Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
End Semester Examination: November 2023
Faculty: Science and Technology

Program: B.Sc. **Semester: I** **SET: A**
Program (Specific): Chemistry **Course Type:**
Class: S.Y.B.Sc **Max.Marks: 35**
Name of the Course: Physical and Analytical Chemistry
Course Code: CH-301 **Time: 2Hr**
Paper: I

Instructions to the candidate:

1) *There are 4 sections in the question paper. Write each section on a separate page.*
2) *All Sections are compulsory.*
3) *Figures to the right indicate full marks.*
4) *Draw a well labeled diagram wherever necessary.*

SECTION: A

Q1) Multiple choice question **5**

1. **In precipitation titration reactants react to form_____**

   a.water soluble indicator **b. water insoluble solid product**

   c. water soluble solid product **d. metal indicator complex**

2. **To prepare solution of accurate volume which of the following is best suited? _____**

   a.volumetric flask **b. measuring cylinder** **c. beaker** **d. burette**

3. **Accuracy is usually expressed in terms of _____**

   a. standard deviation **b. absolute and relative error**

   c. reproducibility of the measurement **d. relative mean deviation**

4. **Chemical adsorption is characterized by _____**

   a.strong forces **b. low heat of adsorption** **c. reversible process**

   d. formation of multimolecular layer

5. **If activation energy of a reaction decreases then the rate of reaction_____**

   a.decreases **b. remains constant** **c. increases** **d. becomes zero**

Q2) Very short answer questions (Attempt any 4/6) 4

1. **Explain the Molecularity of a reaction.**
2. **Define half life.**
3. **What do you mean by physical adsorption?**
4. **What is precision?**
5. **What is the End Point of a reaction?**
6. **What is a primary standard?**

SECTION: B

Q3) Short answer questions (Attempt any 4/6) 8

1. **Show that half life of second order reaction is 1/ak.**
2. **Write the molecularity of following reaction A+2B→3C**
3. **Distinguish between order and molecularity.**
4. **Explain the terms accuracy and precision by labeled diagram.**
5. **What is precipitation titration?**
6. **What is neutralization titration?**

SECTION: C

Q4) Short answer questions (Attempt any 4/6) 8

1. **Derive the equation for rate constant of first order reaction.**
2. **Draw the graph and explain the Langmuir adsorption isotherm.**
3. **Calculate the half life of the second order reaction if the rate constant of the reaction is 5 liter $mol^{-1}s^{-1}$ and the initial concentration is 0.05 M.**
4. **What is the effect of particle size on the adsorption process?**
5. **Explain the methods to minimize systematic errors.**
6. **Explain the pH titration curve of strong acid and weak base.**

SECTION: D

Q5) Solve the following (Any two) 10

1. **The rate constant of second order reaction is 9.5×10^{-3} litre $mol^{-1}s^{-1}$ at 25°C. Find the time required to complete 75% of the reaction.**
2. **For a certain first order reaction, the time required for 50% completion is 60 minutes at 35°C and 20 minutes at 55°C. Calculate the activation energy of the reaction. (R=8.314 $JK^{-1}mole^{-1}$).**
3. **Calculate the normality and strength of H_2SO_4 when 10 ml of it reacts with 25 ml of 0.1N NaOH solution(Eq.Wt. of H_2SO_4=49).**