TM243672A

Reg. No :.....

Name :.....

MASTER'S DEGREE (C.S.S) EXAMINATION, NOVEMBER 2024

2023 ADMISSIONS REGULAR

SEMESTER III - CORE COURSE CHEMISTRY

CH3C11TM20 - Chemical Kinetics, Surface Chemistry and Photophysics

Time : 3 Hours

Maximum Weight : 30

Part A

I. Answer any Eight questions. Each question carries 1 weight (8x1=8)

1. Define entropy of activation ΔS^*. Describe its significance in deciding the rate of the reaction.
2. Define Cage effect. Explain giving using suitable examples.
3. Explain primary isotopic effect and secondary isotopic effect using a suitable example.
4. What is the role of activation energy and threshold energy in collision theory?
5. Define surface pressure and surface potential. How are these properties measured?
6. Differentiate between anionic and cationic surfactants. Give examples of each.
7. Sedimentation potential is an electrokinetic phenomenon. Describe.
8. Define quantum yield and explain its significance in photochemistry.
9. List the important characteristics of excimers. Give one example.
10. Differentiate excimers and exciplexes with suitable examples.

Part B

II. Answer any Six questions. Each question carries 2 weight (6x2=12)

11. Explain the processes involved in catalytic cracking in hydrocarbons.
12. Discuss the mechanisms of catalysed reactions such as ammonia synthesis and hydrogenation of ethylene.
13. Explain hydrogenation of ethylene.
14. Explain the influence of liquid medium on the reaction rates in solutions.
15. Explain the use of Langmuir and BET isotherms for the determination of surface area of solids.
16. Explain Donnan membrane equilibrium and its applications.
17. Explain the theory of photosensitization reactions with suitable examples.
18. Discuss the principle and procedure used to determine quantum yield of a photochemical reaction by ferrioxalate actinometer.

Part C

III. Answer any Two questions. Each question carries 5 weight (2x5=10)

19. (a) Describe Semenov- Hinshelwood mechanism of explosive reactions. How do temperature and pressure influence this mechanism?(b) Explain Lotka-Volterra mechanism for oscillating chemical reaction.
20. (a) Explain the thermodynamic formulation of the activated complex theory. (b) Discuss prototropic mechanism with an example.
21. Derive Gibbs adsorption equation and explain how it is used in explaining the surfactant property of soaps and detergents.
22. (a) Explain delayed fluorescence. Discuss E-type and P-type delayed fluorescence. (b) Compare and contrast bioluminescent and chemiluminescent reactions