

Name of the Project:

Collecting and tabulating the pH values of common food items and household materials.

Objectives:

- Students understand the importance of the pH value in daily life.
- Students will separate substances into acids, bases and neutral based on pH values.
- Students will get an idea about acidity in various substances.

Tools:

pH Papers, Small beaker or Watch glass, Distilled water, Household food items and other liquids and Pencil etc.

Procedure:

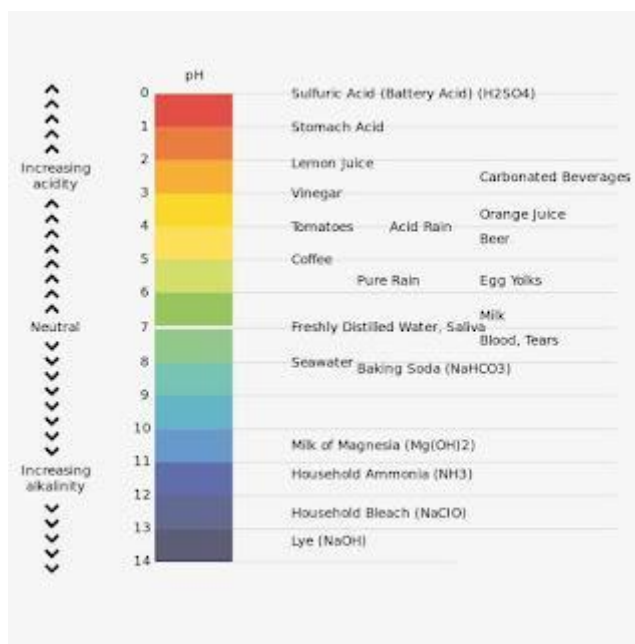
Our daily life we take different substances as our food. Each food material has its own taste, some are sour and some bitter in taste. Different food items have different tastes because of the percentage of acids and bases present in them. The acidic and basic nature of the substances is generally decided with H^+ ions present in their aqueous solutions.

Concentration of H^+ or H_3O^+ ions for acids is 10^0 to 10^{-6} , for bases 10^{-8} to 10^{-14} . If H^+ ion concentration is 10^{-7} for any substance that is considered as neutral. From this it is clear that we are dealing with very small values of H^+ ion concentration to decide acid, base and neutral substance. To avoid the negative powers of H^+ ion concentration in acids and base solutions, Sorensen introduced the concept pH. A scale for measuring hydrogen ion concentration in a solution is called pH scale. The pH value of a solution is simply a number which indicates the acidic or basic nature of a solution.

The negative logarithm of H^+ ions is called pH value.

$$pH = -\log(H^+)$$

The pH value is 7 for the neutral solutions like water. If the pH values less than 7 (0 to 6) represent acidic solutions. If the pH value increases from 7 to 14 or pH value above 7 represents a basic solution.



The universal indicator (pH paper) is used to know the strength of acid or base. Universal indicator is a mixture of several indicators. The universal indicator shows different colours at different concentrations of hydrogen in a solution. To know the pH values of common food items or other solutions, first we need to collect the juice of each food item for example lemon, apple, tamarind, orange etc. and sanitary solutions like floor cleaners, and prepare an aqueous solution. Take a few drops of solution of these items in a beaker or watch glass and take a pH paper and dip in the solution, as soon as we dip pH paper in the solution it changes its colour. As per the changing of colour, with the help of pH scale it is easy to guess the pH value of the solution of food items and household substances. Now tabulate all the pH values and nature of the solution.

pH values of Common Food items and Household materials:

S. No	Name of the Item	Approximate pH value	Acidic/Basic/Neutral Nature
1	Apple Juice	3.3 - 4	Acidic

2	Lemon Juice	2 - 3	Acidic
3	Pure Water	7	Neutral
4	Ginger	5.6 - 5.9	Mild Acidic
5	Garlic	5.8	Mild Acidic
6	Buttermilk	4.4 - 4.8	Acidic
7	Carrot Juice	5.8 - 6.4	Mild Acidic
8	Tomato Juice	4.1 - 4.6	Acidic
9	Vinegar	2.4 - 3.4	Acidic
10	Tamarind	3	Acidic
11	Tea	7.2	Mild Basic
12	Milk	6.4 - 6.8	Mild Acidic
13	Baking Soda	8.3	Basic
14	Common Salt	7	Neutral
15	Toilet Cleaner	1 - 3	Acidic
16	Cold Drink	5	Acidic
17	Antacid Tablet	9.9	Basic
18	Groundnut Oil	6.5 - 6.8	Mild Acidic
19	Palm Oil	4.5 - 6.6	Mild Acidic
20	Blood	7.35 - 7.45	Mild Basic

From the above table it is clear that most of the food items we eat are acidic, very few are basic. The pH value of some of the items like water and salt is 7, these are considered as neutral in nature.

Conclusion:

Living organisms can survive only in a narrow range of pH change. When pH of rain water is less than 5.6, it is called acidic rain. Acidic rain lowers the pH values of water and leads to difficulty of survival of aquatic animals. Tooth decay starts

when the pH of the mouth is lower than 5.5. The pH value of the soil decides which fertilizers to be used for good yielding. Plants require a specific pH range for their healthy growth. The concept of pH scale is essential, especially useful for considering the relationship between pH level and toxicity.

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