

Using Logarithms in pH Calculations

It is easy to find the pH or the $[\text{H}_3\text{O}^+]$ of a solution by using a scientific calculator. Because calculators differ, check your manual to find out which keys are used for log and antilog functions and how to use these functions.

1. Calculating pH from $[\text{H}_3\text{O}^+]$

Use the definition of pH:

$$\text{pH} = -\log [\text{H}_3\text{O}^+]$$

- Take the logarithm of the hydronium ion concentration.
- Change the sign (+/-).
- The result is the pH.

2. Calculating $[\text{H}_3\text{O}^+]$ from pH

If you rearrange $\text{pH} = -\log [\text{H}_3\text{O}^+]$ to solve for $[\text{H}_3\text{O}^+]$, the equation becomes

$$[\text{H}_3\text{O}^+] = 10^{-\text{pH}}$$

- Change the sign of the pH (+/-)
- Raise 10 to the negative pH power (take the antilog).
- The result is $[\text{H}_3\text{O}^+]$.