

## Acidity & Alkalinity in water

### Background Information

**Water acidity:** The acidity of water represents its ability to give protons that come from:

1. De-ionized molecules of ionized weak acids such as (carbonic acid and tannic acid).
2. Ferrous and aluminum salts
3. Weak mineral acids. Such as (sulfuric acid or hydrochloric acid).

CO<sub>2</sub> is the most likely cause of acidity in water, its result of respiration and autolysis Process of plants & animals in water. CO<sub>2</sub> concentrations effect to (pH) values in water that have different effects on aquatic organism, some of organism can lived in acidic medium reach to (pH = 2). So pH values vary throughout the day due to respiration and photosynthesis process that cased different acidity values in water.

### Procedure:

Because CO<sub>2</sub> is the most likely cause of acidity in water, the water sample should be collected within a few hours of the time of analysis. The container used to collect the water should be filled completely and closed with an air-tight seal. A clean plastic soft drink bottle with screw cap is suitable for water samples tested. in this procedure.

1. Take 100 ml from water sample either supplement or irrigated water by cylinder and put it in a flask.
2. Add 3 drops from **phenolphthalein** as indicator solution.
3. Titrate with 0.025N **sodium hydroxide** solution (NaOH).
4. Stir the water sample gently during the titration.
5. The (end point) of titration is the **start of pink color appearance** in the solution.
6. Record the volume of (NaOH) and calculate water acidity by following equation:

$$\text{Acidity} = \frac{(\text{ml NaOH titrant}) * (\text{Normality NaOH}) * 1000}{(\text{ml water sample})}$$

### Water alkalinity:

The alkalinity of water represents its ability to accept protons that come from:

1. Bases such as sodium hydroxide or potassium hydroxide and other hydroxide - compounds),
2. Dissolved carbonates,
3. Bicarbonates.

The total alkalinity in water range between (20-200) mg/L

Alkalinity found in water sample as following forms:

1.  $\text{CO}_3^{=}$
2.  $\text{HCO}_3^-$
3.  $\text{OH}^-$
4.  $\text{OH}^- + \text{CO}_3^{=}$
5.  $\text{HCO}_3^- + \text{CO}_3^{=}$

Alkalinity measurement is very important to treat waste & normal water and assign the irrigation water suitability; also it's considered as a control balance on sewage water treatment processes

#### Procedure:

1. Take 100 ml from water sample either supplement or irrigated water by cylinder and put it in a flask.
2. Add 3 drops from **phenolphthalein** as indicator solution.(1)
3. Add drops from **orange methyl** as indicator solution (2).
4. Titrate with (0.01 N) **Hydrochloric acid (HCL)** until solution color change from **yellow to peal orange**.
5. Record the volume of (HCL) and calculate water alkalinity by following equation:

$$\text{Alkalinity} = \frac{(\text{ml HCL titrant}) * (\text{Normality HCL}) * 1000}{(\text{ml water sample})}$$