



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**B.Sc. DEGREE EXAMINATION – CHEMISTRY**

**SECOND SEMESTER – APRIL 2015**

**CH 2507/CH 3504/CH 3500 - THERMODYNAMICS**

Date : 17/04/2015  
Time : 01:00-04:00

Dept. No.

Max. : 100 Marks

**PART – A**

Answer ALL questions.

(10 x 2 = 20 marks)

1. Define the term state functions.
2. Give the significance of Joule-Thomson coefficient.
3. Define adiabatic process.
4. What is meant by calorific value?
5. Define heat of transition.
6. What is the need for the second law of thermodynamics?
7. State Trouton's rule.
8. State Lechatlier principle.
9. Give the Van't Hoff 's isotherm. Explain the terms.
10. What are the exceptions to third law of thermodynamics?

**PART – B**

Answer any EIGHT questions.

(8 x 5 = 40 marks)

11. Explain the concept of internal energy and enthalpy.
12. Derive an expression for the work done in a reversible, isothermal expansion Process.
13. Derive the Kirchoff's equation. Give its application.
14. State Hess's law of constant heat of summation and explain its application.
15. How to determine the heat of combustion using bomb calorimeter?
16. Calculate the amount of heat supplied to Carnot's cycle working between 368K and 288K if the maximum work obtained is 895 joules.
17. Explain the criteria for spontaneous process.
18. Derive the equation for the entropy of mixing of gases.
19. Derive Van't Hoff reaction isochore.
20. Derive the relationship between  $K_p$  and  $K_c$ .
21. Discuss the dissociation of nitrogen tetraoxide by applying Lechatlier's principle.
22. Explain the Nernst heat theorem.

PART – C

Answer ANY FOUR questions.

(4 x 10 = 40 marks)

23. a) Explain the postulates of the kinetic theory of gases. (5)  
b) Obtain a relationship between  $C_p$  and  $C_v$ . (5)
24. a) State and explain Joule-Thomson effect. (5)  
b) Derive Vander Walls equation of state. (5)
25. a) Define the bond energy and mention its significance. (5)  
b) Calculate the heat of formation of carbon disulphide given that the heats of combustion of carbon disulphide, carbon and sulphur are -1109 kJ, -394.6 kJ and -298.7 kJ respectively. (5)
26. a) Derive Gibbs Helmholtz equation. (5)  
b) Derive the expression for the efficiency of a Carnot cyclic heat engine working between two different temperatures. (5)
27. a) State Law of mass action. What is the significance of equilibrium Constant? (6)  
b) Apply law of mass action for the formation of HI. (4)
28. a) For a water gas reaction at 1000 K the standard Gibb's energy change is  $-8.1 \text{ kJmol}^{-1}$ . Calculate the value of equilibrium constant. (3)  
b) How will you determine the absolute entropy of oxygen gas? (7)

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