

# ALKALINITY OF WATER


Balancing Environmental Health





# ABOUT ME

My name is **Dhanraj Priyadarshi**, and I'm currently a **1<sup>st</sup> semester** student here at **DIT**. I'm pursuing my degree in Bachelor of Technology CSE, a field that captivates my curiosity and drives my ambition.



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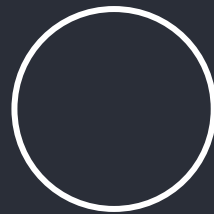
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01

# INTRODUCTION

A Brief Introduction about  
Alkalinity

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# ALKALINITY

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The concentration of ions in the water that neutralize the hydrogen ion is known as alkalinity. There are 3 types of alkalinity based on anions present in water:

- Hydroxide Alkalinity – occurs due to  $\text{OH}^-$  Ion
- Carbonate Alkalinity – occurs due to  $\text{CO}_3^{-2}$  Ion
- Bicarbonate Alkalinity – occurs due to  $\text{HCO}_3^-$  Ion











## Introduction

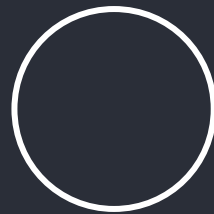
These compounds are obtained from the decomposition of minerals in the soil or the atmosphere. In addition to the mineral origin of the said components these materials can be obtained from the dissolution of carbon dioxide and from the microbial decomposition of organic matter.

High alkalinity gives a bitter taste to water. At the same time, however, the major concern about water alkalinity is related to the reactions that may occur between alkalinity and certain cations in water. The resulting sediment can lead to clogging of pipes and other water supply network accessories.



# ALKALINITY CHART

Result of Titration	$\text{OH}^-$	$\text{CO}_3^{2-}$	$\text{HCO}_3^-$
$P=0$			M
$P=M$	P=M		
$P=\frac{1}{2}M$		2P	
$P>\frac{1}{2}M$	2P-M	$2(M-P)$	
$P<\frac{1}{2}M$		2P	M-2P



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02

# PHENOLPHTHALEIN ALKALINITY

Determination of alkalinity  
using Phenolphthalein indicator

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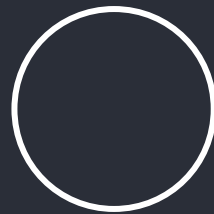






Phenolphthalein alkalinity is a specific type of alkalinity in a water sample characterized by the presence of  $\text{OH}^-$  and half of the carbonate  $\text{CO}_3^{2-}$  ions, detected using phenolphthalein as an indicator. It's an important concept in environmental science, chemistry, and water treatment processes because it helps determine the water's buffering capacity and the ability to neutralize acids, which is critical for aquatic life and water suitability for various uses.





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03

## METHYL ORANGE ALKALINITY

Determination of alkalinity  
using Methyl Orange indicator

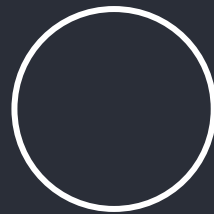
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Methyl orange alkalinity refers to the analytical procedure used to measure the alkalinity of a water sample, specifically targeting the amount of carbonate ( $\text{CO}_3$ ) and bicarbonate ( $\text{HCO}_3$ ) ions. Alkalinity is a measure of the water's capacity to neutralize acids, which is crucial for maintaining a stable pH, important for aquatic life and water quality.





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04

# EXPERIMENT

Experimentation Process for  
determination of alkalinity

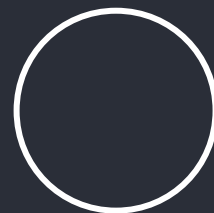
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## Materials Required

- Conical Flask
- Pipette
- Burette
- Standard HCL solution
- Phenolphthalein
- Methyl Orange
- Given Water Sample





## Procedure

- Take 25mL of water sample in a titration flask and add 2-3 drops of phenolphthalein.
- Titrate it sample against HCL solution until pink colour produced by phenolphthalein just disappears
- Note down this reading as Phenolphthalein endpoint
- Now add 2-3 drops of methyl orange in same solution





## Procedure

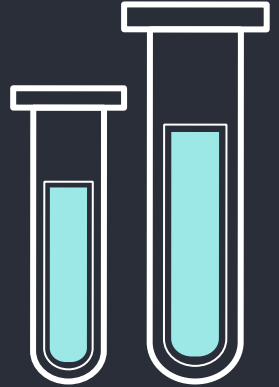




- Continue Titration until yellow colour changes into orange
- Note the volume of acid used, this is methyl orange endpoint
- Use the table shown in previous slides to find out the new [P] and [M] and calculate hardness accordingly and hardness causing substance





# WHOA!

This is the part of the where you ask  
questions regarding my presentation







“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.”

—Marie Curie





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THANK  
YOU



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# MY REFERENCES

## **Economical, Political, and Social Issues in Water Resources,**

Omid Bozorg-Haddad,  
Mohammad Delpasand, Hugo A.  
Loáiciga

## **Alkalinity and Water**

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