



K25U 2319

Reg. No. :

Name :

V Semester B.Sc. Degree (C.B.C.S.S. – O.B.E.-Regular/Supplementary/
Improvement) Examination, November 2025
(2019 to 2023 Admissions)
CORE COURSE IN CHEMISTRY/POLYMER CHEMISTRY
5B09CHE/PCH : Physical Chemistry – 1

Time : 3 Hours

Max. Marks : 40

SECTION – A

Answer **all** questions. **Each** question carries **1** mark.

1. Write the equation for RMS velocity of a gas.
2. What happens to the surface tension of a liquid when temperature increases ?
3. How is Van't Hoff factor calculated ?
4. Define an ideal solution. (4×1=4)

SECTION – B

Answer **any 7** questions. **Each** question carries **2** marks.

5. Calculate most probable velocity of H_2 gas at $27^\circ C$.
6. An element crystallizes in simple cubic unit cell. Its edge length is $3.36 \text{ \AA}$. Calculate density of its unit cell (Molar mass 23 g mol^{-1}).
7. Calculate number of particles in simple cubic, BCC and FCC unit cells.
8. Define the term critical solution temperature.
9. What is meant by elevation in boiling point ? How is it calculated ?
10. Explain the term coordination number of the crystal. What is the value of coordination number in BCC unit cell ?
11. State and explain vacancy theory of liquids.
12. What is meant by surface tension of a liquid ? Explain.

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13. Explain Raoult's law.
14. Define collision number and collision frequency of gases. (7×2=14)

SECTION – C

Answer **any 4** questions. **Each** question carries **3** marks.

15. State degree of freedom of gas molecules. Calculate vibrational degree of freedom of H_2O molecules.
16. Define viscosity of liquids. Derive the expression for coefficient of viscosity.
17. Explain packing efficiency of solids. What is the packing efficiency value of simple cubic unit cell ?
18. What is meant by radius ratio rule of solids ? Illustrate with examples.
19. The boiling point of a solvent is $353 K$. When $1.8 g$ of non-volatile solute is added to $90 g$ of the solvent the boiling point is raised to $354 K$? Calculate the molar mass of the solute. (K_b of the solvent is $2.5 K K g mol^{-1}$).
20. Explain Schottky defect. (4×3=12)

SECTION – D

Answer **any 2** questions. **Each** question carries **5** marks.

21. i) Define colligative properties of solutions. What are the different types of colligative properties ?
ii) Derive the relation of Van't Hoff factor and degree of association of solute molecules.
22. i) Explain the determination of osmotic pressure by Berkeley and Hartley method.
ii) Define Henry's law. The Henry's law constant of CO_2 in water at $298 K$ is 1.67 K bar . Calculate mole fraction of CO_2 at $298 K$ when the pressure CO_2 is one bar.
23. i) What are liquid crystals ? Write any two applications of liquid crystals.
ii) Discuss crystal structure of $NaCl$.
24. i) What are real gases ? Write virial equation of state.
ii) Explain the working of Abbe's refractometer. (2×5=10)