

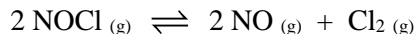
AP CHEMISTRY

TOPIC 6: EQUILIBRIUM, PART B

Day 65:

- Equilibrium (pressures)
-

1) Consider the reaction:



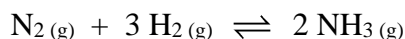
At 25 °C, a particular experiment had the following equilibrium pressures:

$$P_{\text{NOCl}} = 1.20 \text{ atm}, P_{\text{NO}} = 0.00125 \text{ atm}, P_{\text{Cl}_2} = 0.300 \text{ atm}$$

Calculate the value of K_p for the reaction at 25 °C.

$$K_p = \frac{(P_{\text{NO}})^2 (P_{\text{Cl}_2})}{(P_{\text{NOCl}})^2} = \left[\frac{(0.00125 \text{ atm})^2 (0.300 \text{ atm})}{(1.20 \text{ atm})^2} \right] = 3.3 \times 10^{-7} \text{ atm}$$

2) Consider the reaction:



At 25 °C, a particular experiment had the following equilibrium pressures:

$$P_{\text{NH}_3} = 0.0031 \text{ atm}, P_{\text{N}_2} = 0.85 \text{ atm}, P_{\text{H}_2} = 0.00031 \text{ atm}$$

Calculate the value of K_p for the reaction at 25 °C.

$$K_p = \frac{(P_{\text{NH}_3})^2}{(P_{\text{N}_2})(P_{\text{H}_2})^3} = \frac{(0.0031 \text{ atm})^2}{(0.85 \text{ atm})(0.00031 \text{ atm})^3} = 3.8 \times 10^5 \text{ atm}^{-2} \text{ or } \frac{1}{\text{atm}^2}$$

3) For the reaction:



It is found that at equilibrium, $[\text{CO}_2] = 2.1 \times 10^{-3} \text{ M}$ at a particular temperature. Calculate the K_C for the reaction at this temperature. (Note: solids are NEVER considered (calculated) in the equilibrium constant)

Answers:

Solids and Liquids do not appear in the equilibrium expression (only gases and aqueous solutions appear in the equilibrium expression). The equilibrium expression would be written as:

$$K_c = [\text{CO}_2]$$

Therefore:

$$K_c = [\text{CO}_2] = \frac{2.1 \times 10^{-3} \text{ mol}}{L} = 2.1 \times 10^{-3} \text{ mol L}^{-1}$$