LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc.DEGREE EXAMINATION –CHEMISTRY

SECOND SEMESTER – **APRIL 2018**

CH 2507/CH 3504/CH 3500 – THERMODYNAMICS

Date: 26-04-2018   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

PART – A

Answer ALL questions.   (10 x 2 = 20 marks)

1.   What are path functions?
2.   Give the significance of Joule-Thomson coefficient.
3.   What is heat of neutralisation?
4.   Define standard heat of formation.
5.   Calculate the maximum efficiency of a Carnot engine operating between 27°C
      and 127°C.
6.   What is entropy?   What are the units of entropy?
7.   State Lechatlier principle.
8.   What is van't Hoff isotherm equation?
9.   State Nernst heat theorem.
10.   What are the exceptions to third law of thermodynamics?

PART – B

Answer any EIGHT questions.   (8 x 5 = 40 marks)

11.   Derive vander Walls equation of state.
12.   Derive an expression for the work done in a reversible, isothermal process.
13.   Derive the Kirchoff's equation.
14.   State Hess's law of constant heat of summation and explain one of its application.
15.   How is heat of combustion determined using a lamb calorimeter?
16.   Explain the thermodynamic principle of working of refrigerator.
17.   Explain the criteria for spontaneous process.
18.   Derive the equation for the entropy of mixing of gases.
19.   Derive van't Hoff isochore equation.
20.   For a water gas reaction at 1000 K the standard Gibb's energy change is 8.1 kJmol^{-1}.   Calculate the
value of equilibrium constant.
21.   Deduce the relation connecting K_p and K_c for a gaseous reaction.
22.   Explain Plank's and Randall formulation of third law of thermodynamics.

PART – C

Answer ANY FOUR questions.   (4 x 10 = 40 marks)

23.   a) Explain the postulates of the kinetic theory of gases.   (5)
      b) Compare isothermal and adiabatic reversible expansion of ideal gas.   (5)

24.   a) Define integral heat of solution and dilution with an example.   (5)
      b) Explain bond energy.   (5)

25.   a) Discuss the thermodynamics of Carnot cycle.   (5)
      b) Derive Gibbs Helmholtz equation.   (5)

26. a) State Law of mass action.   What is the significance of equilibrium?
     constant.   (5)
     b) Explain Joule-Thomson effect.   (5)

27. a) Apply Le-chatlier – Braun principle for the formation of ammonia.   (6)
     b) Explain van't Hoff reaction isotherm equation.   (4)

28. a) State the third law of thermodynamics.   (2)
     b) How will you determine the absolute entropy of oxygen gas?   (8)

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