**Work Sheet – 2/6**

Q1. State and explain law of mass action.

Q2. Write the expression for equilibrium constant for the following reactions: (i) H2 + I2 $⇌$ 2HI (ii) 2N2O5 $⇌$ 4NO2 + O2 (iii) CaCO3(s) $⇌ $ CaO(s) + CO2(g) (iv) NH3(l) + H2O(l) $⇌$ NH4+(aq) + OH-(aq) (v) 2SO2(g) + O2(g) $⇌ $ 2SO3(g)

(Hints- concentration of solid is taken as unity)

Q3. Derive the relation between Kc and Kp.

Q4. For a chemical reaction ∆n = 0, what is the relation between Kp and Kc?

Q5. For the chemical reactions N2 + 3H2 $⇌$ 2NH3 and 1/2N2 + 3/2H2 $⇌$ NH3, how are the equilibrium constant Kc and Kc’ for both the reactions respectively related to each other?

Q6. At 700K, the equilibrium constant Kp for the reaction: 2SO3(g) $⇌ $ 2SO2(g)  + O2(g) is 1.80 x 10-3. What is the value of Kc for the reaction at the same temperature? ( R= 0.0821 L atm K-1 mol-1)

Q7. At 4480C, the equilibrium constant Kc for the reaction: H2 + I2 $⇌$ 2HI is 50.5 Predict the direction of reaction at the same temperature, if we start with 2.0 x 10-2 mol of HI, 1.0 x 10-2 mol of H2 and 3.0 x 10-2 mol of I2 in a 2.0 L vessel.

Q8. Write the relation between Kc and Kp for the reaction: N2(g) + 3H2(g) $⇌$ 2NH3(g)

Q9. The equilibrium constant for the reactions have been measured at 823 K, CoO + H2 $⇌$ Co + H2O ; K = 67 CoO + CO $⇌$ Co + CO2 ; K = 490 From the given data, calculate equilibrium constant for the reaction CO2 + H2 $⇌$ CO + H2O

Q10. Write the relation between standard free energy change and equilibrium constant.