Progressive Education Society's

Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16, NEP 2020 (Autonomous)

End Semester Examination: OCT / NOV 2024

***Total No. of Questions**: 4/18(Each Section)* ***Total No. of Pages**:03*

SECOND YEAR (NEP Version I)
COURSE CODE: CHE-23101
COURSE NAME: Physical and Organic Chemistry
(Semester III)

Program: B.Sc. General **Credits:** 4
Program Specific: S.Y.B.Sc. (Chemistry) **Time:** 3 Hours
Course Type: MAJOR **Max. Marks:** 60
Paper: I **SET: A**

Instructions to the candidate:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Draw a well labelled diagram wherever necessary.*
4) *Answer both sections on separate answer sheets.*

SECTION I: PHYSICAL CHEMISTRY

Q1) Answer the following: **[5 x 1= 5]**

1. Define order of a reaction.
2. Give the formula to determine order of a reaction by differential method.
3. What is an adsorption isotherm?
4. Write equation of Langmuir adsorption isotherm.
5. Give the formula to calculate ΔA.

Q2) Attempt ANY FIVE of the following: **[5 x 2 =10]**

1. Define half-life period of a reaction. Give the units of half-life of a second order reaction.
2. The time for 50 % completion of a zero order reaction is 30 min. Calculate the time required for 80 % completion of reaction.
3. Draw the graph of a zero order reaction and calculate the rate constant using the graph.
4. Discuss any two factors affecting the rate of a reaction.
5. Give two differences between adsorption and absorption.
6. Write two assumptions of BET theory.
7. Write Gibbs- Helmholtz equation and explain temperature coefficient with it.

Q3) Attempt ANY TWO of the following: **[2 x 5 = 10]**

1. Derive the integrated rate law of a first order reaction. Mention the units of rate constant and the equation for calculating the half-life of a first order reaction.
2. The second order reaction has an energy of activation of 10.76 kcal. The rate constant of this reaction is 5×10^{-3} L $mole^{-1}$ s^{-1} at 800 °C. Calculate the rate constant of the reaction at 875 °C.
   [Given: R = 1.987 cal $mole^{-1}$ K^{-1}]
3. Name the two types of adsorptions and give three characteristics of each type.
4. Show that $\left(\frac{\partial G}{\partial P}\right)_T = V.$

Q4) Attempt ANY ONE of the following: **[1 x 5 = 5]**

1. Explain the experimental determination of order of reaction by graphical method.
2. Discuss factors affecting adsorption.

SECTION II: ORGANIC CHEMISTRY

Q1) Answer the following. **[5 x 1 = 05]**

1. What are phenols?
2. Draw structure of 1,2 dibromobenzene.
3. State Huckel's rule of aromaticity.
4. Define Markovikov's rule.
5. What do you mean by S_N reaction?

Q2) Answer the following (Any 5) **[5 x 2 = 10]**

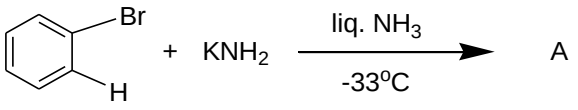
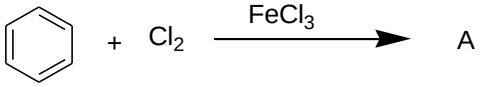
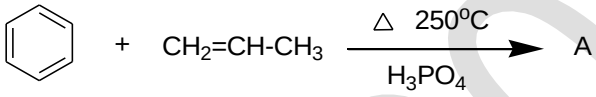
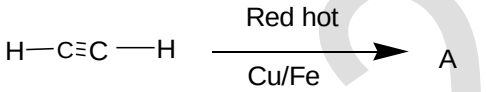
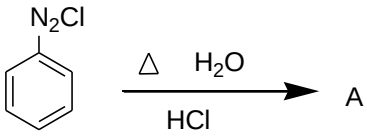
1. Why does benzene undergo electrophilic substitution reactions?
2. Write short note on Friedel craft alkylation.
3. Explain Saytzeff rule with suitable example.
4. What are alkyl halide? Give its classification.
5. Write short note Williamson's synthesis.
6. Alcohols have higher boiling points than alkane. Explain.
7. Write short note on oxidation of alcohols.

Q3) Answer the following (Any 2) **[2 x 5 = 10]**

1. Phenols are acidic in nature. Explain.
2. Write short note on Reimer-Tiemann reaction.
3. How will you prepare ethyl bromide from (a) ethanol (b) ethylene.
4. Propylene on treatment with HBr forms 2-bromopropane as a major product. Explain.

Q4) Answer the following (Any 1) **[1 x 5 = 05]**

1. What is S_N1 reaction? Discuss the mechanism of S_N1 reaction with suitable example.
2. Identify the products.

1.	
2.	
3.	
4.	
5.	

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