MALIBA PHARMACY COLLEGE, TARSADI
B. PHARM. SECOND SEMESTER
MID SEMESTER EXAMINATION MARCH 2009
PHARMACEUTICAL CHEMISTRY – II (220003)

DATE : 25/03/09 TIME : 12:30 p.m. to 3:30 p.m.
MAXIMUM MARKS : 100

Instructions :
(1) Attempt any five of the following questions.
(2) Each question carries 20 marks.

Q.1]
(a) State and explain Henry's law. What are the limitations of Henry's law ? [4]
(b) Define solubility of a gas in a liquid. What are the factors that affect solubility of a gas in a liquid ? [6]
(c) Explain the terms : Adsorption, Adsorbate, Adsorbant, Desorption. [4]
(d) Differentiate between Physical and Chemical adsorption. [6]

Q.2]

(a) What do you mean by adsorption isotherms and adsorption isobars ? [6]
(b) Mention assumptions of Langmuir adsorption isotherm and derive its equation. [8]
(c) Show that Freundlich adsorption isotherm is a special case of Langmuir adsorption isotherm. [6]

Q.3]

(a) What do you mean by Colligative properties ? Name four such properties. [4]
(b) Derive a relation between elevation of boiling point and the molecular weight of the solute with the help of Raoult's law. [8]
(c) Derive a relation between the lowering of vapour pressure and the osmotic pressure of a solution. [8]

Q.4]
(a) A solution of sucrose $C_{12}H_{22}O_{11}$ is prepared by dissolving 68.4 g in 1000 g of water. What is the
(i) Vapour pressure of the solution at 293 K
(ii) Osmotic pressure at 293 K
(iii) Boiling point of the solution
(iv) Freezing point of the solution

The Vapour pressure of water at 293 K is 17.5 mm, K_b = 0.52 K Kg mol^{-1}.
K_f = 1.86 K Kg mol^{-1}. [8]

(b) The resistance of a conductivity cell when filled with 0.02 M KCl solution is 164 ohm at 298 K. However when it is filled with 0.05 M $AgNO_3$ solution, its resistance is found to be 78.5 ohm. If the specific conductivity of 0.02 M KCl is 2.768 x 10-3 mho/cm, calculate
(i) conductivity of 0.05 M $AgNO_3$ solution
(ii) molar conductivity of $AgNO_3$ solution. [7]

(c) Explain the terms : Cryoscopic constant, Ideal solutions and Real solutions [5]

[PTO]

Q.5]

(a) Attempt Any Four. [12]

1. Define "Thermodynamics" and write scope and limitations of Thermodynamics.
2. Distinguish between open, closed and isolated system with examples.
3. Explain the First Law of Thermodynamics with its special forms.
4. With the help of first law of thermodynamics show that:
   (*i*) Heat absorbed by a system at constant volume is equal to increase in internal energy of the system.
   (*ii*) Heat absorbed by a system at constant pressure is equal to the increase in the enthalpy.

(b) Define bond energy. Calculate ΔH for the reaction: $C_2H_{4(g)} + 3O_{2(g)} \rightarrow 2CO_{2(g)} + 2H_2O_{(g)}$ from the following values of bond energies : [3]

Bond	C–H	O=O	C=O	O–H	C=C
Bond Energy (kJ)	414	499	724	460	619

(c) State Hess' Law and explain some of its important applications. [3]

(d) Show thermodynamically that for an ideal gas $C_P - C_V = R$. [2]

Q.6]

(a) Explain following terms. [8]

1. Isobaric process
2. Molar Heat Capacity
3. Joule-Thompson effect
4. Thermo-chemical Equation
5. Standard Heat of Formation
6. RAD
7. Half-life
8. Isotopes

(b) Comment on the following statements. **[6]**

1. The work done in the reversible expansion of a gas is the maximum work that can be done by a system (gas) in expansion between the same initial and final state.
2. C_p is always greater than C_v.
3. The heat of neutralization of a strong acid and strong base is –13.7 kcal, no matter which acid or base is employed.

(c) Calculate following. **[6]**

1. Calculate ΔH for the reaction : $C_{(graphite)} + 2H_{2(g)} \rightarrow CH_{4(g)}$ from the following data.

   (*i*) $CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$ $\Delta H = -890.35$ kJ
   (*ii*) $H_{2(g)} + \frac{1}{2}O_{2(g)} \rightarrow H_2O_{(l)}$ $\Delta H = -286.2$ kJ
   (*iii*) $C_{(graphite)} + O_{2(g)} \rightarrow CO_{2(g)}$ $\Delta H = -393.51$ kJ

2. One mole of an ideal gas at 25°C is allowed to expand reversibly at constant temperature from volume 10 litres to 20 litres. Calculate the work done by the gas in Joules and calories.

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