

P^H OF SOLUTION

Introduction

- We taste food sour and bitter, it is only because of presence of acids and bases respectively.

Litmus Solution

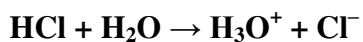
- Litmus, which is extracted from lichen, has purple color (see the image given below), but the condition is when it is neither acidic nor basic, i.e. neutral.



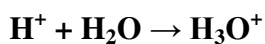
- Litmus basically is a plant belongs to Thallophyta, and in chemical experiment, it is commonly used as an indicator.
- The substances, which odor changes in acidic or basic media, are known as **olfactory** indicators.

Acid or Base in a Water Solution

- The hydrogen ions in HCl are produced because of the presence of water. Secondly, the separation of H⁺ ion from the HCl molecules cannot be done in the absence of water. The chemical formula is illustrated below



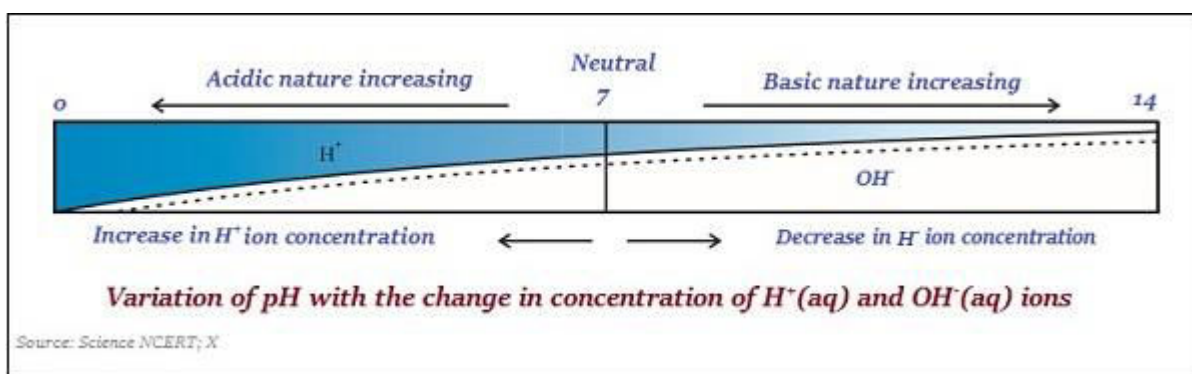
- Furthermore, hydrogen ions cannot exist alone, but they can exist in presence of water molecules. Therefore, hydrogen ions are shown as H⁺(aq) or hydronium ion (H₃O⁺). The chemical formula is –



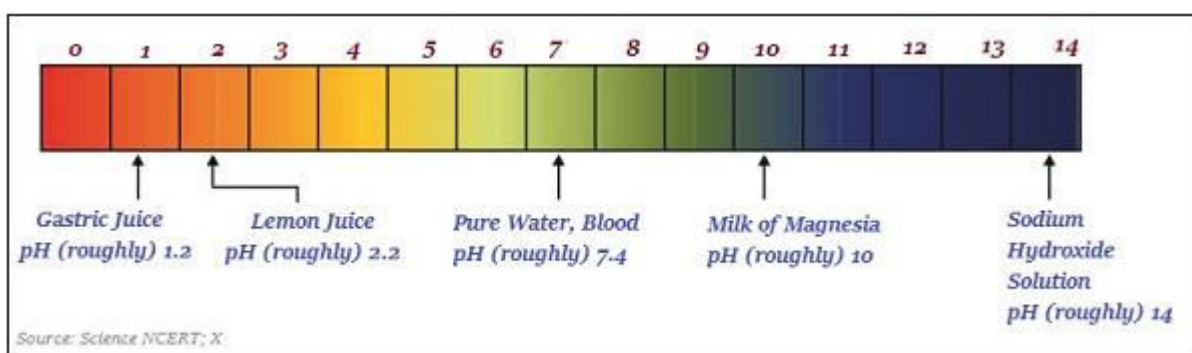
- The bases which are soluble in water are known as **alkalis**. But all bases are not soluble in water.
- If water is added to a concentrated acid, then the heat is generated.
- Mixing an acid or base with the water results into decrease in the concentration of ions (i.e. H₃O⁺/OH⁻) per unit volume and the process is known as **dilution**.

pH Scale

- A scale, used in measuring the hydrogen ion concentration in a solution, is known as **pH scale**.
- The ‘**p**’ in pH stands for ‘**potenz**’, it is a German term, which means ‘**power**’.
- pH value is taken simply as a number, which indicates the acidic or basic nature of a solution. So, if the concentration of hydronium ion is higher, then the value of pH would be lower.
- The value of pH scale ranges between ‘**0**’ and ‘**14**’; so, if pH value is measured ‘**0**,’ it means – it is very **acidic** and if it is 14, then it means – it very **alkaline**.
- The neutral value of pH scale is ‘**7**’.
- On a pH scale, values less than 7 represent an acidic solution and values greater than 7 represent a basic solution.
- Usually, paper impregnated with the common indicator is used for measuring the pH (see the image given below)–



- Likewise, the strength of acids and bases substance mainly depends on the number of H^+ ions and OH^- ions produced, respectively.
- The following image roughly illustrates (variations in color) the pH value of some of the common substances –



Importance of pH in Everyday Life

- The pH value of a human body ranges between 7.0 and 7.8.
- The stomach of a human body produces hydrochloric acid that helps in the digestion of food; surprisingly, it does not harm the stomach anyway.

- However, when the stomach produces too much acid (known as indigestion), it causes pain and irritation. To get relief from this pain, doctors suggest the use of bases known as antacids.
- These antacids neutralize and control the increased amount of acid.
- The teeth, which are made up of calcium phosphate, is the hardest substance in the body. However, when the pH in the mouth decreases (below 5.5), it corrodes the teeth.
- The salt, normally, is formed by the combination of hydrochloric acid and sodium hydroxide solution; and, the combination is known as sodium chloride.
- When the pH value of rain water is measured as less than 5.6, it is known as **acid rain**.
- When acid rain flows into the rivers, then it also lowers the pH of the river water
- The acidic river water is threat for the survival of aquatic life.