

M.SC DEGREE END SEMESTER EXAMINATION OCTOBER 2016**SEMESTER - 3: CHEMISTRY****COURSE: P3CHET11- CHEMICAL KINETICS, SURFACE CHEMISTRY AND PHOTOCHEMISTRY**

Common for Regular (2015 Admission) & Supplementary / Improvement (2014 Admission)

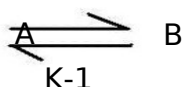
Time: Three Hours

Max. Marks: 75

(Centimeter graph sheets shall be provided)

Section A(Answer **any ten** questions. Each question carries **2** marks)

1. Unimolecular gas phase reactions follow first order kinetics at high pressures and second order kinetics at low pressures . Why ?
2. What is the significance of (a) enthalpy of activation (b) entropy of activation?
3. Define relaxation time. Write equation for the relaxation time for the
K1 reaction



4. What is secondary salt effect?
5. Distinguish between prototropic and protolytic mechanism.
6. What is Lineweaver - Burk plot? Explain its significance.-
7. Define isosteric heat of adsorption. How is it measured.
8. Define electrokinetic phenomenon. Write the examples for electrokinetic phenomenon.
9. Explain terms KLL and KLM with reference to AES.
10. Write BET adsorption isotherm in the linear form. Explain the terms.
11. Distinguish between E-type and P -type of delayed fluorescence.
12. What is chemiluminescence? Write one example.
13. Define laser action.

(2 x 10 = 20)

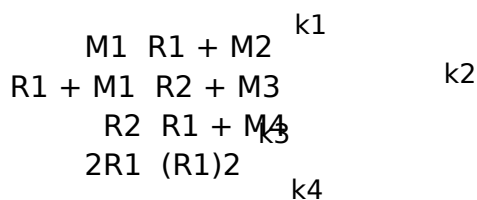
Section B(Answer **any Five** questions by attempting not more than three from each bunch.

Each question carries 5 marks)

Bunch 1

14. With the help of potential energy surfaces explain the term " reaction coordinate".

15. Mechanism for organic decomposition reaction is given below. Derive the rate law.

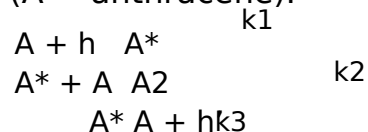


(R1 and R2 represent radical intermediates)

16. Derive Gibbs adsorption isotherm. *Type equation here.*

17. Mechanism for dimerization of anthracene is given below. Derive the rate law

(A = anthracene).



Bunch 2

18. Calculate the pre exponential factor for the reaction $2\text{CH}_3 \rightarrow \text{C}_2\text{H}_6$ using collision theory. Molecular diameter of CH_3 is 3.61 \AA Temp = 500 K.
19. For an enzyme catalyzed reaction a plot of $\frac{1}{\text{Rate}}$ Vs $\frac{1}{S_0}$ gave a straight line of slope 40s and intercept = 50 dm mol^{-1} . Calculate the Michaelis Menton constant and turn over frequency.
 $E_0 = 2.5 \mu\text{M}$
20. The slope and intercept of the linear form of BET plot are 1.23×10^{-2} and $1.98 \times 10^{-6} \text{ mm}^{-3}$ when N_2 was adsorbed on 1g of a solid. Calculate the surface area of N_2 is 16.2 \AA^2
21. The quenching of an excited state of a complex Q in acidic medium was followed by measuring the emission lifetime. Calculate the quenching rate constant.

[Q] (10^{-4}M)	0	1.6	4.7	70	9.4
t ns	600	405	337	296	217

(5 x 5 = 25)

Section C

(Answer **any two** questions. Each question carries 15 marks)

22. What are the assumptions in Transition State Theory? Using the theory derive an equation for rate constant.
23. What are the methods for studying fast reactions? Discuss.
24. Write a brief account of the various methods for surface analysis.
25. How is solar energy utilized? Discuss.

(15 x 2 = 30)
