



Department of Forensic evidence



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Biology Lab

((Water, Acids, Bases and pH))

Lab/5

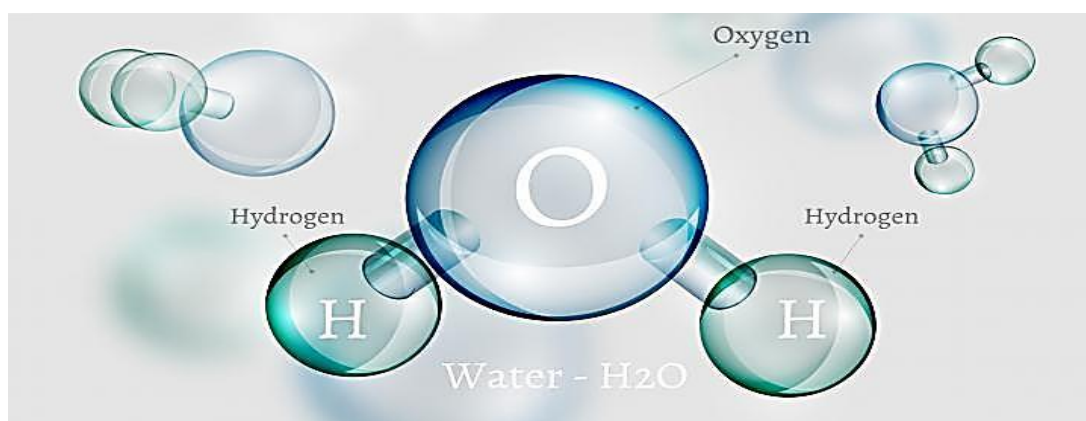
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By

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Water:

Water is one of our most important natural resources and essential for the survival of all living things. Water is made up of tiny units called molecules which are made of even tinier units called atoms. A molecule of water is made of three atoms - two hydrogen atoms and one oxygen atom. The chemical formula for water is H_2O . Water can be found in three physical states on earth: liquid, solid (ice) and gas (water vapor). The freezing point of water is $0^{\circ}C$ and the boiling point is $100^{\circ}C$, one liter of water in liquid form weighs about 1kg.



Acids:

Acids are substances that contain one or more hydrogen atoms that, in solution, are released as positively charged hydrogen ions. An acid in a water solution tastes sour, changes the colour of blue litmus paper to red, reacts with some metals (e.g., iron) to liberate hydrogen, reacts with bases to form salts.

Acids classified on the basis of their source or origin:

- 1) **Organic Acid:** This is the acid obtained from organic materials such as plants and animals. For e.g. Citric acid (Citrus fruits), Acetic acid (Vinegar), Oleic acid (Olive oil), etc.



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2) **Mineral Acid:** Mineral acid is procured from minerals. They are also known as inorganic acids. They do not contain carbon. For e.g. H_2SO_4 , HCl , HNO_3 , etc.

Bases:

Bases are substances that are slippery to touch when in aqueous form. Usually, bases taste bitter. They also change the color of red litmus paper to blue. Bases also dissociate in the water like acids, but instead of producing H^+ they produce OH^- i.e. hydroxyl ion, some examples are caustic soda or sodium hydroxide, calcium hydroxide or limewater, borax. A lot of bleaches, soaps, detergents, kinds of toothpaste, etc are bases.

*** Bases lose their basicity when mixed with water, acids and bases react to form salt and water. This process is known as neutralization.**

PH:

PH stands for Hydrogen potentials. It refers to the concentration of the hydrogen ions in a solution. This is the indicator of a solution's acidity or alkalinity.

pH of Acids and Bases

The pH of a solution varies from 0 to 14.

Solutions having a value of pH ranging from **0 to 7** on the pH scale are termed as **acidic** and the value of pH ranging from **7 to 14** on pH scale are known as **basic** solutions.

Solutions having the value of pH equal to 7 on pH scale are known as neutral solutions.

There are two methods for measuring pH:

- 1- colorimetric methods using indicator solutions or papers.
- 2- accurate electrochemical methods using electrodes and a millivoltmeter (pH meter).

