

[This question paper contains 4 printed pages.]

209-A

Your Roll No.

B.Sc. (Prog.) / II

C

Paper CH-202 : CHEMISTRY

(Admissions of 2007 and before)

Time: 3 hours

Maximum Marks: 75

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*You are allowed to use any type of calculator
except mobile calculators but you cannot
share it. However, log tables will be
provided, if asked for.*

SECTION A

Marks : 50

(Organic Chemistry)

Attempt any four questions.

Question No. 1 carries 14 marks.

1. (a) An organic compound A having molecular formula C_3H_6O is obtained by oxidation of B. Compound B on treatment with $SOCl_2$ gives C. The Grignard reagent prepared from C reacts with A followed by hydrolysis of the adduct gives D ($C_6H_{14}O$). Compound D is a tertiary alcohol and on dehydration forms E. Ozonolysis of E produced two moles of acetone. Identify the compounds A to E and write down all the reactions.

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- (b) What happens when propyl chloride reacts with benzene in the presence of lewis acid. Name the reaction and explains its mechanism? (9,5)
2. Explain the following :
- (a) Coupling of benzene diazonium chloride takes place either under mild alkaline or mild acidic conditions.
- (b) Benzyl chloride is more reactive then chlorobenzene towards nucleophilic substitution.
- (c) Discuss the directive influence of $-CHO$ and $-NH_2$ groups in aromatic electrophilic substitution reaction. (12)
3. (a) Write the Claisen condensation reaction to prepare ethylacetoacetate. Give its mechanism.
- (b) Starting from ethylacetoacetate, write the synthesis of the following (any **three**)
- (i) 2-Pentanone
- (ii). Acetyl acetone
- (iii) 2-Methyl butanoic acid
- (iv) 4-Methyl uracil (3,9)
4. Write the complete reactions and give the mechanism involved (any **four**) :
- (i) Chlorobenzene is treated with sodamide in presence of ammonia.

- (ii) Sodium benzene sulphonate is treated with sodium cyanide.
 - (iii) Addition of hydrobromic acid to propene in absence of peroxide.
 - (iv) Acetaldehyde is treated with Phenyl hydrazine.
 - (v) Toluene is heated with mixture of nitric acid and sulphuric acid. (12)
5. Write note on the following (any **three**):
- (a) Aldol condensation
 - (b) Cannizzaro reaction
 - (c) Hydrohalogenation
 - (d) Diels Alder reaction (12)

SECTION B

Marks : 25

*(Physical Chemistry)**Attempt any two questions.*

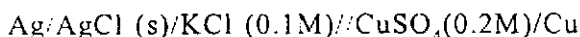
1. (a) Define specific conductance, molar conductance and equivalent conductance. Explain why conductivity decreases while equivalent conductivity increases on dilution.
- (b) Write a short note on Kohlrausch's law for independent migration of ions. Give its application.
- (c) A conductivity cell was filled with 0.01 M KCl which was known to have a specific conductivity of 0.1413 S m^{-1} at 298 K. Its measured resistance

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at 298 K was 94.3 ohms. When the cell was filled with 0.02 M AgNO_3 , its resistance was 50.3 ohms. Calculate (a) Cell constant (b) specific conductance of AgNO_3 solution. (4,4,4½)

2. (a) Explain how quinhydrone electrode is used to measure pH of a solution.

(b) For the following Cell



(i) Write Cell reaction

(ii) Calculate cell potential and free energy change of the reaction if $E^0 (\text{Ag}/\text{AgCl}/\text{Cl}^-) = 0.222 \text{ V}$ and $E^0 (\text{Cu}/\text{Cu}^{2-}) = 0.337 \text{ V}$.

- (c) Explain why the resistance of a metal increases and that of an electrolyte decreases on raising the temperature. (4,5½,3)

3. (a) Draw phase diagram for water. Label the diagram.

(b) For a reaction in equilibrium, derive that $d \ln K_p / dT = \Delta H^0 / RT^2$

- (c) When 0.89 g of succinic acid was shaken with 100 ml each of water and ether, water layer was found to contain 0.70 g of acid. Calculate the quantity of acid that can be extracted from 1 litre of ether solution containing 1 g of the acid using a total of 100 ml of water in two equal installments (u) in single Step extraction. (4,4,4½)