B.Sc. II (CBCS Pattern) Sem-III

USCCHT06 - Chemistry Paper-II : Physical Chemistry

P. Pages : 2 **GUG/W/22/11601**

Time : Three Hours * 3 7 5 1 * Max. Marks : 50

Notes : 1. All **five** questions are compulsory and carry equal marks.
2. Draw Diagram whenever necessary.
3. Use of calculator is permitted.

1. a) Draw the phase diagram for sulphur systems. Discuss the application of the phase rule to this system. **5**

b) State and explain Nernst Distribution law. Discuss its application and Limitations. **5**

OR

c) Discuss minimum boiling azeotropes $HCl - H_2O$ system. **2½**

d) Write a note on steam distillation. **2½**

e) State phase phase rule and explain the term involved in it. **2½**

f) State and explain Raoult's law of ideal solution. **2½**

2. a) Drive an expression for entropy change for an ideal gas under isothermal process. **5**

b) Derive an integrated form of Van't Hoff reaction isochore. **5**

OR

c) Derive Gibbs Helmholtz equation. **2½**

d) State and explain chemical potential. **2½**

e) Derive the relation between standard free energy change and equilibrium constant. **2½**

f) What are the needs for second law of thermodynamics? **2½**

3. a) What is second order reaction? Derive an expression for specific rate constant of second order reaction is initial concentration of both reactants are different. **5**

b) Explain homogeneous and heterogeneous catalysis with example state the characteristic properties of catalyst. **5**

OR

c) Discuss effect of pressure and concentration on the rate of reaction. **2½**

d) The rate constant of reaction is $1.5\times10^{-4}\,\text{sec}^{-1}$ at 28°C and $2.5\times10^{-4}\,\text{sec}^{-1}$ at 38°C. Calculate energy of activation of reaction $\left(R = 8.314\,\text{Jk}^{-1}\text{mol}^{-1}\right)$. **2½**

e) State the postulate collision theory of biomolecular reactions. **2½**

f) Write a note on enzyme catalysis. **2½**

4. a) Define depression of freezing point? Explain how molecular mass is determine from depression of freezing point. **5**

b) Discuss determination of magnetic susceptibility by using Gouy method. **5**

OR

c) State Raoult's Law of lowering of vapour pressure, How can it be used to determine the molecular weight of non-volatile solute in solution. **2½**

d) What is osmotic pressure? How is it measured experimentally by Berkeley and Hartley's Method. **2½**

e) Define degree of association and obtain the relation between degree of association and Van't Hoff factor. **2½**

f) Explain diamagnetism and paramagnetism with suitable examples. **2½**

5. Attempt **any ten** (each carry one mark) **1x10 =10**

i) State Henry's law and give any one limitation.

ii) Define lower consolute temperature.

iii) Write Clausius – Clapeyron equation in its integrated form.

iv) Define standard free energy.

v) Define entropy of fusion.

vi) Define partial molar quantity.

vii) What is zero order reaction?

viii) Define
a) Molecularity of reaction. b) Half life of reaction.

ix) Define autocatalysis.

x) Define Elevation of boiling point.

xi) What is Van't Hoff factor?

xii) Define Ferromagnetism?

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