CH1011 Tutorial 6

Name:

1. Explain the term **enthalpy**. What is an **exothermic** reaction?

2. Calculate the heat of combustion $\mathbf{\Delta H^o_c(\ _{C2H4(g)}\ ,\ _{298K})}$ when ethene (C_2H_4) is combusted to form $CO_2(g)$ and $H_2O(l)$.

3. The oxidation of carbon (graphite) to carbon monoxide occurs spontaneously at 375K.
After reaction of the above system in a closed reaction vessel the equilibrium partial pressure of oxygen is 0.021 atm and that of carbon monoxide is 0.50 atm.
Write down the expression for $\mathbf{K_p}$ and determine the value of K_p in the above system.

Additional information:

$\Delta H^o_f(\ _{C2H4(g),\ 298K}\ )$ 53 kJ/mol $\Delta H^o_f(\ _{CO2(g),\ 298K}\ )$ -394 kJ/mol $\Delta H^o_f(\ _{H2O(l),\ 298K}\ )$ -286 kJ/mol

4. $3O_2(g) \rightleftharpoons 2O_3(g)$ $\Delta H^o = 286 \text{ kJ mol}^{-1}$

In an equilibrium reaction mixture of the above reaction how would $p(O_2)$ and K_p change if the temperature of the reaction vessel were raised? Explain your answer.

5. 50.0 mL of water at 75.0°C is added to a thermos flask containing 100.0 mL of water. The water in the thermos flask prior to the addition is at 25.0°C. Assuming that no heat is lost to the surroundings what is the final temperature of the water in the flask? (C_S H_2O 4.184 J K^{-1} g^{-1}, ρ H_2O 1.00 g cm^{-3})