M Sc DEGREE (CSS) EXAMINATION, APRIL 2022

Third Semester

Faculty of Science

M Sc CHEMISTRY

CORE - CH010301 - CHEMICAL KINETICS, SURFACE CHEMISTRY AND CRYSTALLOGRAPHY

2019 ADMISSION ONWARDS

8D6D29C3

Time: 3 Hours   Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. What is enthalpy of activation $\Delta H^{\ddagger}$? Give its significance with respect to deciding the rate of the reaction.

2. What are the two basic conditions in which the steady state approximation is applied to a chemical reaction?

3. Distinguish between general and specific OH^- ion catalysis.

4. Give the Michaelis Menton equation. Explain its significance.

5. Give the salient features of oscillating reactions.

6. What are the different types of surfaces?

7. What is critical micelle concentration (CMC)?

8. Write a note on surface selection rules of SERS.

9. How can you use BET theory for surface area determination?

10. In crystals how many point groups and space groups are present. Explain

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Derive an expression for the rate constant based on Lindemann Christiansen hypothesis for unimolecular reactions. Explain the variation of experimental results from theoretical results.

12. Discuss on the kinetics of free radical polymerization.

13. The relaxation time for attaining equilibrium in A+B →C has been found to the 200µs. The equlibrium constant of the reaction is 1020. Evaluate the rate constants k_1 and k_{-1}.

14. Explain primary and secondary salt effects on reaction rates.

15. Explain the principle and applications of SEM and TEM in the study of surfaces.

16. Compare Eley-Rideal and Langmuir-Hinshelwood mechanism for surface catalysed reactions.

17. Derive the Bragg equation and explain its significance.

18. Deduce the structure of KCl by powder crystal method.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. (a) Discuss in detail about the kinetic theory of collisions. (b) Compare the collision theory with transition state theory.

20. Explain in detail sedimentation potential and streaming potential, Donnan membrane equilibrium.

21. What are the different methods for determining molecular weight of macromlecules. Explain

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)