

This print-out should have 8 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

Msci 18 0907

001 10.0 points

What is the concentration of SO_4^{2-} in 2.0 M H_2SO_4 ? K_{a1} is strong and $K_{a2} = 1.2 \times 10^{-2}$.

- 4.0×10^{-1} M
- 4.0×10^{-2} M
- 1.0×10^{-7} M
- 2.0×10^{-1} M
- 1.2×10^{-2} M **correct**

Explanation:

Msci 20 0604

002 10.0 points

AgCl would be least soluble in

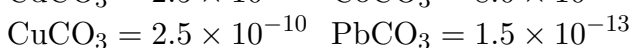
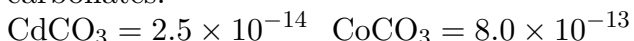
- 0.1 M HNO_3 .
- 0.1 M NH_3 .
- pure water.
- 0.1 M CaCl_2 . **correct**
- 0.1 M HCl .

Explanation:

Msci 20 0402b

003 10.0 points

Consider the following K_{sp} values for metal carbonates:



Which pair would best be separated by fractional precipitation?

- Cd^{2+} and Cu^{2+} **correct**
- Co^{2+} and Cu^{2+}

3. Cu^{2+} and Pb^{2+}

4. Cd^{2+} and Co^{2+}

5. Co^{2+} and Pb^{2+}

6. Cd^{2+} and Pb^{2+}

Explanation:

All the salts are 1:1 ratios so the K_{sp} 's can be directly compared for solubility. The pair that will be the easiest to separate will be the pair that have their K_{sp} values the farthest apart (Cd and Cu).

DAL Hydron Concen

004 10.0 points

Which of the following solutions of weak acids has a hydronium ion concentration that is most accurately calculated by

$$[\text{H}_3\text{O}^+] = (K_a C_a)^{1/2}$$

1. CH_3COOH , $K_a = 1.8 \times 10^{-5}$, $C_a = 0.001$ M

2. HCOOH , $K_a = 1.8 \times 10^{-4}$, $C_a = 0.01$ M

3. HCOOH , $K_a = 1.8 \times 10^{-4}$, $C_a = 0.001$ M

4. CH_3COOH , $K_a = 1.8 \times 10^{-5}$, $C_a = 0.01$ M **correct**

Explanation:

Msci 18 0357

005 10.0 points

What is the pH of a solution labeled 1.6×10^{-6} M KOH?

1. 8.2 **correct**

2. 8.8

3. 6.6

4. 7.4

5. 5.2

Explanation:

$$[\text{KOH}] = 1.6 \times 10^{-6} \text{ M}$$



$$[\text{OH}^-] = [\text{KOH}] = 1.6 \times 10^{-6} \text{ M}$$

$$\begin{aligned} \text{pOH} &= -\log[\text{OH}^-] = -\log(1.6 \times 10^{-6}) \\ &= 5.79588 \end{aligned}$$

$$\text{pH} = 14 - \text{pOH} = 14 - 5.79588 = 8.20412$$

DAL Mass Charge Balance**006** 10.0 points

Which of the following is a correct mass balance expression for the addition of H_2CO_3 to water?

1. $C_{\text{H}_2\text{CO}_3} = [\text{H}_2\text{CO}_3] + [\text{HCO}_3^-] + [\text{CO}_3^{2-}]$
correct

2. $[\text{H}^+] = [\text{HCO}_3^-] + [\text{CO}_3^{2-}] + [\text{OH}^-]$

3. $C_{\text{H}_2\text{CO}_3} = [\text{HCO}_3^-] + [\text{CO}_3^{2-}]$

4. $K_w = [\text{H}^+] + [\text{OH}^-]$

Explanation:**Sys Treat Equil 01****007** 10.0 points

NaF , NaCl , and HBr are dissolved in water. How many equations are needed to describe this system?

1. 6

2. 8

3. 5

4. 7 **correct**

5. 4

Explanation:

The species Na^+ , HF , F^- , Cl^- , Br^- , H^+ , and OH^- will be present in the water.

008 10.0 points

Solid $\text{Mg}(\text{OH})_2$, which has a solubility product constant of 1.5×10^{-11} , dissolves in water when NH_4Cl is added to the solution because

1. OH^- ion reacts with Cl^- ion to form the weak acid HClO .

2. MgCl_2 is a salt and completely ionized in water solution.

3. one of the ions from $\text{Mg}(\text{OH})_2$ is oxidized to form a different species.

4. Mg^{+2} forms a very stable complex ion with ammonia.

5. OH^- ion is converted to NH_4OH by reaction with NH_4^+ . **correct**

Explanation: