* Determination soil reaction (pH)

Introduction:-

Soil reaction refers to the relationship between the concentration of hydrogen ions (H+) and hydroxyle ions (OH-) in the soil solution.

$$H_2O \longleftrightarrow H^+ + OH^-$$

Water hydrogen ion hydroxyl ion

This ionization of water is controlled by ionization constant (Kw)

$$Kw = \frac{(H^+)\,(OH)}{HOH} = 1*10^{-14}$$

The activity of HOH is equal 1unit. In pure water the two ions are in equal concentration of 10^{-7} mol/L solution

$(H^+)(OH^-) = 1*10^{-14}$

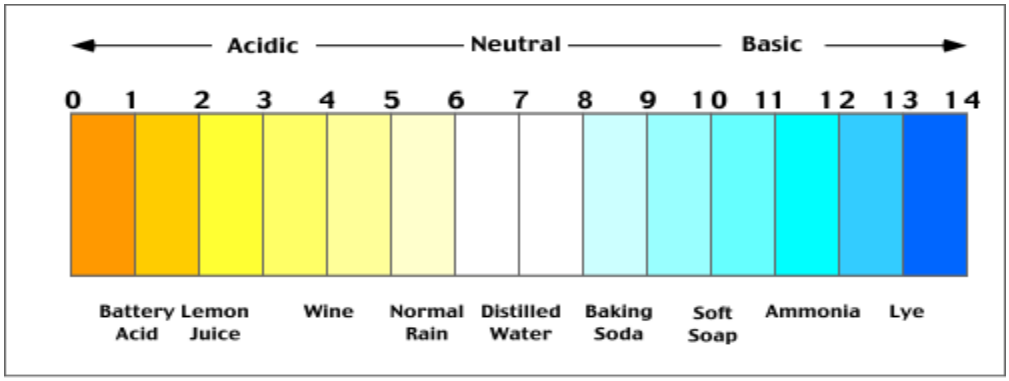
And $(H^+) = (OH^-) = 1*10^{-7}$

Sorenson 1909 defined pH as the **negative logarithm of the hydrogen activity.**

pH =- log (H+)

For example at pH= 5 this means that $(H^+) = 10^{-5}$, and pH 6 means that $H^+ = 10^{-6}$, note that pH5 is 10 times more acidic than pH6

The following scale describe the pH scale ranges from 0 to 14



The pH of normal soils range between 3 and 9

Importance of soil reaction

1- it affects the availability of nutrients in the soil. essential nutrients are most available to most plants at a pH between 6 to 7.5
at high pH, availability of phosphorus and most minor nutrients(except Boron and Molibidnium) decrease
at low pH, the solubility of the toxic heavy metals increase, and are absorbed by the plants

2- The CEC increase when pH increase, which also affect nutrients availability

Method of measurment of soil pH:

the method of determination pH for soil are classified into :-

1- colorimetric method:-

a) using litmos paper
b) using indicators

the pH determination by this method involves the use of indicator dyes, which exhibit a change in color when the pH of a solution changes between certain limits.

The method is suitable for routine rapid pH determination, particularly under field conditions.

2- PH meter:-

Measuring the pH:-

Soil suspention must be prepared by adding distilled water only

The ratio between Soil : Water is 1:1

Mix intermitently for 30 minutes then leave for 60 minutes

Apparatus

pH meter with glass electrode
Glass beakers - 25 ml

Reagent

Standard pH buffer solutions. Since soils of arid and semi-arid regions are alkaline in reaction, it is recommended to use, beside the pH 7 standard buffer solution, another standard solution in the pH range of 8.8 – 9.2 to calibrate the pH meter.

Procedure

1. Standardize the pH meter using the standard pH buffers, with ample rinsing of the electrode with distilled water each time it is dipped into a buffer solution. Make sure to make adjustment for temperature correction according to instruction usually provided with the buffer.
2. Transfer a portion of the already prepared soil filtrate to fill about 3/4 of a 25 ml tall beaker.
3. Rinse the electrode carefully with distilled water and immerse into the soil filtrate.
4. Record the pH reading when the reading stabilizes.