Student Id | | | | | | | |

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B Tech

First Semester (End Sem) Examination Dec 2015

Engineering Chemistry (CY101)

Branch : CSE & IT

Time 3 Hours

Max Marks : 50

Answer any five questions.

(Standard Data: $h=6.62\times10^{-34}$Js, $R=8.314JK^{-1}mol^{-1}$, $m_e=9.1\times10^{-31}$kg)

1. (a) Why do we not observe uncertainty principle for big object? [2]
   (b) Draw the MO diagram for CO and O_2^- molecule and predict their magnetic behavior. [5]
   (c) Write the M.O. electronic configuration of N_2^+, N_2, N^-_2 & N_2^{-2} [3]
   i) Which of these shows highest paramagnetism?
   ii) Arrange these in increasing bond length. [5+5]
2. Write short notes on any two
   (a) Born-Haber cycle
   (b) Calomel electrode
   (c) Transition state theory [2]
3. (a) What do you mean by catalytic poisoning? Give an example.
   (b) At 380 °C, the half life period of a first order reaction is 360 min. The energy of activation for the reaction is 200kJ/mol. Calculate the time required for 75% decomposition at 450 °C. [4]
   (c) Derive equation for rate constant and half life period for a 2nd order reaction when both the reactants are of same type. [4]
4. (a) The standard reduction potential of $Cu(OH)_2$ /Cu is +0.34V. Calculate the reduction potential at pH =12 for the above couple. K_{SP} of $Cu(OH)_2$ is 1×10^{-19}. [4]
   (b) Define calorific value (of fuel) and any one of its Unit. [2]
   (c) Prove that, $(\partial S/\partial V)_T = (\partial P/\partial T)_V$ [4]
5. (a) What are the limitations of phase rule? What is reduced phase rule? Explain the phase diagram of Bi-Cd system. [2+2+3]
   (b) Define component. What is the maximum number of phases that can be exist in equilibrium at one point of one component system. [3]
6. (a) Derive Gibbs Helmholtz equation in terms of Gibbs free energy. [4]
   (b) Calculate the standard heat of formation of acetylene from the heat of combustion of C_2H_2, graphite and H_2 being as -1300, -395 and -285 kJ/mol respectively. [3]
   (c) Calculate the free energy change which occurs when 2 moles of an ideal gas expands reversibly and isothermally at 300K from an initial volume 4L to 40 L. [3]
7. (a) Discuss the construction working principle (cell reaction) and disadvantages of lead acid battery. [6]
   (b) For the cell Zn/Zn^{+2} $(a=10^{-4})$// $Mg^{+2}(a=10^{-3})$ /Mg, the standard reduction potential for Zn &Mg electrodes are -0.76 and -2.36 volts respectively. [4]
   i) Write the overall cell reaction
   ii) Find ΔG and predict whether the cell reaction is spontaneous or not.