

pH

pH is a measure of how acidic or basic a substance is. A pH value of 0 is very acidic and a pH value of 14 is very basic or alkaline. If a substance has a pH value of 7, it is said to be neutral, that is, it is neither acidic or basic. pH is defined as the negative logarithm of the hydrogen ion concentration. What this means is that a pH of 6 is 10 times more acid than a pH of 7. A pH of 5 is 100 times more acid (not twice!) than 7, and a pH of 4 is 1000 times more acid (not 3 times) than a pH of 7. This same logarithmic trend holds true for basic pH values above 7. Therefore, a pH change of only one unit is 10 times more acid or basic, depending on whether you are increasing or decreasing the pH. This is quite a large change in the aquatic environment.

Different forms of aquatic life prefer certain pH levels. For example, most fish species prefer a pH in the range of 6 to 9. At pH levels below about 5.5 or above 10.0, many species of fish may not grow and reproduce as well. Once pH drops to 4.5 or below, many fish species will die. This is called the acid death point. If the pH reaches 11 (alkaline death point), fish will also begin to die.

One form of pollution that can decrease pH to levels that are harmful to aquatic life is acid rain. If large amounts of sulfur and nitrogen oxide gases are allowed to be released from coal or oil burning factories and from auto exhausts, they travel into the atmosphere and mix with rain to form acid rain. However, even normal rainfall has a pH of about 5.6, and even though that is slightly acidic, it must have a pH of below 5.6 to be considered acid rain. Acidic rainfall may kill aquatic life. Approximately 70 percent of the lakes in Norway and 80 percent in the Adirondack Mountains of New York have no fish in them because of acidic rain. To help reduce the effects of acid rain, anti-pollution devices have been installed on many factories and automobiles.

Don't forget that some waters are naturally acidic because of the soil characteristics of that particular region and not because of acid rainfall. However, when the pH of a pond, river or lake rises about 11 or falls below 4.5, very little aquatic life will be able to survive.

Using the test kit provided, measure the pH of a variety of water from different sources. Did you know that distilled water is neither acid or basic, which means it has a pH that is neutral or 7? To give you an idea of the pH of liquids other than water, consider that battery acid has a pH of near 0, milk- 6.6, blood-7.5, oceans-8.0, ammonia- 11.0 and household lye-13.6.

