322202

May 2023
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. *Use of Non-programmable Scientific calculator is allowed.*

PART-A

1. (a) What do you mean by state and path functions? (1.5)

   (b) Explain intensive and extensive variables with suitable examples. (1.5)

   (c) What do you mean by Colligative Properties? Name a few of them. (1.5)

   (d) State and explain Le Chatelier Principle in brief. (1.5)

   (e) Discuss criteria of thermodynamic equilibrium. (1.5)

(f) Write relationships between (P, V), (T, P) and (T, V) for an adiabatic process. (1.5)

(g) Write mathematical expression for Gibbs Duhem equation. (1.5)

(h) What do you mean by reversible and irreversible processes in thermodynamics? (1.5)

(i) Write relation between Gibbs free energy of reaction and reaction quotient. (1.5)

(j) Define entropy and discuss its mathematical expression also. (1.5)

PART-B

2. (a) Discuss the effect of temperature (Kirchhoffs equations) on enthalpy of reactions. (10)

(b) Discuss calculation of entropy change for reversible and irreversible processes. (5)

3. (a) State and explain various statements of first law of thermodynamics, its mathematical expression and limitations. (5)

(b) Write short notes on : (10)
   (i) Relative lowering of vapour pressure.
   (ii) Elevation of boiling point.
   (iii) Depression of freezing point.
   (iv) Osmotic pressure.

4. Discuss free energy functions: Gibbs and Helmholtz energy; and discuss variation of G and A with T, P and V. (15)

5. (a) Discuss Raoult's and Henry's Laws and their applications. (5)

(b) Discus Joule-Thomson experiment, Joule-Thomson coefficient, inversion temperature in detail. (10)

6. (a) What do you mean by Partial molar quantities? (10)

(b) Derive Gibbs-Helmholtz equation. (5)

7. Discuss thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Discuss quantitative dependence of equilibrium constants on temperature, pressure and concentration. (15)

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