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SARDAR PATEL UNIVERSITY

M.Sc Chemistry , First Semester Examination

Friday, Date: 24-04-2015

Time: 10:30 a.m. to 01:30 p.m.

Subject: Physical Chemistry-I Paper: PS01CCHE03

N.B. (1) Figures to the right indicate marks.
(2) Attempt all questions.

[Total Marks: 70]

Q.1 Choose the correct alternatives from the following 08

1 At freezing point, the solution will always be in equilibrium with ..
(a) pure solid solvent
(b) pure liquid solvent
(c) pure solid solute
(d) pure liquid solute

2 Blood is the example of .....system.
(a) heterogeneous system
(b) homogeneous system
(c) any solution
(d) colloidal solution

3 Which of the following is an extensive property?
(a) mass
(b) pressure
(c) density
(d) temperature

4 In reaction isotherm, if reaction is spontaneous then which of the following is true
(a) $J_a < K$
(b) $J_a \leq K$
(c) $J_a > K$
(d) $J_a \geq K$

5 At low pressure , the value of PV for any gas is a linear function of its.....
(a) temperature
(b) pressure
(c) density
(d) Both a & c

6 Isopiestic solutions are such in which...
(a) solute is having same activity
(b) solvent is having same activity
(c) solute is having same activity co efficient
(d) solvent is having same activity co efficient

7 At infinite dilution , the activity of ions becomes equal to its
(a) molality
(b) formality
(c) molarity
(d) formality

8 The fugacity and pressure are in general, not proportional to one another for
(a) real gas
(b) ideal gas
(c) both real and ideal gas
(d) none of these

Q-2 **Answer the following. (Any seven)** **14**

1 Define: (i) System (ii) Intensive properties.
2 What is apparent molar property? Derive the expression for the same.
3 Derive the expression for Direct method for partial molar property.
4 What are tests of reversibility?
5 Give the confirmation of 3rd law of thermodynamics.
6 What is fugacity? How will you obtain the equation for relative fugacity.
7 Explain positive deviation from ideal solution.
8 Derive the equation $dF = RT\, d\ln F$
9 State ideal form of Henry's law.

Q.3 **A** Explain the term fugacity and fugacity co-efficient. Describe the Graphical method for determination of fugacity. **06**

B Discuss the Lewis Randall rule for determination of fugacity of a gas in gaseous mixture. **06**

OR

B How one can calculate fugacity of solids and liquids? The vapour pressure of liquid chlorine is 3.66atm at 0°c and the molar volume of the vapour under these conditions is 60.1 lit /mole. Evaluate the fugacity of liquid chlorine at 0°c. Give your comments. **06**

Q.4 **A** Write Van't Hoff equation and integrate this equation without limits of integration. **06**

B What is Metathesis? Derive the equation for equilibrium constant for such a reaction. **06**

OR

B Derive the equilibrium constant for homogeneous reaction in dilute solutions. **06**

Q.5 **A** Derive the Duhem- Margulas equation. Explain its use in understanding the positive and negative deviations of binary solutions from ideal behaviour. **06**

B

1 1 molal aqueous solution of mannitol has vapour pressure of 17.22 mm. of mercury at 20°c. At the same temperature the vapour pressure of pure water is 17.53mm. of mercury. Calculate the activity and activity co efficient of water in given solution. **03**

2 Determine the mean ionic activity of 0.5 molal solution of sodium sulphate. **03**

OR

B When liquid components of an ideal solutions are mixed, ΔV and ΔH_{mix} are always zero. Justify. **06**

Q.6	A	Discuss relationship between apparent molar property and partial molar property for infinite dilute solution.	06
	B	Derive the following equation, $\bar{V}_2 = \frac{M_2}{1000(\rho - C\frac{d\rho}{dc})}$	06
		OR	
	B	Using the expression for V as a function of m for aqueous NaCl at 25^0C : V= 1002.94 +16.40m + 2.140 $m^{3/2}$ + 0.027$m^{5/2}$. Find V_{NaCl} & V_{H2O} in a 1 molal solution. (V_1 = 18.06ml/mole, molecular mass of water = 18.02 gm/mole)	06

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