

24U217

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Name :

Reg. No :

SECOND SEMESTER UG DEGREE EXAMINATION, APRIL 2025

(FYUGP)

CC24UCHE2MN102 - LIQUID STATE, GASEOUS STATE AND ELECTROCHEMISTRY

(Chemistry - Minor Course)

(2024 Admission - Regular)

Time: 2.0 Hours

Maximum: 70 Marks

Credit: 4

Part A (Short answer questions)

Answer *all* questions. Each question carries 3 marks.

1. Construct the vapour pressure-composition curve for a binary solution of components A and B showing negative deviation from Raoult's law. [Level:4] [CO1]
2. Examine one feature in which nematic liquid crystals differ from smectic liquid crystals. [Level:4] [CO1]
3. Analyze the pressure effect the solubility of a gas in a given liquid? [Level:4] [CO1]
4. Compare the term osmosis and semipermeable membrane. [Level:4] [CO1]
5. A sample of gas occupies 5 L at 27°C and 1 atm. The gas is cooled at constant pressure to -23°C. What is the final volume of the gas? [Level:3] [CO2]
6. Compare the terms mean free path and collision diameter. How are they related? [Level:4] [CO2]
7. Distinguish between coefficient of viscosity and mean free path of a gas [Level:4] [CO2]
8. Explain critical pressure of gas. [Level:2] [CO3]
9. Explain critical compressibility factor. [Level:2] [CO3]
10. Explain specific conductance. How is it related to the conductivity of an electrolyte solution? [Level:2] [CO4]

(Ceiling: 24 Marks)

Part B (Paragraph questions/Problem)

Answer *all* questions. Each question carries 6 marks.

11. Analyze the variation of viscosity of a liquid with temperature. [Level:4] [CO1]
12. Give the Maxwell's equation for the distribution of molecular velocities. Sketch the distribution curve for two different temperatures and explain the influence of temperatures on distribution [Level:4] [CO2]

13. (i) What is meant by the term viscosity of gases [Level:2] [CO2]
(ii) Explain how the viscosity of a gas depends on its temperature and pressure.
14. Express vander waal's equation in virial form for one mole of gas. [Level:2] [CO3]
15. Describe compressibility factor and its significance. [Level:2] [CO3]
16. Explain the buffer action of a mixture of acetic acid and sodium acetate. [Level:2] [CO4]
17. Explain how conductance measurements can be used to determine the solubility and solubility product (K_{sp}) of a sparingly soluble salt. [Level:2] [CO4]
18. Explain how the molar conductance of strong and weak electrolytes varies with dilution. Use a graph to support your answer. [Level:2] [CO4]

(Ceiling: 36 Marks)

Part C (Essay questions)

Answer any **one** question. The question carries 10 marks.

19. (a) Define: (i) Osmosis (ii) Osmotic pressure (iii) Semipermeable membrane. [Level:2] [CO1]
Explain how molecular mass of a solute is determined by osmotic pressure measurements.
- (b) 0.2 dm^3 of a solution containing 5g of a polymer is found to have an osmotic pressure of 11262 nm^{-2} at 298 K. Calculate the molar mass of the polymer.
20. (a) Describe the Standard Hydrogen Electrode (SHE) and the Calomel Electrode. [Level:2] [CO4]
- (b) Write the Nernst Equation for a single electrode potential. Explain how it is used to calculate the EMF of a galvanic cell under non-standard conditions.

(1 × 10 = 10 Marks)
