C. U. SHAH SCIENCE COLLEGE

SEMESTER - VI

C-309 (Physical chemistry) Date: 20/03/2017

Time- 12.15 to 2.00 pm Marks- 50

Q (1) (A) Answer any one of the following. (8)

(1) Derive Thermodynamically the following equation

$$Kb = \frac{RT_0^2}{1000 \times lv}$$

(2) Write Third law of thermodynamics? How absolute entropy can be calculated using third law of thermodynamics?

(B) Calculate any one example. (5)

(1) In 1000 gm water 50gm containing solution of Trioxane freezes at -1.02^{0}C The freezing point of pure water is 0.0^{0}C and its latent heat of fusion is 80 cal/mole. If the empirical formula of trioxane is CH_2O,what is its molecular formula? [C=12.009, H=1.008,O=16.00]

(2) Calculate free energy of a reaction A+B→C at 27^{0}C

[Enthalpy change=5.0 kcal/mole, Entropy change=2.0cal/mole]

Q (2) (A) Answer any one of the following. (8)

(1) Derive an equation for calculating potential of cell with transference.

(2) Write note on Decomposition voltage.

(B) Calculate any one example. (4)

(1) Calculate potential of a following cell at 25^{0}C.

$Pt/H_{2\,(g)}$ 1atm/H^+ ion containing solution/ $H_{2(g)}$ 10atm./Pt

(2) Calculate potential of a following cell at 25^{0}C.

$Pt/H_{2(g)}$ 1atm/ N/10 Hcl (aq) /Agcl/Ag/Agcl/ N/100 Hcl / $H_{2(g)}$1atm /Pt

[t_+=0.67]

Q (3) (A) Answer any one of the following. (8)

(1) Define osmosis. Write note on reverse osmosis

(2) Explain condensed phase rule. Discuss Zn-Cd system according to phase rule.

(B) Calculate any one example. (5)

(1) At 60^{0}C the vapour pressure of ethanol is 352.7mm and that of methanol is 625.0 mm A mixture of the two which may be considered as ideal, contains 50% by weight of each constituent. what will be the composition of the vapour above the solution at 60^{0}C?

(2) Electrolysis of molten NaCl carried out by passing15 amp current for 4.0 min. How much amount of Cl_2 gas obtained? [Cl=35.5gm/mole]

Q (4) Answer any two of the following. (12)

(1) what is quantum yield? What are the reasons for low and high quantum yield?

(2) write note on photosensitized reaction

(3) write note on Flash photolysis. (4) Write note on chemiluminesence

(P.T.O.)

Q (5) Answer the question in short. (10)

(1) What is the value of entropy of perfectly crystalline solid at zero Kelvin temperature?

(2) Addition of solute increases or decreases the boiling point of solvent?

(3) What is Kf ?

(4) What is ω^0 ?

(5) What is the value of potential for concentration cell?

(6) What is the value of $t_+ + t_-$

(7) What is the unit of osmotic pressure?

(8) 1520 mm = ? atm

(9) Give one example of photochemical reaction.

(10) What is one Einstein?