

C.U.SHAH UNIVERSITY

Winter Examination-2015

Subject Name : Physical Chemistry

Subject Code :5SC01PCC3

Branch : M. Sc (Chemistry)

Semester :1 Date :04/12/2015 Time :10:30 To 1:30 Marks :70

Instructions:

- (1) Use of Programmable calculator and 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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SECTION – I

- Q-1 Attempt the Following questions (07)**
- a. Define Microstates (01)
 - b. Write the expression of molar heat capacity of an ideal gas at constant volume in term of partition function. (01)
 - c. Define Fugacity (01)
 - d. What is debye length? (01)
 - e. What is canonical ensemble? (01)
 - f. Define activity (01)
 - g. Define Dilute solution (01)
- Q-2 Attempt all questions (14)**
- a) Derive Lewis Randall rule (05)
 - b) Derive an equation for determination of mean ionic activity coefficient (05)
 - c) Derive expression of rotational partition function. (04)
- OR**
- Q-2 Attempt all questions (14)**
- a) Discuss equation of state method to determine fugacity (05)
 - b) Derive the relation between Debye-Huckel theory and osmotic coefficient. (05)
 - c) Derive Sakur-Tetrode equation. (04)
- Q-3 Attempt all questions (14)**
- a) Discuss Boltzmann distribution law in detail (10)
 - b) Calculate the vibrational contribution to the entropy of iodine at 25°C. ($\omega=214.6 \text{ cm}^{-1}$, $h=6.62 \times 10^{-27}$, $C=3 \times 10^{10}$, $k=1.38 \times 10^{-16}$, $R=8.314$) (04)

OR

- Q-3 a) Explain Bose Einstein statistics in detail (10)
b) Calculate the standard entropy of zinc at 25°C (Atomic weight =65.38) (04)

SECTION – II

Q-4 **Attempt the Following questions** (07)

- a. Define non Ideal Solution (01)
b. Give two examples of ideal solutions (01)
c. What is Raoults law? (01)
d. Define cell (01)
e. What is standard electrode potential? (01)
f. Define chemical equilibrium (01)
g. Write the statement of law of mass action. (01)

Q-5 **Attempt all questions** (14)

- a) Derive Duhem-Margules Equation (05)
b) Derive relation for freezing point of Dilute Solution (05)
c) The melting point of naphthalene is 80.2°C and its molar heat of fusion of this temperature is 4540 cal. mole⁻¹. Determine its ideal solubility at 20°C. (R=8.314) (04)

OR

Q-5 **Attempt all questions**

- a) Derive General Equation for liquid mixtures (05)
b) Discuss Vapour pressure curves for ideal solutions (05)
c) 10 gram of a substance of molecular weight 186, when dissolved in 100 gms of water lowered the freezing point of latter by 1.0 °C. Calculate the molal freezing point constant of water. (04)

Q-6 **Attempt all questions** (14)

- a) Discuss the construction and working of Galvanic cell. (05)
b) Derive the relation for equilibrium constant for homogenous reactions in dilute solution. (05)
c) Calculate the single Electrode potential of zinc half cell from its standard potential. (04)

OR

Q-6 **Attempt all Questions**

- a) Discuss the characteristic of Electrochemical series (05)
b) Determine the dissociation constant of water. (05)
c) Explain reaction isotherm in chemical reations. (04)

