General Chemistry II
PLI Sheet 6 AK
July 19, 2021

1.. Write the expression for K_C for the following reactions. In each case indicate whether the reaction is homogeneous or heterogeneous.

a. $Ni(CO)_4\,(g) \leftrightarrow Ni\,(s) + 4\,CO\,(g)$ (1)

b. $H_2O\,(l) \leftrightarrow H^+\,(aq) + OH^-(aq)$ (1)

c. $2Ag\,(s) + Zn^{2+}\,(aq) \leftrightarrow 2\,Ag^+\,(aq) + Zn(s)$ (1)

2. Consider the following reaction: $Cl_2\,(g) + I_2\,(g) \leftrightarrow 2ICl\,(g)$ $K_p = 81.9$ at 25°C. A reaction mixture initially at 25°C initially contains $P_{I2} = 0.100$ atm, $P_{Cl2} = 0.100$ atm, $P_{ICl} = 0.100$ atm. Find the equilibrium partial pressures of I_2, Cl_2, and ICl at this temperature.

3. Consider the following reaction: $NiO\,(s) + CO\,(g) \leftrightarrow Ni\,(s) + CO_2\,(g)$ $K_c = 4.0 \times 10^3$ at 1500 K. If a mixture of solid nickel(II) oxide and 0.20 M carbon monoxide is allowed to come to equilibrium at 1500 K, what will be the equilibrium concentration of CO_2?

4. Consider the reaction: $CO\,(g) + 2H_2\,(g) \leftrightarrow CH_3OH\,(g)$

A reaction mixture at 780℃ initially contains [CO] = 0.500 M and [H_2] = 1.00 M. At equilibrium, the CO concentration is found to be 0.150 M. What is the value of the equilibrium constant?

5. Consider the chemical equation and equilibrium constant for the synthesis of NH_3 at 25℃: $N_2\,(g) + 3H_2\,(g) \leftrightarrow 2NH_3\,(g)$ $K_{c1} = 3.7 \times 10^8$

Calculate the equilibrium constant for the following reaction at 25℃: $NH_3\,(g) \leftrightarrow \frac{1}{2}\,N_2\,(g) + 3/2\,H_2\,(g)$