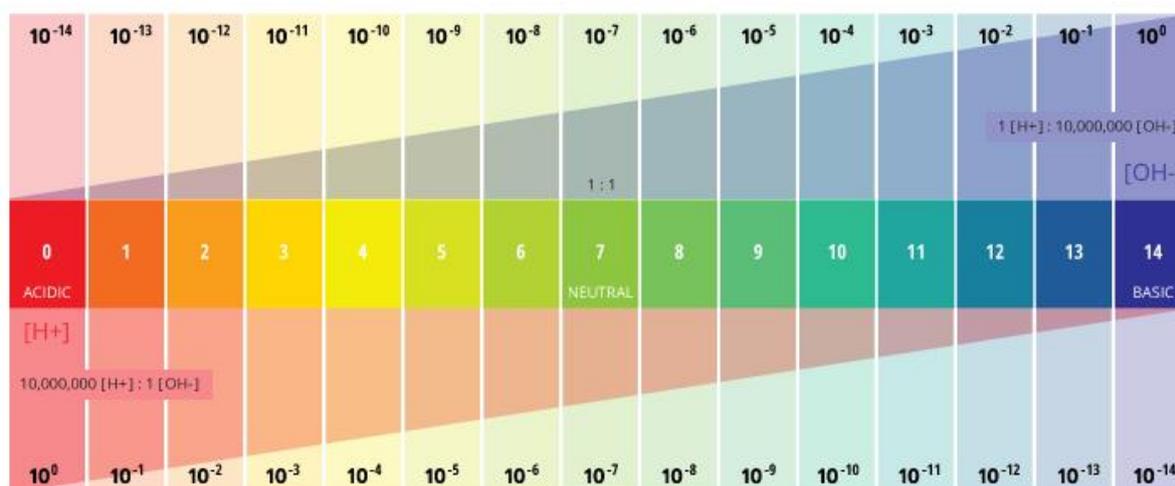


pH of Water

What is pH?

pH is a determined value based on a defined scale, similar to temperature. This means that pH of water is not a physical parameter that can be measured as a concentration or in a quantity. Instead, it is a figure between 0 and 14 defining how acidic or basic a body of water is along a logarithmic scale ¹. The lower the number, the more acidic the water is. The higher the number, the more basic it is. A pH of 7 is considered neutral. The logarithmic scale means that each number below 7 is 10 times more acidic than the previous number when counting down. Likewise, when counting up above 7, each number is 10 times more basic than the previous number ².



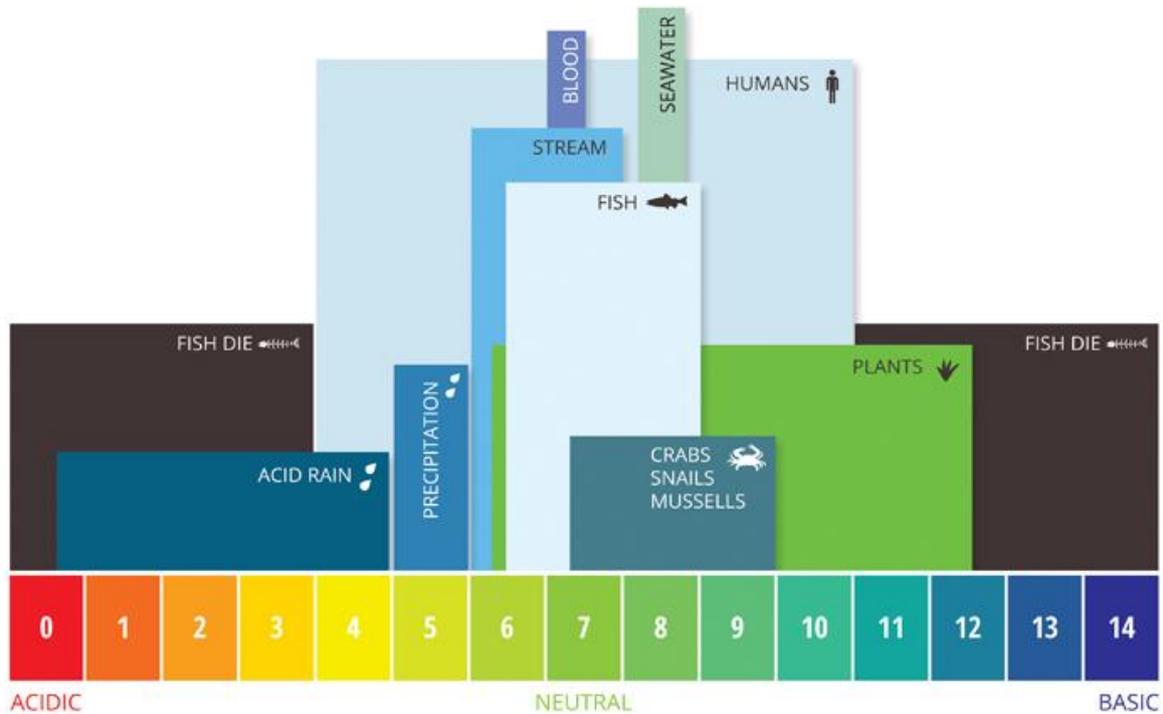
The logarithmic scale of pH means that as pH increases, the H^+ concentration will decrease by a power of 10. Thus at a pH of 0, H^+ has a concentration of 1 M. At a pH of 7, this decreases to 0.0000001 M. At a pH of 14, there is only 0.000000000000001 M H^+ .

pH stands for the "power of hydrogen" ³. The numerical value of pH is determined by the molar concentration of hydrogen ions (H^+) ³. This is done by taking the negative logarithm of the H^+ concentration ($-\log(H^+)$). For example, if a solution has a H^+ concentration of 10^{-3} M, the pH of the solution will be $-\log(10^{-3})$, which equals 3.

This determination is due to the effect of hydrogen ions (H^+) and hydroxyl ions (OH^-) on pH. The higher the H^+ concentration, the lower the pH, and the higher the OH^- concentration, the higher the pH. At a neutral pH of 7 (pure water), the concentration of both H^+ ions and OH^- ions is 10^{-7} M. Thus, the ions H^+ and OH^- are always paired – as the concentration of one increases, the other will decrease; regardless of pH, the sum of the ions will always equal 10^{-14} M ². Due to this influence, H^+ and OH^- are related to the basic definitions of acids and bases.

Why is pH Important?

If the pH of water is too high or too low, the aquatic organisms living within it will die. pH can also affect the solubility and toxicity of chemicals and heavy metals in the water¹². The majority of aquatic creatures prefer a pH range of 6.5-9.0, though some can live in water with pH levels outside of this range.



Aquatic pH levels. The optimum pH levels for fish are from 6.5 to 9.0. Outside of optimum ranges, organisms can become stressed or die.

Source:

Fondriest Environmental, Inc. "pH of Water." Fundamentals of Environmental Measurements. 19 Nov. 2013. Web. < <https://www.fondriest.com/environmental-measurements/parameters/water-quality/ph/> >.