



25047483

QP CODE: 25047483

Reg No :

Name :

M.Sc DEGREE (CSS) EXAMINATION, NOVEMBER 2025

Third Semester

M Sc CHEMISTRY

**Core Course - CH010301 - CHEMICAL KINETICS, SURFACE CHEMISTRY AND
CRYSTALLOGRAPHY**

2019 ADMISSION ONWARDS

607F0B50

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. What is collision number? Give an expression for it.
2. With an example, explain how pressure affects the velocity of gases.
3. With the help of an example, explain primary salt effect.
4. What is meant by turn over number in enzyme catalysis?
5. What you meant by cationic surfactant? Write two examples.
6. Write a note on Auger electron spectroscopy.
7. Write a note on flash desorption.
8. Write a short note on stability of colloids.
9. What are Miller Indices? Explain using an example
10. Write a short note on interplanar spacing in crystals.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. How does NMR and ESR methods help in studying fast reactions?
12. Explain prototropic mechanism of acid-base catalysis.





13. Derive Gibbs adsorption equation.
14. What are the important postulates of Langmuir adsorption isotherm?
15. What are macromolecules? Explain the determination of molecular mass using mass average method.
16. Briefly explain the different crystal growth techniques.
17. A 2nd order reaction has the rate constant $k = 2.0 \times 10^{-4} \text{ L mol}^{-1} \text{ s}^{-1}$ and the activation energy is 50 kJ mol^{-1} at 25°C . Calculate $\Delta S^\ddagger$ for the reaction assuming that the reaction takes place in solution.
18. . 0.106 mg of stearic acid ($M = 284 \text{ g mol}^{-1}$) is found to cover 500 cm^2 of water surface at the point where surface pressure just begins to rise sharply. Estimate the cross sectional area "a", per stearic acid molecule and thickness "t", of the surface film of stearic acid on water. Density of stearic acid = 0.85 g cm^{-3}

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight **5** each.

19. Describe the $\text{H}_2\text{-Br}_2$ thermal reaction by deducing the rate expression. How is it different from the photochemical reaction?
20. Explain lower and upper explosion limits in $\text{H}_2\text{-O}_2$ reaction and discuss the Semenov-Hinshelwood mechanism for explosion reactions.
21. Explain Surface Enhanced Raman Scattering and the different surfaces for SERS studies.
22. Explain the relevance of atomic scattering factor & structure factor? Give their mathematical expressions. How is structure of a unit cell determined by Fourier synthesis?

(2×5=10 weightage)

