25020359

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE / MERCY CHANCE EXAMINATIONS, FEBRUARY 2025

Sixth Semester

CORE COURSE - CH6CRT11 - PHYSICAL CHEMISTRY - III

Common for B.Sc Chemistry Model I, B.Sc Chemistry Model II Industrial Chemistry & B.Sc Chemistry Model III Petrochemicals

2017 Admission Onwards

ED10CA8B

Max. Marks : 60

Time: 3 Hours

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. Define path function. Give an example.

2. Give the expressions for heat capacity at constant volume and heat capacity at constant pressure.

3. Give the relationships for (i) ΔU and ΔH for the adiabatic expansion of an ideal gas.

4. What are the limitations of First Law of thermodynamics?

5. Explain giving reasons the efficiency of a steam engine can be increased by superheated steam.

6. What happens to the ionic product of water with increase in temperature ?

7. An aqueous solution of NH_4Cl is acidic. Why?

8. What is condensed phase rule?

9. A eutectic mixture has a definite composition and a sharp melting point, yet it is not regarded as a compound. Why?

10. Give Arrhenius equation and account for the influence of temperature on the reaction rate on the basis of this equation.

11. Show that the half-life is inversely proportional to the initial concentration of the reactant for a second order reaction.

12. The half-life of a second order reaction involving only one reactant is 20 minutes when the initial concentration of the reactant is 0.05 mol dm-3. Calculate the rate constant?

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. The enthalpies of formation of $C_2H_{6(g)}$, $CO_{2(g)}$ and $H_2O_{(l)}$ are respectively -84.4, -393.5 and -285.5KJ/mol. Calculate the enthalpy of combustion of ethane.

14. The condition for maximum work concides with that for a thermodynamics reversibility. Justify the statement.

15. Define standard enthalpy of formation. Taking a suitable example, prove that the standard enthalpy of a compound is equal to its standard enthalpy of formation.

16. Calculate the total entropy change (ΔS_{total}) during an irreversible process when heat flows from a body at higher temperature T_2 to a body at lower temperature T_1.

17. Derive the relation: $dG = VdP - SdT$

18. Briefly explain the factors that influence the equilibrium.

19. Discuss the Arrhenius concept of acids and bases.

20. What are buffer solutions? How are they classified? Explain their buffer actions with suitable examples.

21. Explain the mechanism of enzyme catalysis

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. What is Joule - Thomson effect? Justify that during this process, enthalpy of the system remains constant. Derive the expression for Joule - Thomson coefficient. Explain its values for ideal gases and real gases.

23. Explain the third law of thermodynamics and its applications.

24. Discuss the phase diagram of ferric chloride-water system.

25. Discuss the Lindemann theory of unimolecular reactions with special reference to the use of steady state approximation.