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M.Sc. (I-Year) (I-Semester) Examination, 2018-19

CHEMISTRY

[Paper : Second]

(Physical Chemistry)

[PPU-M1(CHE)-CC-2]

Time : Three Hours] **[Maximum Marks : 70**

Note : Attempt **all** Parts as for direction.

PART - A

(Objective Type Questions)

Note : Attempt **all** questions. Each question carries **02** marks. [2x10=20]

1. (i) An electronically excited molecule may emit a quantum of energy by fluorescence or may transfer its excitation energy by collision with other molecules are called as :

(a) Leaching

(b) Quenching

(c) Chelating

(d) Polarisation

(ii) The mean activity coefficient of 0.001 molar Na_2SO_4 solution is :

(a) 0.879

(b) 0.246

(c) 0.571

(d) 0.369

(iii) Consider the following statements - An increase in the rate of a reaction for a rise in temperature is due to :

(I) The increase in the number of collision

(II) The shortening of the mean free path

(III) The increase in the number of activated molecules

(IV) The increase in pressure of the system.

Which of the statement given above correct :

(a) I, II

(b) II, III

(c) I, III

(d) I, III, IV

(iv) Which of the following is not an intensive property ?

(i) Internal energy

(ii) Enthalpy

(iii) Molar entropy

(iv) Specific heat capacity

(v) The efficiency of an enzyme in catalyting reaction is due to its capacity :

(a) To form a strong enzyme substrate complex

(b) To decrease the bond energy of all substrate molecules

(c) To change the shape of substrate molecules

(d) To lower the activation energy of the reaction

(vi) The rotational partition function is :

(a) $\frac{n \times 8\pi^2 IKT}{h^2}$

(b) $\left[\frac{8\pi^2 IKT}{h^2}\right]^n$

(c) $\frac{V^n}{h^{3n} n!}(2\pi mKT)^{3n/2}$

(d) $\frac{1}{2\sinh(hV/2kT)}$

(vii) A polymer whose all type of asymmetric carbon atoms have the same (dore) configuration are called as :

(a) Syndiotactic

(b) Atactic polymers

(c) Isotactic polymers

(d) Copolymers

(viii) The quantum yield of Co (carbon monoxide) during photolysis of acetaldehyde increase with :

(a) Decreasing wavelength and Decreasing pressure at 3130Å

(b) Increasing wavelength and Decreasing pressure at 3130Å

(c) Increasing wavelength and Increasing pressure at 3130Å

(d) Decreasing wavelength and Increasing pressure at 3130Å

(ix) $r = V_{max} \frac{[s]}{K_m + [s]}$ [Michaelis-Menten equation predict the condition under which rate of catalytic reaction followed zero order kinetics :

(a) $K_m >>> [s]$

(b) $[s] >>> K_m$

(c) $K_m = [s]$

(d) $K_m = [s]^n$

(x) The theory that link thermodynamics with chemical kinetics is :

(a) Simple Collosion theory

(b) Modified Simple Collision theory with the introduction of the steric factor

(c) Arrhenious theory

(d) Absolute Reaction Rate theory

PART - B

(Short Answer Type Questions)

Note : Attempt **any four** questions. Each question carries **05** marks. [4x5=20]

2. (a) How extension of Debye-Huckel limiting law to concentration solution was made ?

(b) What is polydispersity index ? Is $\overline{M}_m$ always equal to M_n ?

3. Explain transition partition function.

4. Derive equation for determination of fugacity at moderately low pressure.

5. In what condition kinetics measurements in flow system are useful and what are the types of flow systems ?

6. Chemical potential is defined as $\mu i = \left(\frac{\partial g}{\partial n_i}\right)_{T,P,n_j} \quad i \neq j$

show that $\left(\frac{\partial \mu}{\partial T}\right)_{P,n_j} = \bar{S}i$

PART - C

(Long Answer Type Questions)

Note : Attempt **any three** questions. Each question carries **10** marks. [3x10=30]

7. (a) Explain what is meant by an Ensemble and why it is useful in statistical thermodynamics ?

   (b) What are advantages of activated complex theory over collision theory ?

8. (a) Describe the principle of osmometry method for determination of molecular weight of macromolecules.

(b) Over that molecular weight range can light scattering be used to measure $\overline{M}w$ and limitations set this range.

9. Deduce the kinetics of an mechanism of photolysis of acetaldehyde.

10. (a) What is Gibbs-Duhem equation ? Prove this equation.

    (b) What are the factors on which the activity coefficient of a given electrolyte depends when its solution containing many electrolytes ?

11. Discuss the features, advantages and limitation of the Michaelis-Menten machanism of enzyme action.

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