoholic KOH gives (C) which is also formed on passing the vapours of (B) over heated copper. The compound (C) readily decolourises bromine water. Ozonolysis of (C) gives two compounds (D) and (E). Compound (D) react with NH_2OH to give (F) and the compound (E) reacts with NaOH to give an alcohol (G) and sodium salt (H) of an acid. (D) can also be prepared from propyne on treatment with water in presence of Hg^{2+} and H_2SO_4. Identify (A) to (H) with proper reasoning.

2. Black coloured (insoluble in H_2O) solid (A) does not dissolve in dil. HNO_3. Aqua regia can dissolve (A) forming (B). (B) gives yellow precipitate (C) with NaOH. (B) also gives orange precipitate (D) with KI; (D) dissolves in excess of KI forming (E). (E) gives brown precipitate with NH_4^+ salt in presence of NaOH. (A) is precipitated if H_2S gas is passed into solution of (B) in dil. HCl. Identify (A) to (E) and explain reactions.

3. The K_{SP} of $Ag_2C_2O_4$ at 25°C is 1.29×10^{-11} mole^3 l^{-3}. A solution of $K_2C_2O_4$ containing 0.152 mole in 500 mL water is shaken at 25°C with excess of Ag_2CO_3 till the equilibrium is reached.
    $Ag_2CO_3 + K_2C_2O_4 \rightleftharpoons Ag_2C_2O_4 + K_2CO_3$
    At equilibrium the solution contains 0.0358 mole of K_2CO_3. Assuming degree of dissociation of $K_2C_2O_4$ and K_2CO_3 to be same, calculate K_{SP} of Ag_2CO_3.

4. $_{92}^{238}U$ by successive radioactive decay changes to $_{82}^{206}Pb$. A sample of uranium ore was analysed and found to contain 1.0 gm of ^{238}U and 0.1 gm of ^{206}Pb. Assuming that all the ^{206}Pb has accumulated due to decay of ^{238}U, find the age of the ore (half−life of $^{238}U = 4.5 \times 10^9$ years).

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