



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

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

**SECOND SEMESTER – APRIL 2013**

**CH 2507/CH 3504/CH3500 - THERMODYNAMICS**

Date: 03/05/2013  
Time: 9:00 - 12:00

Dept. No.

Max. : 100 Marks

**PART – A**

**Answer ALL the questions:**

**(10 × 20 = 20)**

1. Define Inversion temperature
2. Classify the following as state and path functions  
a) H b) q c) w d) G
3. The heat of neutralization of strong acid by a strong base is constant, why?
4. What is heat of transition? Give an example.
5. State Trouton's rule.
6. Write the expression for  
a) Gibb's free energy b) Work function
7. State the law of mass action.
8. Write any two characteristics feature of chemical equilibrium.
9. State the Lewis & Randall statement for the III law of thermodynamics.
10. What is absolute zero?

**PART – B**

**Answer any EIGHT questions:**

**(8 × 5 = 40)**

11. State the postulates of kinetic theory of gases.
12. Obtain a relationship between  $C_p$  and  $C_v$ .
13. Derive Van der Waal's equation of state.
14. a) The heat of combustion of ethylene at 17 °C at constant volume is -332.19 kcal.  
Calculate the heat of combustion at constant pressure  $R = 2 \times 10^{-3} \text{kcal deg}^{-1} \text{mol}^{-1}$ .  
b) Write short notes on integral heat of solution.
15. Explain the determination of calorific value fuel using Bomb Calorimeter.
16. Derive Gibbs-Helmholtz equation.
17. Entropy is a measure of disorderliness-Justify.
18. Discuss the thermodynamic principle of working of a refrigerator.
19. Derive  $K_p$  for the dissociation of  $\text{PCl}_5$ .
20. Deduce Vant Hoff reaction isotherm.
21. Bring out the relationship between  $K_p$  &  $K_c$ .
22. Discuss the Nernst heat theorem.

**PART – C**

**Answer any FOUR questions:**

**(4 × 10 = 40)**

23. a) Derive an expression for work done in isothermal reversible expansion of an ideal gas.  
b) Write the thermodynamic derivation of law of chemical equilibrium.
24. a) State and explain Joule-Thomson effect.  
b) Derive Kirchoff's equation.
25. a) Explain Born-Haber cycle.  
b) Calculate the heat of formation of benzene at 25 °C, if the heats of combustion of benzene, carbon & hydrogen are -780.98, -94.05, -68.32 Kcals respectively at 25 °C.
26. Describe Carnot cycle and explain how it leads to the definition of II law of thermodynamics.
27. State Le-Chatelier's principle. Discuss its application in  
a) Manufacture of ammonia.  
b) Dissociation of N<sub>2</sub>O<sub>4</sub>.
28. a) Explain the determination of absolute entropy of a gases.  
b) Write a note on the exceptions of the III law of thermodynamics.

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