



PPP-2073

Seat No. _____

M. Sc. (Sem. II) Examination

April / May - 2016

CHN-503 : Physical Chemistry : Paper - IX

Time : 3 Hours]

[Total Marks : 70

Instructions :

- (1) Each question carries 14 marks.
- (2) Figures to the right indicate marks of the question.

1 (a) Answer any two of the following : 10

- (1) Discuss the kinetics of decomposition of Ethane.
- (2) Write a short note : Transition state theory.
- (3) Write a short note : Flash photolysis.

(b) Answer any one of the following : 4

- (1) Calculate the Ionic strength (μ) of given mixture. 50 ml 0.05 M $K_2S_2O_8$ + 50 ml 0.05 M KI + 150 ml H_2O .
- (2) The rate constant is found to be 4.6×10^{-5} at $27^\circ C$ and 8.3×10^{-4} at $47^\circ C$. Calculate the energy of activation in Jule/mole.

- 2 (a) Answer any two of the following : 10
- (1) Explain : Mechanism of free radical Polymerization.
 - (2) Write a short note : Micellization.
 - (3) Explain the pressure across curved surface and derive Laplace equation.
- (b) Answer any one of the following : 4
- (1) A polymer sample is prepared by mixing two components are equal weight. The ratio if it's molecular weight is 4.0. Prove the \overline{Mn} is greater in molecular weight of the small component by 0.4.
 - (2) The surface tension of ethanol-water mixtures follows the equation $\gamma / (10^{-3} Nm^{-1}) = 72.0 - 0.5 (C/mol. dm^{-3}) + 0.2 (C/mol. dm^{-3})^2$. Calculate the surface excess of ethanol for a 0.5 mol. dm⁻³ solution at 298 K. [R = 8.314 Jule/mol.K].
- 3 (a) Answer any two of the following : 10
- (1) Discuss the thermodynamics of electrified interfaces.
 - (2) Write a short note : Gouy-Chapman theory.
 - (3) Describe the Tafel's theory for the secret of hydrogen overvoltage.

(b) Answer any one of the following : 4

- (1) In the electrolysis of H_2SO_4 the value of overvoltage is 0.35 V. Calculate the overvoltage under the condition, when the magnitude of electric current is increased by ten times and the value of b is 0.12.
- (2) The exchange current density for the reaction

$2H^+ + 2e^- \rightarrow H_2$ on nickel at $25^\circ C$ is $1.5 \times 10^{-5} A.cm^{-2}$ overpotential $\eta = 0.1 V$, $\alpha = 0.5$. What current density would be necessary to attain from the Butler-Volmer equation ?

4 (a) Answer any two of the following : 10

- (1) Explain : Donnan membrane equilibrium when the electrolytes on both the sides have no common ions.
- (2) Explain the current potential relation at a semiconductor.
- (3) Write a short note : Half wave potential.

(b) Answer any one of the following : 4

- (1) Write a short note : Quantization of charge transfer.
- (2) Determine the diffusion current for nickel weight of drop = $4.0 mg sec^{-1}$ concentration 3.0 m. mole/liter time = 5 sec. $n = 2$, $D = 0.69 \times 10^{-5} cm^2 sec^{-1}$.

5 Answer any seven of the following :

- (1) Calculate the η_{red} of Myosin intrinsic viscosity is 1.0 dl/gm. Mark Howwink constant $K = 1.0 \times 10^{-4}$ C = 0.3 M and $K'=0.33$.
 - (2) Write a lindmann equation on high and low pressure and give the order of reaction.
 - (3) Discuss the Acid and Base catalysis.
 - (4) Explain the Adsorption and Absorption.
 - (5) Derive the unit of surface excess.
 - (6) Write a difference between Thermoplastic and Thermosetting polymer.
 - (7) Give the factors affecting overvoltage.
 - (8) Explain Polarogram and Palarograph.
 - (9) Give the benefits of DME.
 - (10) What is n-p junction ?
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