91034

B.Sc. 1st Semester (Hons) Examination,

November–2014

CHEMISTRY

Paper–II

Physical Chemistry

Time allowed : 3 hours] *[Maximum marks : 40*

Note : *Attempt **five** questions in all, **Question 1 is compulsory.** Select **one** question from each section.*

1. (a) What is the effect of temperature on most probable speed ? 1×8=8

(b) Define Crystal Habit.

(c) Under what condition, the non-ideal gas behaves like ideal gas ?

(d) Define Mean free path.

(e) What is the formula of kinetic energy of one molecule of ideal gas ?

(f) Write BET equation.

(g) In which adsorption, unimolecular layer formation takes place ?

(h) Define Inversion temperature.

Section–I

2. (a) To-derive $\left[\pi + \frac{3}{\phi^2}\right](3\phi - 1) = 8\theta$ from van der Waal equation. 4,4

(b) To derive $T_c = \frac{8a}{27Rb}$ from van der Waal equation.

3. (a) Give four differences in between ideal gas and real gas. 2,2,2,2

(b) The reduced volume, reduced temperature of a gas are 10.2 and 0.7. What will be its pressure if its critical pressure is 42 atm ?

(c) Derive van der-Waal equation.

(d) Write a short note on liquification of gases.

Section–II

4. (a) Calculate the root mean square velocity, average velocity and most probable velocity of carbon dioxide molecules at 373°C.

(b) Define : Occulsion, most probable speed.

(c) Calculate the temperature at which the hydrogen molecules will have average speed of 1764 m/s.

5. (a) Write two differences between positive and negative adsorption. 2,3,3

(b) Define : Collision number, collision diameter, Coefficient of viscosity.

(c) Explain the effect of increase of temperature on physical and chemical adsorption.

Section–III

6. (a) Give differences between crystalline and amorphous solids. 2,4,2

(b) To prove that $v = -\frac{d[S]}{dt} = -k_2 \frac{[E_0][S]}{k_m + [S]}$ in enzyme-catalysed reaction.

(c) Explain the lock-key mechanism of enzyme action.

7. (a) A face makes intercepts '3a' and '2c' on the X-axes and Z-axes respectively and does not cut the Y-axis at all. What are the Miller indices of the face. 3,2,3

(b) Define : Centre of symmetry, crystal habit.

(c) The reflection from silver crystal was found to occur at $\theta = 22.20°$ using X-rays of wavelength 154.1pm. Calculate the spacing between the planes of silver atoms that gave rise to the above reflection. (sin 22.20° = 0.3778).

Section–IV

8. (a) Explain Liquid crystals. Give applications of them. 4,4

(b) Define: Rheochor, Parachor, Specific viscocity.

9. (a) Calculate the surface tension of benzene. Given : Density of benzene at 20°C is 0.878g/ml. The parachor of C,H, double bond are 4.8, 17.1,23.2 respectively. 3,3,2

(b) Calculate the parachor for hexane. Given : Parachor of ethane, propane are 110.5 and 150.8 respectively.

(c) Find parachor values of H in decane($C_{10}H_{22}$). Given : $[P]_{CH_2} = 39.0$; $[P]_{C_{10}H_{22}} = 424.2$.