BSC. PART - II EXAMINATION - 2009

CHEMISTRY HONOURS PHYSICAL

Answer any five questions. including Q. No. 1 which is compulsory

1. Select the most appropriate answer :

   (a) For an ideal gas joule-Thomson coefficient is :
   (i) Positive   (ii) Negative   (iii) Zero   (iv) Dependent on molecular weight

   (b) The free energy change $\Delta G = 0$, when;
   (i) Catalyst is added   (ii) The reactants are completely consumed
   (iii) The system is in equilibrium
   (iv) The reactants are initially mixed thoroughly.

   (c) The relationship which describes variation of vapour pressure with temperature is: (i) Kirchoff's law   (ii) Clausius-Clapeyron equation
   (iii) Hess's law   (iv) Arrhenius equation

   (d) At 320K the solubility product of AgCl is 1×10^{-6} Its solubility in mol/litre is: (i) 1×10^{-3} (ii) 1×10^{-6} (iii) 1×10^{-2} (iv) 1×10^{-4}

   (e) Which of the following solutions of KCl has the lowest value of equivalent conductance ?
   (i) 1 M   (ii) 0.1M   (iii) 0.01M   (iv) 0.001M

   (f) What is the correct mathematical representation of Phase-rule ?
   (i) $P + F = C - 2$ (ii) $F = C - 2 + P$ (iii) $F = C + 2 - P$ (iv) $F = P - C + 2$

   (g) At Triple point what is the number of degree of freedom is sulphur system ?
   (i) 0   (ii) 1   (iii) 2   (iv) 3

   (h) Heat of neutralisation of a strong acid by strong base is a constant value because : (i) Salt formed does not hydrolyse.
   (ii) Only H^+ and OH^- ions react in every case

   (iii) The strong base and strong acid react completely
   (iv) The strong base and strong acid react in aqueous solution

   (i) The conductivity of a strong electrolyte :
   (i) Increases on dilution   (ii) Does not change considerably on dilution
   (iii) Decreases on dilution   (iv) Depends on density

   (j) The intermolecular force of attraction between non-polar molecule is called:
   (i) H-bonding   (ii) Dispersion forces
   (iii) Interionic attraction   (iv) Adhesive forces

2. (a) What do you understand by adiabatic changes? Derive relation between V-T and P-T for a gas undergoing adiabatic change.

   (b) Pressure versus volume curve has greater slope in case of adiabatic changes than that in case of isothermal change. Explain.

3. (a) What is meant by the term bond energy ? How would you determine the following from bond energies ?
   (i) Enthalpies of reaction (ii) Enthalpies of formation of compounds
   (iii) Resonance energy.

   (b) Calculate the enthalpy change for the transition graphite $\rightleftharpoons$ diamond from the ΔH^0 comb values of -393.5 KJ mol^{-1} and -395.4 KJ mol^{-1} for graphite and diamond respectively.

4. (a) Define entropy. Discuss its physical significance. Deduce an expression for the entropy changes associated with the changes in temperature and pressure of an ideal gas.

   (b) Calculate the entropy change when 2 moles of an ideal gas are allowed to expand isothermally at 293 K from a pressure of 10 atm to a pressure of 2 atm.

5. (a) Discuss intermolecular forces operating in Liquids.
   (b) Elaborate Liquid Crystals.

6. (a) Define the transport number of an ion and discuss moving boundary method of its determination.

   (b) At 25^0C the transport number of H^+ ion and HCl and CH_3COO^- ion in CH_3COONa are 0.81 and 0.47 respectively. The equivalent conductance at infinite dilution of HCl and CH_3COONa are 426 ohm^{-1} cm^2 eqv^{-1} and 91 ohm^{-1} cm^2 eqv^{-1} respectively. Calculate the equivalent conductance of acetic acid at infinite dilution.

7. Discuss phase diagram of Lead-Silver System and highlight the process of desilverisation of Lead.

8. State and explain Ostwald dilution law. Discuss its limitation. Explain, how conductance measurement be used to verify this law for weak electrolytes.

9. Write notes on any two of the following :

   (i) Nernst Distribution law (ii) Joule-Thomson Effect (iii) Triple Piont (iv) Vant Hoff reaction Isotherm