

# 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<sub>2</sub>, I<sub>2</sub> 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<sub>p</sub> for a reaction is 10<sup>-12</sup> at 327°C and 10<sup>-7</sup> at 427°C. Calculate the enthalpy of the reaction. (R = 8.314 J K<sup>-1</sup> mol<sup>-1</sup>) (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<sub>1/2</sub> 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<sup>10</sup> 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)

