

M. Sc. DEGREE (C.S.S.) EXAMINATION, OCTOBER 2016
SEMESTER III - CHEMISTRY
CH3C11TM - CHEMICAL KINETICS, SURFACE CHEMISTRY AND
PHOTOCHEMISTRY

Time: Three Hours

Maximum Marks: 75

PART A**I. Answer any five questions. Each question carries 3 marks**

1. State and Explain Primary Salt Effect
2. Write Hammett Equation. Show that it is a linear free energy relation
3. Account for the absorption of hysteresis in adsorption-desorption isotherms
4. Write the Principle of STEM
5. Comment on the term Chemiluminescence
6. The quantum yield in the combination of H₂ and Cl₂ is 10⁵ whereas it is only 0.01 when H₂ combine with Br₂. What is the reason for the difference?
7. Explain the term critical micellar concentration. What is its significance?

(5x3=15)

PART B**II. Answer any six questions. Each question carries 5 marks**

8. Discuss the kinetics of reactions involving ions in the solution
9. NO₂Cl decomposes to give NO₂ and Cl₂. According to the following mechanism derive the rate law?

$$\text{NO}_2\text{Cl (g)} \rightarrow \text{NO}_2 + \text{Cl}$$

$$\text{NO}_2\text{Cl} + \text{Cl} \rightarrow \text{NO}_2 + \text{Cl}_2$$
10. Describe the experimental techniques in temperature jump method
11. Discuss Donnan Membrane equilibrium
12. Write a note on fluorescence
13. Propose Rice-Herzfeld mechanism for a typical reaction
14. The slope and intercept of BET plot are 1.23x10⁻³mm⁻³ and 4.06x10⁻⁶mm⁻³. Calculate the surface area of the solid. The adsorbable molecule has a cross sectional area of 16x10⁻²⁰m². The data are normalised to 1atm pressure and 0 degree C
15. Write explanatory note on Green house effect
16. For a photochemical reaction A→B, 1.0x10⁻⁵ mol of B were formed absorption of 6.0x10⁷ ergs at 3600Å. Calculate the quantum efficiency

(6x5=30)

PART C**III. Answer any two questions. Each question carries 15 marks**

17. What are the assumptions in absolute rate theory? Following the theory, derive the equation for rate constant.
18. How are relaxation methods useful in kinetics of fast reactions? Describe field jump and NMR method in this respect.
19. What are the assumptions in BET adsorption isotherm? Derive BET adsorption isotherm. Express the isotherm in linear form.
20. (A) Define Electrokinetic properties and discuss one of the electrokinetic properties.
 (B) Explain Photosensitisation and Bioluminescence.

(2x15=30)