

Roll No.

Total Pages : 3

337202

May, 2019

**B.Sc. (CHEMISTRY), II SEMESTER
PHYSICAL CHEMISTRY-II (BCH-202)**

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *Log tables and non-programmable calculators are allowed.*

PART-A

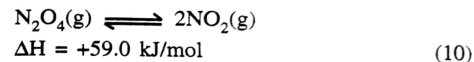
1. (a) What are colligative properties? Explain. (1.5)
(b) Write the criteria for a system to be in thermodynamic equilibrium. (1.5)
(c) Define partial molar quantities. (1.5)
(d) Explain inversion temperature. (1.5)
(e) Define enthalpy of formation. (1.5)

- (f) Differentiate between intensive and extensive properties with examples. (1.5)
- (g) What are path functions? Explain with example. (1.5)
- (h) State the second law of thermodynamics. (1.5)
- (i) Explain Henry's law with one application. (1.5)
- (j) What is Van't Hoff factor? What does it signifies if its value is less than 1. (1.5)

PART-B

2. (a) Explain Joule-Thomson effect in detail. Derive an expression for the Joule-Thomson coefficient and give its significance. (10)
- (b) Derive an expression for the work done by an ideal gas in reversible isothermal expansion. (5)
3. (a) Derive the Kirchhoff's equation and give its physical significance. (5)
- (b) Explain in detail chemical potential? Derive Gibbs-Duhem equation. (10)
4. (a) Derive the Gibbs-Helmholtz equation. (5)
- (b) Give the thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. (10)

5. (a) Differentiate between reaction quotient and equilibrium constant of a reaction and derive a relation between K_p , K_c and K_x . (5)
- (b) Explain in detail the Le Chatelier's Principle. Write the favorable conditions for the following reaction to proceed in forward direction :



6. (a) What is osmotic pressure? Derive an expression for the molar mass of the non-volatile solute dissolved from osmotic pressure measurements. (5)
- (b) 1.20 g of a non volatile solute was dissolved in 100 g of acetone at 20°C. The vapour pressure of the solution was found to be 182.5 torr. Calculate the molar mass of the substance (vapour pressure of acetone at 20°C is 185.0 torr). (5)
- (c) Explain Raoult's Law. What are positively and negatively deviating solutions from ideal behavior. (5)
7. Define heat capacity of substances and derive a relation between the two types of heat capacities of ideal gases. The heat capacity at constant volume of an ideal gas is found 12.47 J K⁻¹. Calculate the heat capacity at constant pressure for the gas. (15)