23144844

QP CODE: 23144844

Reg No : .....

Name : .....

M Sc DEGREE (CSS) EXAMINATION, NOVEMBER 2023

Third Semester

Faculty of Science

M Sc CHEMISTRY

CORE - CH010301 - CHEMICAL KINETICS, SURFACE CHEMISTRY AND CRYSTALLOGRAPHY

2019 ADMISSION ONWARDS

4DF11A63

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. With an example, explain how volume affects the velocity of gases.
2. What do you mean by branching chain?
3. Explain with an example how NMR can be used to study fast reactions.
4. Explain acidity function.
5. What you meant by non-ionic surfactant ? Write two examples.
6. Write the use of Langmuir isotherm for surface area determination.
7. Write Langmuir-Hinshelwood mechanism for surface catalysed reactions.
8. Write a note on number average molecular weight and weight average molecular weight.
9. What is meant by Reciprocal lattices?
10. Briefly explain any one of the crystal growth technique

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Explain the Rice Herzfeld mechanism of organic decomposition reactions of acetaldehyde having overall order 1/2.

12. What is the effect of dilelectric constant of a medium on rate of ionic reactions in solution? Derive equation for rate constant.

13. What is Gibbs equation? Explain.

14. What are the important scanning probe microscopic methods used for surface studies ? Explain their applications in surface studies.

15. Explain sedimentation and light scattering methods used for molecular weight determination.

16. Explain screw axis and glide plane.

17. The enzyme catalyzed conversion of a substance at 25°C has Michealis constant of 0.05 moles L^{-1}. The reaction rate is 4.5 moles $L^{-1}s^{-1}$ when substrate concentration is 0.7moles L^{-1}. What is the maximum velocity of this enzyme catalysis?

18. A sample of serum globulin is placed in an ultracentrifuge which is operating at 50,000 rotations per minute (rpm). If the sedimentation coefficient of this protein is 7.1×10^{-13} s, how far will the solution boundary move in 30 minutes at a distance of 6.5 cm from the axis of rotation?

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Derive the rate constant for the transition state theory. Show that it agrees with simple collision theory.

20. Discuss on Lindemann's approach to explaining unimolecular reactions. How did Hinshelwood overcome the limitations of Lindemann theory?

21. Explain Surface Enhanced Raman Scattering and the different surfaces for SERS studies.

22. Explain atomic scattering factor and structure factor. How is structure of the unit cell determined by fourier synthesis?

(2×5=10 weightage)