THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CBCSS - UG)

CC19U CHE3 B03 - PHYSICAL CHEMISTRY - I

(Chemistry - Core Course)

(2019 Admission - Regular)

Time : 2.00 Hours   Maximum : 60 Marks

                                                                              Credit : 3

Part A (Short answer questions)

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

1. Write expressions for the average translational kinetic energy (i) per mole and (ii) per molecule of an ideal gas.

2. Give expressions connecting collision diameter of a gas to (i) its collision number, and ii) its mean free path.

3. Explain the term reversible process.

4. Define enthalpy.

5. What is meant by Joule-Thomson coefficient ?

6. How is q related to w in a cyclic process ?

7. Give the thermodynamic expression relating G and H.

8. What is the relation between Gibb's free energy and equilibrium constant?

9. Distinguish between statistical probability and thermodynamic probability.

10. Define Kx . Derive its relationships with Kp and Kc.

11. State and explain Le Chatelier principle.

12. What is meant by non-commutative combination of symmetry operations?

                                                                    (Ceiling: 20 Marks)

Part B (Short essay questions)

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

13. Discuss Andrews' experiments on the isotherms of a real gas.

14. Write the van der Waals' reduced equation of state and explain the terms.

15. Explain the physical significance of the term entropy.

16. "Entropy of the universe is increasing." Account for this statement.

17. Derive the Gibbs-Duhem equation.

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

19. Explain the terms proper rotation and proper rotation axis with suitable examples .

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. Starting from the van der Waals' equation for 1 mole of gas, obtain it in virial form and deduce an expression for Boyle temperature.

21. Discuss Linde's process and Claude's process for the liquefaction of gases

(1 × 10 = 10 Marks)

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