

CHEMISTRY I (H)
K, Le Chatelier, and K_{sp} Practice

- 1.00 g of each NO(g) and Cl₂(g) are placed in an empty 100-mL flask and allowed to reach equilibrium via the following reaction: $2\text{NO}(\text{g}) + \text{Cl}_2(\text{g}) \leftrightarrow 2\text{NOCl}(\text{g})$. The K value of the reaction is $6.25 \times 10^4 \text{ L/mol}$.
- An important reaction in the commercial of hydrogen is:
$$\text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g}) \leftrightarrow \text{H}_2(\text{g}) + \text{CO}_2(\text{g}) \quad \Delta H = -41 \text{ kJ}$$
How will this system at equilibrium shift in each of the five following cases.
 - Gaseous carbon dioxide is removed.
 - Water vapor is added.
 - The pressure is increased by adding helium gas.
 - The temperature is increased.
 - The pressure is increased by decreasing the volume of the reaction container.
- The solubility of barium carbonate is $7.07 \times 10^{-5} \text{ M}$. What is its K_{sp} ?
- The K_{sp} of iron(III) hydroxide is 8×10^{-16} . How many μg of iron (III) hydroxide could be dissolved in 250 mL of solution?

ANSWERS

- $[\text{NO}]_{\text{eq}} = 0.0520 \text{ M}$
 $[\text{Cl}_2]_{\text{eq}} = 4.89 \times 10^{-4} \text{ M}$
 $[\text{NOCl}]_{\text{eq}} = 0.281 \text{ M}$
- shifts right to replenish the lost product
 - shifts right to use excess reactant
 - no shift since He is inert and partial pressures of reactants and products are not affected
 - shifts left to use excess product
 - no shift since the number of moles on each side is the same
- $K_{sp} = 5.0 \times 10^{-9}$
- 1971 g