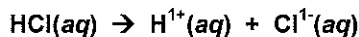


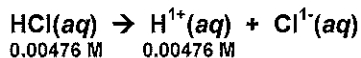
WKst: 18 b - key

For each of the problems below, assume 100% dissociation.

1. A. Write the equation for the dissociation of hydrochloric acid.



- B. Find the pH of a 0.00476 M hydrochloric acid solution.

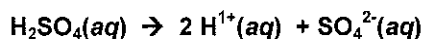


$$\text{pH} = -\log[\text{H}^+]$$

$$\text{pH} = -\log[0.00476 \text{ M}]$$

$$\text{pH} = 2.32$$

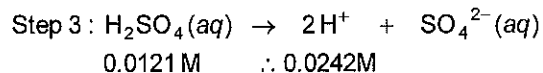
2. A. Write the equation for the dissociation of sulfuric acid.



- B. Find the pH of a solution that contains 3.25 g of H_2SO_4 dissolved in 2.75 liters of solution.

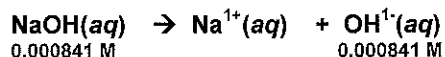
$$\text{Step 1: } x \text{ mol H}_2\text{SO}_4 = 3.25 \text{ g H}_2\text{SO}_4 \left(\frac{1 \text{ mol H}_2\text{SO}_4}{98 \text{ g H}_2\text{SO}_4} \right) = 0.033 \text{ mol H}_2\text{SO}_4$$

$$\text{Step 2: } M = \frac{\text{mol}}{\text{L}} \Rightarrow M = \frac{0.033 \text{ mol H}_2\text{SO}_4}{2.75 \text{ L}} \Rightarrow M = 0.0121 \text{ M H}_2\text{SO}_4$$



$$\text{Step 4: } \text{pH} = -\log[\text{H}^+] \Rightarrow \text{pH} = -\log[0.0242 \text{ M}] \Rightarrow \text{pH} = 1.62$$

3. A. Write the equation for the dissociation of sodium hydroxide.



- B. Find the pH of a 0.000841 M solution of sodium hydroxide.

$$\text{pOH} = -\log[\text{OH}^-]$$

$$\text{pOH} = -\log[0.000841 \text{ M}]$$

$$\text{pOH} = 3.08$$

$$\text{pH} + \text{pOH} = 14$$

$$\text{pH} + 3.08 = 14$$

$$\text{pH} = 10.92$$

or

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

$$1 \times 10^{-14} = [\text{H}^+][0.000841 \text{ M}]$$

$$[\text{H}^+] = [1.19 \times 10^{-11} \text{ M}]$$

$$\text{pH} = -\log[\text{H}^+]$$

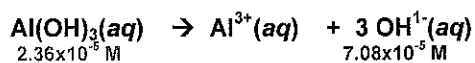
$$\text{pH} = -\log[1.19 \times 10^{-11} \text{ M}]$$

$$\text{pH} = 10.92$$

Wkst: 18D - Key

continued

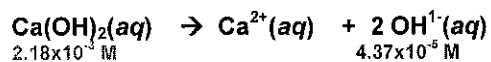
4. A. Write the equation for the dissociation of aluminum hydroxide.



- B. If the pH is 9.85, what is the concentration of the aluminum hydroxide solution?

$$\begin{aligned} \text{pH} + \text{pOH} &= 14 & \text{pOH} &= -\log[\text{OH}^{-}] & \frac{7.08 \times 10^{-5} \text{ M}}{3} &= 2.36 \times 10^{-5} \text{ M} \\ 9.85 + \text{pOH} &= 14 & 4.15 &= -\log[\text{OH}^{-}] & & \\ \text{pOH} &= 4.15 & & & & \\ & & \boxed{2^{\text{nd}} \log} - 4.15 &= [\text{OH}^{-}] & & \\ & & [\text{OH}^{-}] &= 7.08 \times 10^{-5} \text{ M} & & \end{aligned}$$

5. A. Write the equation for the dissociation of calcium hydroxide.



- B. If the pH is 11.64 and you have 2.55 L of solution, how many grams of calcium hydroxide are in the solution?

$$\begin{aligned} \text{pH} + \text{pOH} &= 14 & \text{pOH} &= -\log[\text{OH}^{-}] & \frac{2.18 \times 10^{-3} \text{ M}}{2} &= 4.37 \times 10^{-3} \text{ M} \\ 11.64 + \text{pOH} &= 14 & 2.36 &= -\log[\text{OH}^{-}] & & \\ \text{pOH} &= 2.36 & & & & \\ & & \boxed{2^{\text{nd}} \log} - 2.36 &= [\text{OH}^{-}] & & \\ & & [\text{OH}^{-}] &= 4.37 \times 10^{-3} \text{ M} & & \end{aligned}$$

$$M = \frac{\text{mol}}{\text{L}} \Rightarrow 2.18 \times 10^{-3} \text{ M} \Rightarrow \frac{x \text{ mol Ca(OH)}_2}{\text{L}} \Rightarrow x = 5.57 \times 10^{-3} \text{ mol Ca(OH)}_2$$

$$x \text{ g Ca(OH)}_2 = 5.57 \times 10^{-3} \text{ M} \left(\frac{74 \text{ g Ca(OH)}_2}{1 \text{ mol Ca(OH)}_2} \right) = 0.412 \text{ g Ca(OH)}_2$$