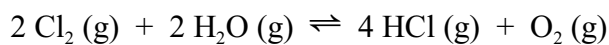


Worksheet 7

1. Consider the following equilibrium, for which $K_p = 0.0752$ at $480\text{ }^\circ\text{C}$.

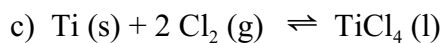
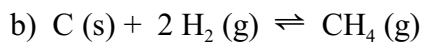
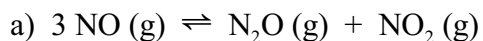


a) What is the value of K_p for the reaction $4 \text{HCl} (\text{g}) + \text{O}_2 (\text{g}) \rightleftharpoons 2 \text{Cl}_2 (\text{g}) + 2 \text{H}_2\text{O} (\text{g})$?

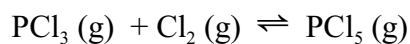
b) What is the value of K_p for the reaction $\text{Cl}_2 (\text{g}) + \text{H}_2\text{O} (\text{g}) \rightleftharpoons 2 \text{HCl} (\text{g}) + \frac{1}{2} \text{O}_2 (\text{g})$

c) What is the value of K_c for the reaction in part (b)

2. Write the equilibrium constant expression, K_c , for the following reactions. In each case indicate whether the reaction is homogeneous or heterogeneous



3. Phosphorous trichloride gas and chlorine gas react to form phosphorous pentachloride gas:



A gas vessel is charged with a mixture of $\text{PCl}_3 (\text{g})$ and $\text{Cl}_2 (\text{g})$, which is allowed to equilibrate at 450 K. At equilibrium the partial pressures of the three gases are $P_{\text{PCl}_3} = 0.124 \text{ atm}$, $P_{\text{Cl}_2} = 0.157 \text{ atm}$, and $P_{\text{PCl}_5} = 1.30 \text{ atm}$. a) What is the value of the K_p at this temperature? b) Does the equilibrium favor reactants or products?

4. At 218 °C, $K_c = 1.2 \times 10^{-4}$ for the equilibrium



Calculate the equilibrium concentrations of NH_3 and H_2S if a sample of solid NH_4HS is placed in a closed vessel and decomposes until equilibrium is reached.