

## UNIT-I

### WATER TREATMENT AND TECHNOLOGY

#### 1.1 INTRODUCTION

Water is essential for the existence of human beings, animals and plants. Though 80% of the earth's surface is occupied by water, less than 1% of the water is available for ready use.

The main sources of water are

- Rain
- rivers and lakes (surface water)
- wells and springs (ground water)
- sea water

Among the above sources of water, rain water is the purest form of water but it is very difficult to collect whereas sea water is the most impure form. Thus, surface and ground water are normally used for industrial and domestic purposes. Such water must be free from undesirable impurities.

#### Water Treatment

*"The process of removing all types of impurities from water and making it fit for domestic or industrial purposes are called Water treatment or Water Technology"*

#### 1.2 HARDNESS OF WATER

**Definition:** If the water produces lather with soap, it is **soft water**. If the water does not produce lather with soap, it is called as **Hard water**. The property is known as hardness. But it will produce a scummy white precipitate. The hardness is due to  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Cl}^-$ ,  $\text{CO}_3^{2-}$ ,  $\text{HCO}_3^-$  ions and their salts.

**Test for hardness:** a) Eriochrome Black – T indicator gives wine red colour in hard water.

b) With soap, hard water gives a scummy precipitate.

#### Types of Hardness:

- a) **Temporary Carbonate hardness:** The hardness due to carbonates and bicarbonates can be removed by simple boiling. So, they are known as temporary or carbonate or alkaline hardness.



(b). **Permanent hardness:** (Non-carbonate): The hardness due to chlorides and sulphates cannot be removed by simple boiling. They need special methods like lime soda process and zeolite process. This hardness is called as "Permanent hardness or Noncarbonate or non alkaline hardness.



**Units of hardness:** i) ppm ii) mg/L iii) degree Clarkes iv) Degree French

# Engineering Chemistry 1 Water Unit Notes Ebicos

**David Albert Jenkins, American  
Association of Professors in Sanitary  
Engineering**

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