

pH and the Properties of Water

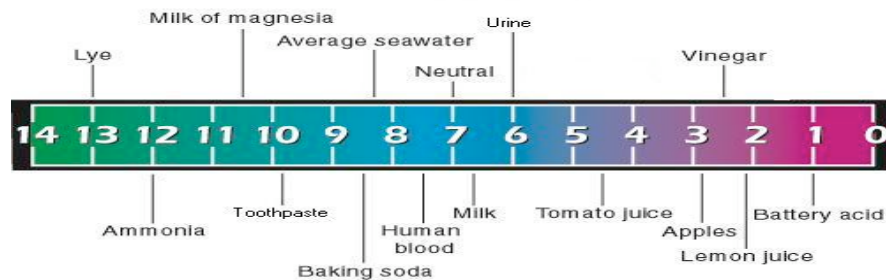
Introduction

Water is essential for all life. All the chemistry to conduct life occurs in water inside and outside your cells. Water is made of H_2O molecules. The two hydrogen are covalently bonded to the oxygen, meaning the hydrogen atoms "share" electrons with the oxygen atom.

Water can be broken up (ionized) into hydrogen ions (H^+) and hydroxide ions (OH^-).
($H_2O \leftrightarrow H^+$ and OH^-)

In pure water the number, or concentration, of H^+ and OH^- ions are equal. Pure water is said to be *neutral* and has a pH of 7. pH, which stands for $-\log$ [hydrogen], measures the concentration of hydrogen ions. If the concentration of H^+ is greater than the concentration of OH^- ions the water solution is said to be *acidic and has a pH less than 7*. If the H^+ is less than the concentration of OH^- the water solution is said to be *basic and has a pH that is greater than 7*.

Most cells can only survive within a certain range of pH. Human blood has a pH of approximately 7.2 any higher or lower and the blood cells would be injured or destroyed. Bases have the ability to dissolve fats and oils, which is why many cleaning products for ovens have a pH of around 12.



Answer the following questions in complete sentences:

1. What is an ion?
2. A solution with a pH of 6.5 is said to be _____. A solution with a pH 10 is said to be _____.
3. Which is more acidic vinegar or tomato juice?
4. Which is more basic toothpaste or human blood?
5. What subatomic particle (proton, neutron, or electron) do atoms gain or lose in order to become charged?
6. Hydroxide ions have a negative charge, why?
7. Hydrogen ions have a positive charge, why?
8. If you add lemon juice to pure water what would happen to the pH? What is in the lemon juice that makes the solution this way?