23U305 (Pages: 2) Name: .....

Reg.No: .....

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2024

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U CHE3 B03 - PHYSICAL CHEMISTRY - I

(Chemistry - Core Course)

(2019 Admission onwards)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

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

1. Calculate the average velocity velocity of CO molecules at S.T.P.
2. What is meant by Boyle temperature of a gas ?
3. What is meant by a state function ? Give an example:
4. What happens to the internal energy of a system if (a) work is done on the system and (b) work is done by the system ?
5. Give the relationship for (i) delta U and (ii) delta H for the adiabatic expansion of an ideal gas
6. Define inversion temperature. What relation does it have with the Joule-Thomson coefficient?
7. Mention the significance of the term entropy.
8. Mention two applications of Gibbs-Helmholtz equation.
9. Define the term activity.
10. Apply Le Chatelier principle to the equilibrium $N_2(g) + O_2,\{g) \leftrightarrow 2NO\ (g);$ = +180.7 kJ.
11. State Le Chatelier principle and explain with one example its utility to physical equilibria.
12. What does the term proper rotation mean ? Give an example.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. Explain the term continuity of state.
14. Calculate the critical temperature of n-hexane which has a boiling point of 341.9 K.
15. State and explain Carnot's theorem.
16. Derive an expression for the entropy of mixing in isothermal mixing of gases.
17. Discuss Nernst heat theorem.

18. Explain th terms heterogeneous equilibria and homogeneous equilibria with suitable examples.

19. Give the group multiplication table for the point group C_2h.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. Discuss the applicability of van der Waals' equation in explaining real gas behaviour under different conditions.

21. Describe the Carnot's cycle and derive an expression for the efficiency of a heat engine.

(1 × 10 = 10 Marks)

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