25U206S (Pages: 2) Name: .....

Reg.No: .....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2026

(CBCSS - UG)

CC19UCHE2C02 - PHYSICAL CHEMISTRY

(Chemistry - Complementary Course)

(2019 to 2023 Admissions - Supplementary)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

Answer ***all*** questions. Each question carries 2 marks.

1. Define entropy of sublimation. How is it related to enthalpy of sublimation?
2. State the Gibbs energy criterion for spontaneous process.
3. Define the term root mean square velocity of a gas.
4. What does the term crystal system mean?
5. Define the term vapour pressure of a liquid.
6. What are isotonic solutions?
7. What are colligative properties? Give two examples.
8. The molar conductivities of $Ba(OH)_2$, $BaCl_2$ and NH_4Cl at infinite dilution at 298K are respectively 228.8, 120.3 and 129.8 cm^2 mol^{-1}.calculate the molar conductivity of NH_4OH at infinite dilution at 298K.
9. Indicate the electrode and cell reactions in the cell: $Zn(s)|Zn^{2+}(aq)\|Cu^{2+}(aq)|Cu(s)$.
10. $\lambda m^o(Na+)$ and $\lambda m^o(Cl-)$ respectively represent the ion conductances of Na^+ and Cl^- ions. What is the expression for the limiting molar conductivity of sodium chloride[$\Lambda^o m(NaCl)$] ?
11. What is the Henderson's equation? Explain its significance.
12. What is meant by ionic product of water? How is it affected by a change of temperature?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer ***all*** questions. Each question carries 5 marks.

13. Discuss the limitations of the first law of thermodynamics.
14. 500 J of heat was supplied to a system at constant volume it resulted in the inrease of temperture of system from 293 K to 298 K. what is the change in internal energy of system.

15. Discuss how real gases deviate from Boyle's law.

16. Distinguish between the terms intrinsic defects and extrinsic defects.

17. Explain how reverse osmosis is applied in desalination of sea water.

18. What are the differences between electronic and electrolytic conduction?

19. Calculate the EMF of a Daniel cell at $25^{O}C$ when the concentrations of $ZnSO_4$ and $CuSO_4$ solutions are respectively 0.001 M and 0.1 M. Given: $E^{O}Zn^{2+}|Zn$ =-0.76 V; $E^{O}Cu^{2+}cu$ =+0.34V.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. (a) Define the term Gibbs energy.
    (b) Show that decrease in Gibbs free energy in a process is equal to the useful work done by the system.

21. Write down the van der Waals' equation for a real gas and explain the terms. Discuss the significance of the van der Waals' constants.

(1 × 10 = 10 Marks)

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