DETERMINATION OF TOTAL HARDNESS IN WATER SAMPLE:

AIM:

To estimate the total hardness of given water sample.

DEFINITION:

Hardness is defined as a characteristic of water representing the total concentration of calcium and magnesium.

PRINCIPLE:

Ethylene diamino tetra acetic acid (EDTA) and sodium salt form a chelate soluble complex when added to a metal cation. If a small amount of dye, such as eriochrome black-T is added to a query solution containing calcium and magnesium ions at the **P^H of 10 ± 2,** the solution turns wine red. If EDTA is added as a titrant, calcium and magnesium will be complex red.

REAGENTS REQUIRED:

1. **Buffer solution:** Dissolve 16.9 grams of NH_4Cl in 143ml of concentrated NH_4OH. Mix and add 1.25g of EDTA and dilute to 250ml of distilled water.
2. **Indicator EB-T:** Mix 0.8g of eriochrome black-T dye and 100g of NaCl salt.
3. **Standard EDTA solution (0.01M):** 3.725g of EDTA is dissolved and made it to 1000ml with distilled water.

PROCEDURE:

Take 50ml of the sample in a clean and dry conical flask. Add 0.5ml of buffer solution to bring P^H of the solution to 10-10.1. to this, add approximately 0.1g of indicator powder, shake well. Reddish colour appears. Titrate it against EDTA solution until reddish tinge disappears and turns blue.

It is important to note that the entire titration should be completed within 5 minutes and should not require more than 15ml of titrant. End point is disappearance of reddish tinge and appearance of blue colour.

FORMULA:

$$\textbf{Total hardness/Liter} = \frac{\textbf{A x B x 1000}}{\textbf{ml of sample}}$$

where A= ml of titrant,

B= mg of calcium carbonate (0.4008).

OBSERVATION:

Sl. No:	Burette reading	Trial		
		I	**II**	**III**
01.	Initial burette reading			
02.	Final burette reading			
03.	Volume of EDTA added			

Volume of EDTA run down = _____mg/L.

RESULT:

The total hardness of the given sample was found to be _____ mg/L.