Assignment 3

The due date for submitting this assignment is Friday, 2023-06-02. You have 1 week to complete it.

1. A solution reacts with CO₂ to form a hypochlorite salt. Listed below are reactions and their corresponding products. Identify the balanced chemical equation for each reaction.

   a. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium hypochlorite.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{HClO} \]

   b. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium chlorate.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{NaClO}_3 \]

   c. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium hypochlorite.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{HClO} \]

2. A solution contains excess CO₂. To determine the solubility product, the solubility product constant, the dissociation reaction, and the equilibrium constant for each reaction.

   a. The solubility product constant for CO₂ is

      \[ K_{sp} = \text{product} \]

   b. The dissociation reaction for CO₂ is

      \[ \text{CO}_2 (aq) \rightarrow \text{CO}_2 (g) + \text{H}_2\text{O} \]

   c. The equilibrium constant for CO₂ is

      \[ K_{eq} = \text{product} \]

3. Identify the chemical equation for each reaction.

   a. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium chlorate.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{NaClO}_3 \]

   b. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium hypochlorite.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{HClO} \]

   c. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium chlorate.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{NaClO}_3 \]

4. A solution contains excess CO₂. To determine the solubility product, the solubility product constant, the dissociation reaction, and the equilibrium constant for each reaction.

   a. The solubility product constant for CO₂ is

      \[ K_{sp} = \text{product} \]

   b. The dissociation reaction for CO₂ is

      \[ \text{CO}_2 (aq) \rightarrow \text{CO}_2 (g) + \text{H}_2\text{O} \]

   c. The equilibrium constant for CO₂ is

      \[ K_{eq} = \text{product} \]

5. Identify the chemical equation for each reaction.

   a. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium chlorate.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{NaClO}_3 \]

   b. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium hypochlorite.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{HClO} \]

   c. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium chlorate.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{NaClO}_3 \]

6. A solution contains excess CO₂. To determine the solubility product, the solubility product constant, the dissociation reaction, and the equilibrium constant for each reaction.

   a. The solubility product constant for CO₂ is

      \[ K_{sp} = \text{product} \]

   b. The dissociation reaction for CO₂ is

      \[ \text{CO}_2 (aq) \rightarrow \text{CO}_2 (g) + \text{H}_2\text{O} \]

   c. The equilibrium constant for CO₂ is

      \[ K_{eq} = \text{product} \]

7. Identify the chemical equation for each reaction.

   a. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium chlorate.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{NaClO}_3 \]

   b. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium hypochlorite.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{HClO} \]

   c. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium chlorate.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{NaClO}_3 \]

8. A solution contains excess CO₂. To determine the solubility product, the solubility product constant, the dissociation reaction, and the equilibrium constant for each reaction.

   a. The solubility product constant for CO₂ is

      \[ K_{sp} = \text{product} \]

   b. The dissociation reaction for CO₂ is

      \[ \text{CO}_2 (aq) \rightarrow \text{CO}_2 (g) + \text{H}_2\text{O} \]

   c. The equilibrium constant for CO₂ is

      \[ K_{eq} = \text{product} \]

9. Identify the chemical equation for each reaction.

   a. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium chlorate.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{NaClO}_3 \]

   b. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium hypochlorite.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{HClO} \]

   c. Sodium hypochlorite reacts with CO₂ to form sodium carbonate and sodium chlorate.

      \[ \text{NaClO} + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{NaClO}_3 \]

10. A solution contains excess CO₂. To determine the solubility product, the solubility product constant, the dissociation reaction, and the equilibrium constant for each reaction.

    a. The solubility product constant for CO₂ is

       \[ K_{sp} = \text{product} \]

    b. The dissociation reaction for CO₂ is

       \[ \text{CO}_2 (aq) \rightarrow \text{CO}_2 (g) + \text{H}_2\text{O} \]

    c. The equilibrium constant for CO₂ is

       \[ K_{eq} = \text{product} \]