



1. Scope and Objectives

To determine the total hardness of the given samples by EDTA titrimetric method.

2. Principle

Ethylenediamine tetra-acetic acid and its sodium salts (EDTA) form a chelated soluble complex when added to a solution of certain metal cations. If a small amount of a dye such as Eriochrome black T is added to an aqueous solution containing calcium and magnesium ions at a pH of 10 ± 0.1 , the solution will become wine red.

3. Equipment and Materials

1. Burette
2. Pipette
3. Erlenmeyer flask
4. Bottle etc.

4. Reagents

1. Standard EDTA titrant (0.01 M)
2. Eriochrome black T indicator
3. Ammonia buffer solution

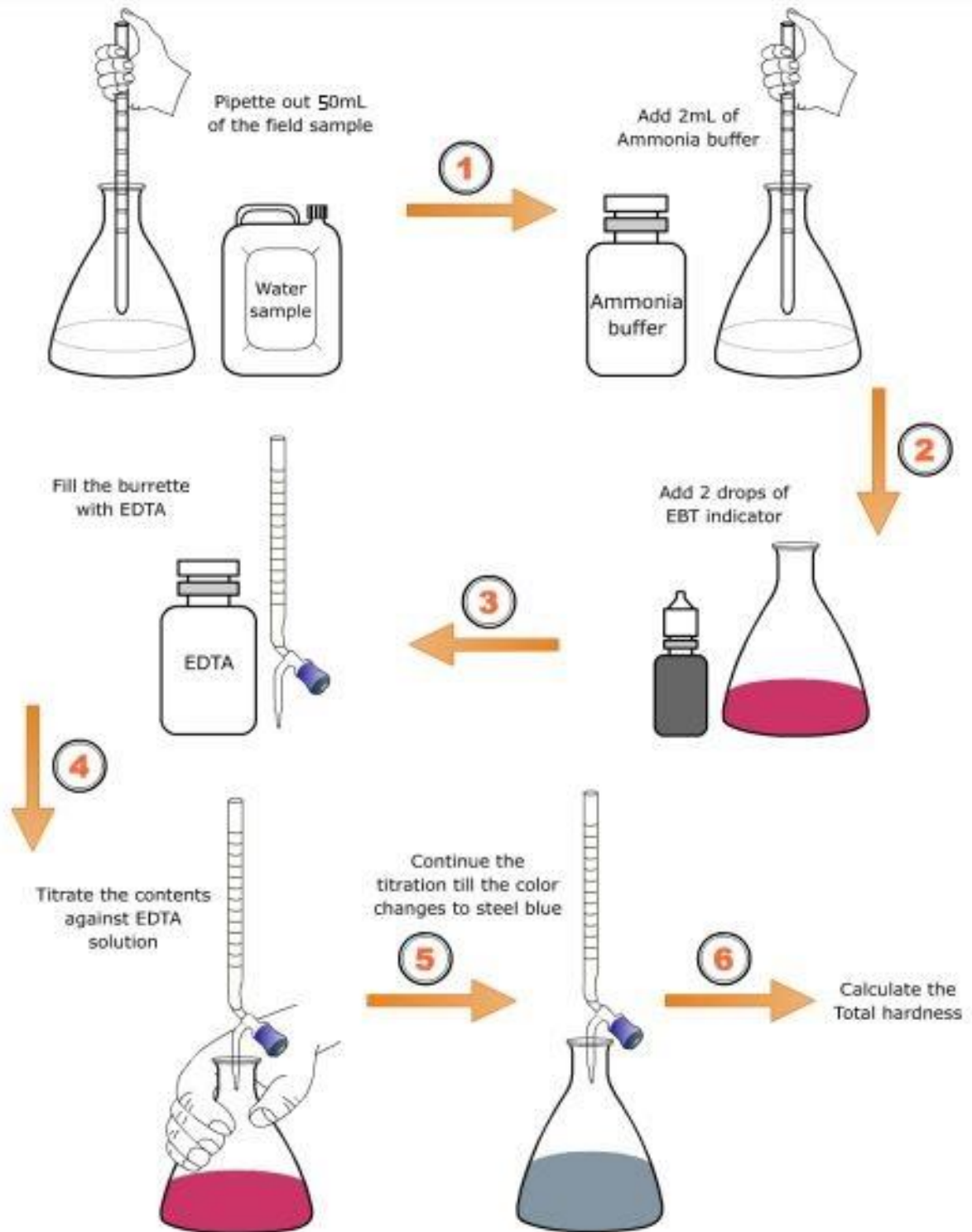
5. Sampling and sample preparation

Sample collection will be done according to the water quality monitoring plan and SOPs for sample collection.

6. Procedure

1. Take about 50 mL with distilled water in an Erlenmeyer flask.
2. Add 1 mL of buffer solution.
3. Add two drops of indicator solution. The solution turns wine red in colour.
4. Add the standard EDTA titrant slowly with continuous stirring until the last reddish tinge disappears from the solution. The colour of the solution at the end point is blue under normal conditions.
5. Note down the volume of EDTA added (V_1)

Procedure Chart



7. Calculations

Hardness as CaCO₃= $\frac{V_1 \times S \times 1000}{\dots}$



$$V \quad \text{mg / L}$$

where,

S = mg CaCO₃ equivalent to 1 mL of EDTA titrant
= 1 mg CaCO₃

$$\text{Hardness as CaCO}_3 = \frac{1000 V_1}{V} = \dots\dots\dots \text{mg / L}$$

8. Precision and Bias

Run a blank to check the analyte contamination. Analyse the sample in duplicate to see the precision of method.

9. References

- ❖ AWWA, WEF, APHA, 1998, Standard Methods for the Examination of Water and Wastewater (Methods: 2340 C. EDTA Titrimetric Method)

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