

Determining the Acidity of a Solution

Objectives

1. To understand pH and pOH
2. To learn to find pH and pOH for various solutions
3. To use a calculator to find pH
4. To learn methods for measuring pH of a solution
5. To learn to calculate the pH of strong acids

Determining the Acidity of a Solution

A. The pH Scale

- The “p scale” is used to express small numbers.
- $\text{pH} = -\log [\text{H}^+]$

Steps for Calculating pH on a Calculator

Step 1 Enter (–).

Step 2 Press the \log key.

Step 3 Enter the $[\text{H}^+]$.

Section 16.2

Determining the Acidity of a Solution

A. The pH Scale

The number of decimal places for a log must be equal to the number of significant figures in the original number.

$$[\text{H}^+] = \overbrace{1.0}^{\substack{\text{2 significant} \\ \text{figures}}} \times 10^{-5} \text{ M} \quad \text{and} \quad \text{pH} = 5.\underbrace{00}_{\substack{\text{2 decimal} \\ \text{places}}}$$

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A. The pH Scale

Table 16.2

The Relationship of the H^+ Concentration of a Solution to Its pH

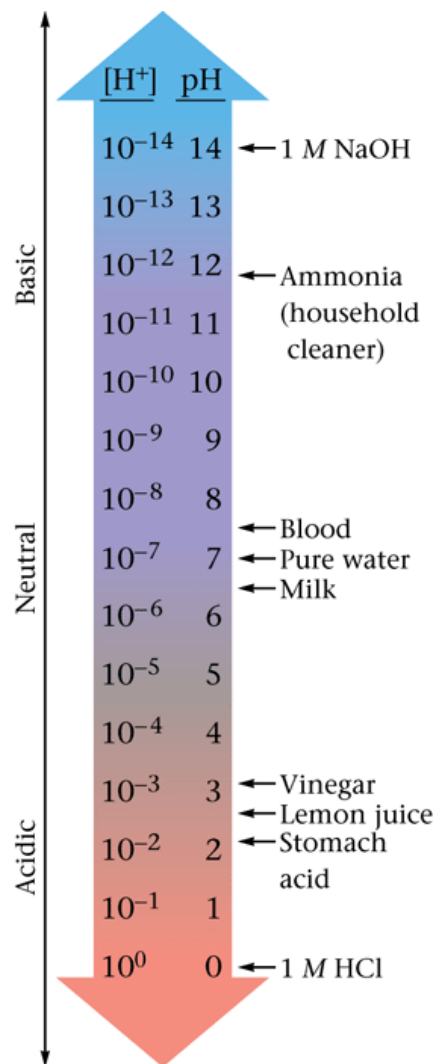
$[H^+]$	pH
1.0×10^{-1}	1.00
1.0×10^{-2}	2.00
1.0×10^{-3}	3.00
1.0×10^{-4}	4.00
1.0×10^{-5}	5.00
1.0×10^{-6}	6.00
1.0×10^{-7}	7.00

- Because the pH scale is a log scale based on 10, the pH changes by 1 for every power of 10 change in the $[H^+]$.

Section 16.2

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- pOH scale

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

- $\text{pH} + \text{pOH} = 14.00$

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Steps for Calculating $[H^+]$ from pH

- Step 1** Take the inverse log (antilog) by using the $\boxed{2nd}$ $\boxed{\log}$ keys in that order. (Your calculator may require different keys for this operation.)
- Step 2** Enter (–).
- Step 3** Enter the pH.

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B. Measuring pH

- Indicators – substances that exhibit different colors in acidic and basic solutions



- In an acid solution the indicator will be in the **HIn** form.
- In a basic solution the indicator will be in the **In⁻** form.

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B. Measuring pH

- Other methods
 - Indicator paper
 - pH meter

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C. Calculating the pH of Strong Acid Solutions

- Determine the $[H^+]$.
- $pH = -\log[H^+]$