QP CODE: 23002800

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Reg No : .....

Name : .....

M Sc DEGREE (CSS) EXAMINATION, MARCH 2023

Third Semester

Faculty of Science

M Sc CHEMISTRY

CORE - CH010301 - CHEMICAL KINETICS, SURFACE CHEMISTRY AND CRYSTALLOGRAPHY

2019 ADMISSION ONWARDS

F582DD95

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. What are the assumptions of collision theory?
2. What is free energy of activation $\Delta G^{\ddagger}$? Give its significance with respect to deciding the rate of the reaction.
3. How does Hinshelwood treatment of unimolecular reactions differ from Lindemann theory?
4. For a reaction in solution, how does the dielectric constant and ionic strength affect the reaction rate?
5. Give the principle of SERS in surface studies.
6. Write the Langmuir adsorption isotherm equation and explain the terms.
7. Write a note on flash desorption.
8. Write a short note about sedimentation potential.
9. Explain Miller indices of a crystal?
10. What are liquid crystals? List their characteristics.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Discuss on the kinetics of anionic polymerization.
12. What are the different types of acid-base catalysis? Define each type with an example.
13. Derive Gibbs adsorption equation.
14. What is surface pressure and surface potential? Explain how are their measurements done and discuss their interpretation.
15. What are the important applications of SEM and TEM in the study of surfaces.
16. What are the important crystal growth techniques?
17. Calculate the specific rate k at 500°C for the reaction $2HI \rightarrow H_2 + I_2$. Given that activation energy is 40000 cals and collision diameter is 2.5×10^{-10} cm.
18. *At 25^0C and 1 atm pressure, a volume of 250 ml of H_2 was required to form a monolayer on an adsorbant. Calculate the surface area of the solid given that the area occupied by one molecule of H_2 is 0.11 nm^2*

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Discuss the relaxation method of studying fast reactions by deducing an expression for the relaxation time of a reaction which is first order in both directions.
20. Write short notes on the following mechanisms of oscillating reactions:
    a) Lotka-Volterra mechanism b) the brusselator mechanism
21. Explain the various methods used for the determination of molecular weight of macromolecules.
22. Explain in detail the different techniques for characterizing a crystal structure.

(2×5=10 weightage)