

$$r = \frac{k_2[E_1]_0[s]}{k_m + [s]}$$

Discuss the rate when $k_m \gg s$; and $k_m \ll s$. Also explain why rate of reaction changes from first order to zero-order as the substrate concentration is increased.

- (b) How constant, k_m can be predicted? Explain. Also discuss its significance. 12, 4

SECTION - D

8. (a) Introduce the concept of mobility of ions. 4, 8, 4
 (b) What do you mean by ionic drift velocity? Derive expression for ionic current density using the concept of ionic drift velocity. What is the utility of the relation?
 (c) Write a note on Walden rule.
 9. Write notes on the following: 5, 5, 6
 (i) Stokes-Einstein relation
 (ii) Onsager's phenomenological equations and their significance.
 (iii) Planck-Henderson equation.

74052-1450-(P-4)(Q-9)(16) (4)

Roll No.

74052

M. Sc. Chemistry 2nd Semester (For Affiliated Colleges) Examination - May, 2016

PHYSICAL CHEMISTRY

Paper : CH-406

Time : Three Hours]

[Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note: Attempt five questions in all, selecting at least one question from each Section. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) Name the phenomena which the classical mechanics fails to explain but quantum mechanics can explain.
 (b) What do you mean by angular wave function? Discuss its significance.
 (c) Is Nernst heat theorem applicable to gases? Explain.

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P. T. -O.

- (d) What do you mean by fugacity ? How fugacity can be predicted at low pressure ?
- (e) Define Residual Entropy.
- (f) Define quantum yield.
- (g) Why reactions of high order are rare ?
- (h) Discuss the significance of diffusion coefficient.

2 × 8 = 16

SECTION – A

2. Derive wave function and energy of a simple harmonic oscillator. What is the zero point energy of a particle possessing simple harmonic motion ? Comment on its physical significance. Also write first three eigen functions. 16
3. (a) Write Schrodinger wave equation for hydrogen atom. Separate the equation into three parts containing r , θ and ϕ only. Comment on the physical significance of each part.
- (b) Show that wave function of hydrogen is normalized wave function.
- (c) Draw and comment on the radial probability curve for $n = 3$ and $l = 2$ orbital. 9, 5, 2

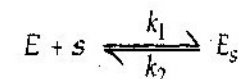
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SECTION – B

4. (a) What is third law of thermodynamics ? Evaluate theoretically the absolute entropy of a liquid above its boiling point. 8, 8
- (b) Discuss the applications of Clausius-Clapeyron equation.
5. (a) Describe phase diagram for a system forming solid compound A_XB_Y with congruent melting point. 8, 8
- (b) Write an explanatory note on thermodynamics of solid solution.

SECTION – C

6. (a) Discuss the kinetics of decomposition of Ethane molecule. 8, 8
- (b) Write an explanatory note on the kinetics of branched chain reactions.
7. (a) Consider the following mechanism for enzyme-catalyzed reaction :



Using steady state approximation, show that rate of reaction is given by :

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P. T. O.