B.E./B.TECH. Degree Examination, December 2020

Third Semester

CH16303 – PHYSICAL CHEMISTRY

(Regulation 2016)

Time: Three hours Maximum :80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. At 25^0C the molar conductance at infinite dilution of HCl, CH_3COONa and NaCl are 426.16 x 10^{-4}, 91.0 x 10^{-4}, 126.45 x 10^{-4} Sm^2mol^{-1} respectively. The molar conductance at infinite dilution for CH_3COOH is
   a) 191.6 x 10^{-4} Sm^2mol^{-1}
   b) 390.71 x 10^{-4} Sm^2mol^{-1}
   c) 389.6 x 10^{-4} Sm^2mol^{-1}
   d) 217.45 x 10^{-4} Sm^2mol^{-1}
2. A catalyst functions by
   a) Increasing the forward reaction rate
   b) Increasing the concentration of the product
   c) Changing the equilibrium constants
   d) Reducing the activation energy of the reaction
3. Which of the following are the reactions in which molecules absorbing light do not themselves react but induce other molecules to react?
   a) Photosensitized reactions
   b) Free radical reactions
   c) Chain reactions
   d) Reversible reactions
4. When colloids are subjected to an electrical field the particles move towards the electrode and precipitate. Name the process
   a) Peptization
   b) Electrophoresis
   c) Brownian movement
   d) Tyndal effect
5. How will you represent a calomel electrode?
6. Calculate the energy per mole of light having wavelength of 300nm.
7. Potash alum is added to remove impurities from water. Give reason.
8. How is partition coefficient useful in the desilverisation of lead?

PART B - (4 X16 = 64 marks)

09. (a) (i) Illustrate how kohlrausch's law is used to calculate molar ionic conductance of weak electrolytes and transport numbers. **(8)**

(ii) Calculate the specific conductance and molar conductance of 0.0075M aqueous solution of KCl, if the conductance is 1.49×10^{-3} S and the cell constant is $1.05 cm^{-1}$. **(8)**

(OR)

(b) (i) How are redox reaction carried out potentiometrically. Explain with suitable example. **(8)**

(ii) How does a fuel cell differ from a battery? Explain its functioning with neat diagram **(8)**

10. (a) (i) Discuss the influence of temperature on reaction rate. How activation energy of a chemical reaction is determined. **(8)**

(ii) The rate constant of a second order reaction is 5.7×10^{-5} $dm^3 mol^{-1} s^{-1}$ at 25^0C and 1.64×10^{-4} $dm^3 mol^{-1} s^{-1}$ at 40^0C. Calculate the activation energy and frequency factor. **(8)**

(OR)

(b) (i) Derive an expression for the rate constant of second order reaction where the two reactants are different. **(8)**

(ii) Discuss the activated complex theory(ACT) of bimolecular reactions and show that for reactions involving simple molecules, the collision theory and ACT gives identical results. **(8)**

11. (a) (i) How would you explain very high and very low quantum yield of photochemical reaction? Give examples. **(8)**

(ii) Discuss briefly the experimental measurements of quantum yield of a photochemical reaction. **(8)**

(OR)

(b) (i) Explain the mechanism of photosensitization with energy level diagram. **(8)**

(ii) Describe the mechanism of the photochemical reaction between $H_2 - Br_2$ with the kinetic expression and give justification for the low quantum yield. **(8)**

12. (a) (i) Write short notes on the electrical and mechanical properties of colloids. **(8)**

(ii) What is coagulation? Explain the various methods of coagulating a colloid. **(8)**

(OR)

(b) (i) How is distribution law modified if the solute undergoes association and dissociation? **(8)**

(ii) What is solvent extraction? Show that how the extraction of solute can be made more efficient. **(8)**