Non Sibi High School

Andover's Chem 300: Accelerated/Honors Chemistry

Chapter 15, Review Quiz 1

1

a. Write the K_c and K_p expressions for the reaction $\frac{1}{2}I_2(s) + \frac{1}{2}Cl_2(g) \rightleftharpoons ICl(l)$.

b. If $K_c = 1.19 \times 10^3$ for this reaction, calculate the equilibrium molarity of chlorine gas.

2

For the reaction $\frac{1}{2}I_2(s) + \frac{1}{2}Cl_2(g) \rightleftharpoons ICl(l)$, the value of $K_p = 241$. Calculate the value of K_p for the following reaction:

$$2ICl(l) \rightleftharpoons I_2(s) + Cl_2(g)$$

3

a. Write the K_c expression for the reaction $2Cr(s) + 3Ge^{4+}(aq) \rightleftharpoons 2Cr^{3+}(aq) + 3Ge^{2+}(aq)$.

b. Solid chromium metal is added to a solution containing the initial concentrations 0.30 M Ge^{4+}, 0.86 M Cr^{3+}, and 0.73 M Ge^{2+}. When equilibrium is reached, the molarity of Cr^{3+} is found to be 0.68 M. Calculate the equilibrium molarity of Ge^{2+} and Ge^{4+} as well as K_c for the reaction.

4

For the reaction $2CO(g) + O_2(g) \rightleftharpoons 2CO_2(g)$, $K_p = 7.7$. If a mixture initially contains 0.79 atm CO, 0.67 atm O_2, and 0.21 atm CO_2, calculate the equilibrium pressure of each gas and the total pressure at equilibrium.

5

a. Write the K_p expression for the decomposition of liquid bromine trifluoride to form bromine gas and fluorine gas:

$$2BrF_3(l) \rightleftharpoons Br_2(g) + 3F_2(g)$$

b. After a 0.85 gram sample of liquid bromine trifluoride was placed in a 225 mL container and heated to 75°C, the total pressure at equilibrium was found to be 0.68 atm. Calculate the equilibrium pressure of each gas and K_p for this reaction.

c. Calculate the mass of liquid bromine trifluoride present at equilibrium.

6

Consider the reaction:

$$2K(s) + Cl_2(g) + 3O_2(g) \rightleftharpoons 2KClO_3(s) \quad \Delta H < 0$$

a. State whether the amount of chlorine gas present at equilibrium will increase, decrease, or remain unchanged when each of the following occurs:

i. Helium gas is added at constant volume.
ii. Oxygen gas is removed.
iii. The volume of the container is decreased.
iv. The temperature is increased.
v. Neon gas is added at constant pressure.
vi. A catalyst is added.
vii. Solid potassium metal is added.

b. Of the changes above, which will change the value of K_c and K_p, and will K_c and K_p increase or decrease?

7

If $K_p = 0.29$ at 35°C for the reaction $NH_4HS(s) \rightleftharpoons H_2S(g) + NH_3(g)$, calculate K_c for the reaction at 35°C.

8

If $K_c = 3.65 \times 10^6$ at 425°C for the reaction $O_2(g) + 2SO_2(g) \rightleftharpoons 2SO_3(g)$, calculate ΔG° for the reaction at 425°C.

9

If $\Delta G^\circ = 14.0\,\text{kJ/mol}$ at 45°C for the reaction $PbCl_2(s) \rightleftharpoons Pb^{2+}(aq) + 2Cl^-(aq)$, calculate K_c for the reaction at 45°C.

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