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AP Chemistry – Applications of K_{eq} – 43

Name _____Per ___

1. At 800. K the equilibrium constant for $I_{2(g)} \leftrightarrow 2I_{(g)}$ is $K_{eq} = 2.04 \times 10^{-3}$. If an equilibrium mixture in a 10.0 L vessel contains 3.22×10^{-2} g of $I_{(g)}$, how many grams of I_2 are in the mixture?

2. For $2SO_{2(g)} + O_{2(g)} \leftrightarrow 2SO_{3(g)}$, $K_{eq} = 3.0 \times 10^{4}$ at 700. K. In a 2.00 L vessel the equilibrium mixture contains 2.65 g of SO_3 and 1.08 g of O_2. How many grams of SO_2 are in the vessel?

3. For the equilibrium $Br_{2(g)} + Cl_{2(g)} \leftrightarrow 2BrCl_{(g)}$ at 400. K, $K_{eq} = 7.0$. If 0.30 moles of Br_2 and 0.30 moles of Cl_2 are introduced into a 1.0 L container at 400. K, what will be the equilibrium partial pressure of BrCl?

4. At 21.8°C, $K_{eq} = 7.0 \times 10^{-2}$ for the equilibrium $NH_4HS_{(s)} \leftrightarrow NH_{3(g)} + H_2S_{(g)}$. Calculate the equilibrium partial pressures 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.

5. For the equilibrium $N_{2(g)} + 3H_{2(g)} \leftrightarrow 2NH_{3(g)}$ $K_{eq} = 4.51 \times 10^{-5}$ at $450°^{C}$. For each of the mixtures listed below, determine the reaction quotient, Q, and indicate whether the mixture is at equilibrium at $450°^{C}$. If it is not at equilibrium, indicate the direction, toward the products or reactants, in which the mixture must shift to achieve equilibrium.
(a) 105 atm NH_3, 495 atm H_2, 35 atm N_2

(b) 35 atm NH_3, 595 atm H_2, no N_2

(c) 26 atm NH_3, 42 atm H_2, 202 atm N_2

(d) 105 atm NH_3, 55 atm H_2, 5.0 atm N_2

6. For the following reaction, $6CO_{2(g)} + 6H_2O_{(l)} \leftrightarrow C_6H_{12}O_{6(s)} + 6O_{2(g)}$, $\Delta H° = 2816$ kJ. How is the equilibrium yield of $C_6H_{12}O_6$ affected by:
(a) increasing P_{CO2}

(b) increasing temperature

(c) removing CO_2

(d) decreasing the total pressure

(e) removing part of the $C_6H_{12}O_6$

(f) adding a catalyst

7. For a certain homogeneous gas-phase reaction, the fraction of products in an equilibrium mixture is increased by increasing the temperature and increasing the volume of the reaction vessel.
(a) What can you conclude about the reaction from the influence of temperature on the equilibrium?

(b) What can you conclude from the influence of increasing the volume?