

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name: Physical Chemistry - II

Subject Code: 4SC06CHC3

Branch: B.Sc.(Chemistry)

Semester: 6

Date: 19/04/2017

Time: 02:30 To 05:30

Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
 - (2) Instructions written on main answer book are strictly to be obeyed.
 - (3) Draw neat diagrams and figures (if necessary) at right places.
 - (4) Assume suitable data if needed.
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- Q-1 Attempt the following questions: (14)**
- Write Nernst heat theorem. (1)
 - Write any one statement of third law of thermodynamics. (1)
 - Define reversible reactions. (1)
 - Define law of mass action. (1)
 - Define order of reaction. (1)
 - Give the unit of zero order reaction. (1)
 - Define isobars. (1)
 - What is mass defect? (1)
 - Define colligative properties. (1)
 - Define reverse osmosis. (1)
 - Define molal elevation constant. (1)
 - Define nuclear isomerism. (1)
 - What is reaction rate? (1)
 - Write the expression representing van't Hoff reaction isotherm. (1)

Attempt any four questions from Q-2 to Q-8

- Q-2 Attempt all questions (14)**
- Derive Boltzman's entropy equation. (4)
 - Determine absolute entropies of solid, liquid and gasses. (7)
 - Write a short note on residual entropy. (3)
- Q-3 Attempt all questions (14)**
- Discuss Le Chateliers Principle in detail. (7)
 - Derive van't Hoff's Equation. (7)
- Q-4 Attempt all questions (14)**
- Explain methods to determine the order of reaction. (7)
 - Derive rate equations for first and second order reaction with their units. (7)
- Q-5 Attempt all questions (14)**
- One mole of H_2 and one mole of I_2 were heated in a 1 litre sealed glass box at (5)



490°C till the equilibrium was reached. Assuming that the equilibrium constant is 45.9, find the final concentrations of H_2 , I_2 and HI .

The following data was obtained on hydrolysis of methyl acetate at 25°C in 0.35N hydrochloric acid. Establish that it is a first order reaction. (5)

b.

t (secs)	0	4500	7140	∞
ml alkali used	24.36	29.32	31.72	47.15

c. The equilibrium constant K_p for a reaction is 10^{-12} at 327°C and 10^{-7} at 427°C. Calculate the enthalpy of the reaction. ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$) (4)

Q-6

Attempt all questions (14)

a. Explain the properties of radiation. (7)

b. Explain types of radioactive decay. (3)

c. Give the difference between Nuclear fission and Nuclear fusion. (4)

Q-7

Attempt all questions (14)

a. Discuss different methods to determine lowering in vapor pressure. (7)

b. Explain the determination of molecular weight from Depression of Freezing point. (4)

c. Explain Molecular sieve and vapor pressure theories of osmosis. (3)

Q-8

Attempt all questions (14)

a. For a certain first order reaction $t_{1/2}$ is 100 sec. How long will it take for the reaction to be completed 75%? (5)

b. Calculate the half-life of radium-226 if 1 g of it emits 3.7×10^{10} alpha particles per second. (4)

c. 18.2 g of organic compound is dissolved in 100 g of water at 50°C. The lowering of vapour pressure produced is 5 mm Hg. Calculate the molecular mass of organic compound. The vapour pressure of water at 50°C is 92 mm Hg. (5)

