

B.Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2024**SEMESTER 6 - CHEMISTRY****COURSE : 19U6CRCHE11 - PHYSICAL CHEMISTRY – III***(For Regular 2021 Admission and Supplementary 2020/2019 Admissions)*

Time : Three Hours

Max. Marks: 60

PART A**Answer All (1 mark each)**

1. The concept Parachor correlates surface tension of a species with _____.
2. Define mean free path.
3. Give an example for chemisorption.
4. What is the total number of degrees of freedom for ammonia molecule?
5. Give the point group of NH₃.
6. What is the total number of atoms in Simple Cubic crystal structure?
7. Give the symmetry elements of D_{3h} point group.
8. NaCl belongs to -----type structure?

(1 x 8 = 8)**PART B****Answer any 6 (2 marks each)**

9. Write the BET equation. Give its significance.
10. What is a centre of symmetry? Using examples explain.
11. How will viscosity vary with temperature?
12. What is a unit cell? Illustrate schematically.
13. Deduce Boyle's law from kinetic gas equation.
14. Describe the significances of van der Waal's constants 'a' and 'b'.
15. Why is all adsorptions exothermic in nature?
16. What are crystal planes?

(2 x 6 = 12)**PART C****Answer any 4 (5 marks each)**

17. Explain experimental determination of viscosity coefficient of liquids.
18. Schematically represent (2 0 0), (2 1 0), (2 1 1) and (2 2 2) planes.
19. Calculate the collision number, collision frequency and the mean free path of oxygen at 298 K and 1 bar. Given collision diameter of oxygen = 357 pm.
20. Draw the crystal planes with x,y,z intercepts at a) (2a, a, 2a) and b) (0, a, a). Calculate the miller indices of both.
21. Calculate the RMS, average and most probable velocities of sulphur dioxide at 400 K.
22. Schematically represent the various symmetry elements present in benzene. Which is the point group of benzene?

(5 x 4 = 20)

PART D

Answer any 2 (10 marks each)

23. a) Write a short note on surface tension and explain its variation with temperature.
b) Give some effects of surface tension in daily life.
c) Explain why surface tension of water (73 dynes/cm) is higher than that of ethyl alcohol (22 dynes/cm) at 30 °C.
24. Represent schematically the unit cells of all the fourteen Bravais lattices.
25. a) Discuss Freundlich adsorption isotherm of a gas on a solid surface.
b) How are the constants in this isotherm equation determined?
c) How will you prove that Langmuir adsorption isotherm is superior to Freundlich adsorption isotherm?
26. Give a brief account of Maxwell's distribution of molecular velocities.

(10 x 2 = 20)