

The letters "pH" represent the French words "pouvoir hydrogene" which means "hydrogen power".

- The definition of pH is *pH is equal to the negative log (logarithm) of the \_\_\_\_\_ ion concentration of a solution.*
- The logarithm of a number is the power to which 10 must be raised to equal that number.

A pH value of less than 7 indicates a(n) \_\_\_\_\_ solution. A pH value of \_\_\_\_\_ indicates a neutral solution. A pH value of more than 7 indicates a(n) \_\_\_\_\_ solution.

**PROBLEMS:** Show all work and circle the final answer.

1. Determine the pH of a 0.010 M HNO<sub>3</sub> solution.
2. What is the pH of a  $2.5 \times 10^{-6}$  M solution of HCl?
3. Calculate the pH of a solution of 0.0025M H<sub>2</sub>SO<sub>4</sub>.
4. Calculate the pH of a 0.0010 M NaOH solution.
5. What is the pH of a 0.020M Sr(OH)<sub>2</sub> solution?

6. a) What is the hydrogen ion concentration of an aqueous HCl solution that has a pH of 3.0?

b) What is the hydroxide ion concentration of this same solution?

c) Which ion,  $H^+$  or  $OH^-$ , is in greater concentration? \_\_\_\_\_

d) Is this solution acidic or basic? \_\_\_\_\_

7. Find the  $[H^+]$  and the  $[OH^-]$  of a solution with a pH of 3.494.

Is this solution acidic or basic? \_\_\_\_\_

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- The logarithm of a number is the power to which 10 must be raised to equal that number.

A pH value of less than 7 indicates a(n) acidic solution. A pH value of 7 indicates a neutral solution. A pH value of more than 7 indicates a(n) basic solution.

**PROBLEMS:** Show all work and circle the final answer.

1. Determine the pH of a 0.010 M HNO<sub>3</sub> solution.

$$\text{pH} = -\log(0.010) = \boxed{2}$$

2. What is the pH of a  $2.5 \times 10^{-6}$  M solution of HCl?

$$\text{pH} = -\log(2.5 \times 10^{-6}) = \boxed{5.60}$$

3. Calculate the pH of a solution of 0.0025M H<sub>2</sub>SO<sub>4</sub>.

$$\text{pH} = -\log(0.0025) = \boxed{2.60}$$

4. Calculate the pH of a 0.0010 M NaOH solution.

$$\text{pOH} = -\log(0.0010) = 3$$

$$14 - 3 = 11$$

$$\text{pH} = \boxed{11}$$

5. What is the pH of a 0.020M Sr(OH)<sub>2</sub> solution?

$$\text{pOH} = -\log(0.020) = 1.7$$

$$14 - 1.7 = 12.3$$

$$\text{pH} = \boxed{12.3}$$

6. a) What is the hydrogen ion concentration of an aqueous HCl solution that has a pH of 3.0?

$$[H^+] = 1.0 \times 10^{-3} = \boxed{0.001 M}$$

or

$$\boxed{1 \times 10^{-3} M}$$

- b) What is the hydroxide ion concentration of this same solution?

$$K_w = [H^+][OH^-] = 1.0 \times 10^{-14}$$

$$\frac{1.0 \times 10^{-14}}{1.0 \times 10^{-3}} = [OH^-] = \boxed{1.0 \times 10^{-11} M}$$

- c) Which ion,  $H^+$  or  $OH^-$ , is in greater concentration?  $H^+$

- d) Is this solution acidic or basic? acidic

7. Find the  $[H^+]$  and the  $[OH^-]$  of a solution with a pH of 3.494.

$$[H^+] = 1 \times 10^{-3.494} = 3.21 \times 10^{-4}$$

$$[OH^-] = 3.12 \times 10^{-11}$$

- Is this solution acidic or basic? acidic