

**PRACTICE**

- Chloric acid,  $\text{HClO}_3$ , is a strong acid. What is the concentration of a chloric acid solution with a pH of 2?
- What is the concentration of a hydrochloric acid (HCl) solution with a pH of 5? Hydrochloric acid is a strong acid.
- A solution is composed of the strong acid nitric acid,  $\text{HNO}_3$ , dissolved in water. If the solution has a pH of 3, what is the concentration of the solution?
- A permanganic acid ( $\text{HMnO}_4$ ) solution has a pH of 5. Given that permanganic acid is a strong acid, what is the concentration of the solution?
- Hydrobromic acid is a strong acid. A hydrobromic acid solution has a pH of 3. What is the concentration of hydrobromic acid in the solution?
- What is the concentration of an  $\text{HBF}_4$  solution that has a pH of 6?  $\text{HBF}_4$  is a strong acid.
- $\text{HIO}_4$ , or periodic acid, is a strong acid. What is the concentration of periodic acid in a solution whose pH is 1?

**MIXED PRACTICE**

- What is the pH of a  $1 \times 10^{-4}$  solution that contains dissolved  $\text{HClO}_3$ , a strong acid?
- What is the concentration of a solution with a pH of 3, if it contains the strong acid HI, or hydroiodic acid?
- What is the pH of a 0.01 M permanganic acid solution? Permanganic acid is a strong acid.

- Sulfuric acid is a strong acid. A sulfuric acid solution has a pH of 6. What is the concentration of the solution?
- What is the concentration of a hydrochloric acid (HCl) solution with a pH of 3? Hydrochloric acid is a strong acid.
- Calculate the pH of a  $1 \times 10^{-5}$  solution of  $\text{HClO}_3$ , a strong acid.

**Math Skills**

**DETERMINING pH**

- 6
- 2
- 3.3
- 6
- 5
- 3
- 7.5
- 8.2
- 0.01 M
- 0.000 01 M
- 0.001 M
- 0.000 01 M
- 0.001 M
- 0.000001 M
- 0.1 M
- 4
- 0.001 M
- 2
- 0.000001 M
- 0.001 M
- 5

Math Skills *continued*

- What is the pH of a 0.000 001 M solution of HCl, a strong acid?
- Periodic acid,  $\text{HIO}_4$ , is a strong acid. If periodic acid is dissolved in a  $1 \times 10^{-5}$  M solution, what is the pH of the solution?
- A given solution has  $\text{HNO}_3$ , nitric acid, dissolved in it. If the solution is a 0.001 M solution, what is its pH?
- What is the pH of a 0.000 01 M solution of the strong acid, hydrobromic acid?
- Perchloric acid, or  $\text{HClO}_4$ , is dissolved in a  $1 \times 10^{-2}$  M solution. What is the pH of the solution?

**PROBLEM**

A solution with a pH of 4 consists of the strong acid sulfuric acid, or  $\text{H}_2\text{SO}_4$ , dissolved in water. What is the molarity of the solution?

**Step 1: List the given and unknown values.**

Given: pH of solution = 4

Unknown: molarity

**Step 2: Convert the pH to  $\text{H}_3\text{O}^+$  concentration.**

pH = the negative of the power of ten used to describe the concentration of hydronium ions

concentration of  $\text{H}_3\text{O}^+ = 1 \times 10^{-(\text{pH})}$  M

pH = 4

concentration of  $\text{H}_3\text{O}^+ = 1 \times 10^{-4}$  M

**Step 3: Convert the  $\text{H}_3\text{O}^+$  concentration to acid concentration.**

Since  $\text{H}_2\text{SO}_4$  is a strong acid,  $\text{H}_3\text{O}^+$  concentration =  $\text{H}_2\text{SO}_4$  concentration

$\text{H}_3\text{O}^+$  concentration =  $1 \times 10^{-4}$  M

$\text{H}_2\text{SO}_4$  concentration =  $1 \times 10^{-4}$  M = 0.0001 M

Skills Worksheet

Math Skills

**Determining pH**

After you study each sample problem and solution, work out the practice problems on a separate sheet of paper. Write your answers in the spaces provided.

**PROBLEM**

What is the pH of a 0.001 M solution of the strong acid HI dissolved in water?

**SOLUTION**

**Step 1: List the given and unknown values.**

Given: concentration of HI in solution = 0.001 M

Unknown: pH

**Step 2: Determine the molar concentration of hydroxide ions.**

concentration of HI in solution = 0.001 M

HI is a strong acid, so the concentration of hydroxide ions in the solution is equal to the concentration of HI

concentration of  $\text{H}_3\text{O}^+$  ions = concentration HI = 0.001 M =  $1 \times 10^{-3}$  M

**Step 3: Convert the  $\text{H}_3\text{O}^+$  concentration to pH**

pH = the negative of the power of ten used to describe the concentration of  $\text{H}_3\text{O}^+$  ions

concentration of  $\text{H}_3\text{O}^+$  ions =  $1 \times 10^{-3}$  M

pH =  $-(-3) = 3$

**PRACTICE**

1. A strong acid, HBr, has been dissolved into a beaker of water. If the solution is known to be 0.000 001 M, what is the pH of the solution?

2. Tetrafluoroboric acid,  $\text{HBF}_4$ , is dissolved into a  $1 \times 10^{-2}$  M solution. Since tetrafluoroboric acid is a strong acid, what is the pH of the solution?

3. What is the pH of a 0.001 M solution of HI, a strong acid, dissolved in solution?

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