



DE-1294

M. Sc. (Sem. I) (Reg. & Eve. & S.F.) Examination

March / April - 2016

Chemistry : Paper - III

(Physical Chemistry)

Time : 3 Hours]

[Total Marks : 70

Instructions :

(1)

| | |
|--|---|
| नीचे दशांश के निशानीवाणी विगतो उत्तरवही पर अवश्य लिखनी. Fillup strictly the details of signs on your answer book. | Seat No. : |
| Name of the Examination : | <input type="text"/> |
| <input type="text" value="M. SC. (SEM. I) (REG. & EVE. & S.F.)"/> | <input type="text"/> |
| Name of the Subject : | <input type="text"/> |
| <input type="text" value="CHEMISTRY : PAPER - 3"/> | <input type="text"/> |
| Subject Code No. : <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="9"/> <input type="text" value="4"/> | Section No. (1, 2,.....) : <input type="text" value="Nil"/> |
| Student's Signature | |

- (2) Answer all questions.
(3) Figures to the right indicate full marks of the questions.
(4) Answer of all questions to be written in same answer books.

1. Attempt any three questions.

18

- (a) Name two initiators each for free radical, anionic and cationic chain polymerization. Describe mechanism of anionic polymerization.
(b) Describe the molecular weight determination of polymers by viscometry.
(c) Define and explain briefly average mol. weights of polymers. Calculate \bar{M}_w for a polymer sample containing equal number of particles with molecular weight $M_1 = 20,000 \text{ gm. mol}^{-1}$ and $M_2 = 30,000 \text{ gm. mol}^{-1}$.
(d) Write note on stereochemistry of polymers.

2. Attempt any three questions.

18

- (a) Explain the kinetics and mechanism for parallel reaction giving illustration.
(b) Describe kinetics of enzyme catalyzed reaction.
(c) For the consecutive reaction $X \xrightarrow{K_1} Y \xrightarrow{K_2} Z$. Determine the concentration of Y at 17 sec., 20 sec. and 23 sec. with $K_1 = 0.1 \text{ sec}^{-1}$ and $K_2 = 0.2 \text{ sec}^{-1}$ and the initial concentration $[X]_0 = 0.006 \text{ M}$.
(d) Discuss mechanism of photochemical reactions using a suitable example.

3. Attempt any three questions.

18

- (a) Write note on Boltzmann Distribution Law.
 (b) Calculate the translation partition function for one mole of nitrogen at 2 atm. pressure at 27 °C, assuming the gas to behave ideally. The following data are given. Atomic weight of $N_2 = 14.0028$; $K = 1.38 \times 10^{-16}$ erg/deg./molecule; $h = 6.624 \times 10^{-27}$ erg.sec.; $R=82.06$ c.c.atm/deg./mole; $T=300K$.
 (c) Calculate the rotational partition function of H_2 gas at 300K. Given that $K = 1.38 \times 10^{-16}$ erg.deg.⁻¹; $h = 6.624 \times 10^{-27}$ erg.sec.; $I_{H_2} = 0.459 \times 10^{-40}$ g.cm² and $\sigma = 2$.
 (d) Derive relationship between chemical equilibrium constant and partition function.

4. Attempt any four questions.

16

- (a) Discuss excess property. Describe excess volume, excess enthalpy and excess free energy for any binary mixture.
 (b) Discuss physical significance of partial molar properties.
 (c) The following data were obtained on the osmotic pressure of solution of polyisobutylene in 0.20 M NaCl at 27 °C.

| | | | | |
|--------------------------|-------|-------|-------|-------|
| $C. gm dl^{-3}$ | 1.0 | 2.0 | 3.0 | 4.0 |
| $\pi \times 10^{-4} atm$ | 0.632 | 1.982 | 3.250 | 3.237 |

Plot π/C versus C gives a straight line. From the graph value of intercept $(\pi/C)_{C \rightarrow 0}$ is $0.574 \times 10^{-4} atm dm^3/gm$. Calculate molecular weight of polyisobutylene.

$$(R = 0.082 dm^3 atm. mol^{-1} deg^{-1})$$

- (d) Write a note on thermal transitions in polymers.
 (e)
$$A \xrightleftharpoons[K_r]{K_f} B$$
 For the given reaction Calculate K_f and K_r after 60 second.
 Given that $[A]_0 = 0.50M$, $[A]_e = 0.21M$ and $[A]_{60} = 0.285 M$.
 (f) What are complex reaction? Classify complex reactions with illustrations.