

K-383

Total Pages : 4

Roll No.

MSCCH-503

Physical Chemistry-I

M.Sc. Chemistry (MSCCH)

1st Semester Examination, 2023 (Dec.)

Time : 2 Hours]

Max. Marks : 70

Note : This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein. Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

SECTION–A

(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. (a) What do you mean by partial molar quantities? Define chemical potential. How chemical potential vary with temperature and pressure?
(b) What is transition state theory of reaction rate? Derive an expression for the thermodynamic formulation of reaction rate.
2. (a) Describe primary and secondary salt effects.
(b) Discuss in detail Michaelis-Menten mechanism of enzyme reactions.
3. (a) What are the various methods to study the kinetics of fast reactions?
(b) Write notes on the following :
 - (i) Catalytic activity at surfaces.
 - (ii) Ionic strength.
4. (a) Explain Debye-Hückel theory of strong electrolytes with derivation.
(b) Discuss about activity and activity coefficient of strong electrolytes.
5. Explain the following :
 - (a) Collision theory of reaction rate.
 - (b) Over voltage.
 - (c) BET equation.

SECTION-B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. Describe various laws of thermodynamics.
2. Discuss Bose-Einstein and Fermi-Dirac statistics in detail.
3. Explain Lindemann mechanism of unimolecular reactions.
4. Write notes on the following :
 - (a) Partition functions.
 - (b) Stirling's approximation.
5. Describe the kinetics of pyrolysis of acetaldehyde.
6. What is ionic atmosphere? Write note on thickness of ionic atmosphere.
7. Explain the concept of fugacity along with its significance.

8. (a) Two moles of an ideal gas are allowed to expand isothermally and reversibly at 300 K from a pressure of 1 atm to a pressure of 0.1 atm. Calculate the change in Gibbs free energy.
- (b) Calculate the ionic strength of 0.01 molal solution of NaCl.
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