24U305S (Pages: 2) Name: .....

Reg.No: .....

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - UG)

CC19UCHE3B03 - PHYSICAL CHEMISTRY - 1

(Chemistry - Core Course)

(2019 to 2023 Admissions - Supplementary/Improvement)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

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

1. Define an ideal gas.
2. Give the relationships for a' and b' in terms of Pc and Tc.
3. Give the relationship between the internal energy change and enthalpy change in process.
4. What is the Joule-Thomson coefficient for an ideal gas ?
5. What is Carnot's theorem ?
6. How does the entropy of a gaseous substance change with (i) increase in temperature, and (ii) decrease of pressure ?
7. Define entropy of fusion.
8. Give two Maxwell relations.
9. Explain unattainability of zero kelvin in context of third law of thermodynamics
10. Explain the term reaction quotient and discuss its significance.
11. State Le Chatelier principle and predict the effect of a change of pressure on the equilibrium: H2(g) + I 2(g) ↔ 2HI(g)
12. What is the identity operation?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. Using (i) ideal gas equation and (ii) van der Waals' equation, calculate the pressure exerted by 2 moles of NH3, confined in a 5 L flask at 300 K. a = 4.17 atm L' mol 2: b= 0.037 L mol-.
14. Starting from the van der Waals' equation for 1 mole of gas, obtain it in virial form.
15. State and explain the Zeroth Law of thermodynamics.

16. Derive an expression for the work done in a reversible isothermal expansion of an ideal gas.

17. Explain the term partial molar quantities.

18. Define chemical equilibria. What are its important characteristics?

19. Give the group multiplication table for the point group C_2v.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. Discuss Andrews experiments on the isotherms of CO_2, and bring out the idea of continuity of states.

21. Obtain expressions for the entropy changes of an ideal gas in (a) an isothermal process: (b) an isobaric process, and (c) an isochoric process.

(1 × 10 = 10 Marks)

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