

B.Sc. (Part-I) Sem-II (Old)
2SChe-T2 - Chemistry Paper-II (Physical Chemistry)

P. Pages : 2

Time : Three Hours



GUG/S/19/1233

Max. Marks : 50

- Notes :
- All **five** questions are compulsory and carry equal marks.
 - Write chemical reaction and draw diagram wherever necessary.

1. a) Using the log table calculate the value of 5
$$\left(\frac{0.085 \times 0.45}{50.12} \right)^{1/2}$$

b) Describe nuclear liquid drop model. What are the advantages of nuclear liquid drop model? 5

OR

c) Calculate slope of line passing through two points (4, 9) & (3, 2) and write its equation of line. 2½

d) Evaluate $\int \frac{x^4 + x^3 + 4}{x} dx$. 2½

e) Write a short notes on nuclear fusion reaction. 2½

f) Write applications of radioisotopes. 2½

2. a) Derive Kinetic gas equation for an ideal gas. 5

b) Describe critical phenomenon in the light of Andrew's experiment on CO₂ gas. 5

OR

c) Derive Graham's law of diffusion from Kinetic gas equation. 2½

d) Calculate root mean square velocity of SO₂ gas at 25°C (R = 8.314 Jk⁻¹ mol⁻¹). 2½

e) Show that $\frac{8P_c V_c}{3T_c} = R$ 2½

f) Define compressibility factor. How does it deviate with temperature in a real gas. 2½

3. a) What are intermolecular forces? Discuss the following intermolecular forces in liquid. 5
i) Dipole – Dipole interaction.
ii) Dipole – induced dipole interaction.

b) Define coefficient of viscosity. Explain the experimental determination of viscosity of given liquid by flow time method. 5

OR

- c) Write a short note on Nematic liquid crystal. 2½
- d) Explain Eyring vacancy model of liquid. 2½
- e) What is refractive index? Define specific and molar refraction. 2½
- f) In the determination of surface tension of a liquid by drop number method. It gives 60 drops while water 30 drops for the same volume. The densities of the liquid and water are 0.880 and 0.996 gm/cm³. respectively find the surface tension of the liquid? Surface tension of water is 72.0 dyne/cm. 2½
4. a) What is order of a reaction? Derive integrated rate equation for second order reaction when initial concentration of both the reactant species are same. 5
- b) What are the postulates of transition state theory? Derive the expression for rate constant based on equilibrium constant. 5

OR

- c) Explain Homogeneous and heterogeneous catalysis give one example of each. 2½
- d) Explain Ostwald isolation method for determination of order of reaction. 2½
- e) What is catalysis? Give characteristics of catalysis. 2½
- f) The rate constant of a reaction is $1.2 \times 10^{-3} \text{ sec}^{-1}$ at 30°C and $2.1 \times 10^{-3} \text{ sec}^{-1}$ at 40°C. Calculate energy of activation of the reaction ($R = 8.314 \text{ Jk}^{-1} \text{ mol}^{-1}$) 2½
5. Attempt **any ten**. 10
- i) Evaluate $\frac{5! \times 3!}{2!}$
- ii) Evaluate $\int x^4 dx$
- iii) Define mass defect.
- iv) State Avagadro's law.
- v) Define most probable velocity.
- vi) Calculate critical pressure of a gas if its Van der Waal's constants are $a = 0.740 \text{ dm}^6 \text{ bar} / \text{m} \text{ mol}^{-2}$ and $b = 0.0213 \text{ dm}^3/\text{mole}$
- vii) What is thermography?
- viii) Write any two application of liquid crystals.
- ix) What is Parachor?
- x) What is Pseudo-unimolecular reaction?
- xi) What is steric factor?
- xii) Define autocatalysis.
