

Subject: *Water Hardness Experiment*
A numerical sample- calculation

- I. Standard solution: 0.4985 g of CaCO_3 is dissolved and diluted to 500.0 mL.
- II. Standard Titration: A 25.0 mL of standard solution requires 23.62 mL EDTA solution.
- III. Sample Titration: A **100.0 mL** water sample requires 30.13 mL EDTA for titration.
- IV. Calculate the total hardness of the water in ppm CaCO_3

CALCULATION:

Step 1: Calculate ppm CaCO_3 in standard solution.

$$\frac{0.4985 \text{ g}}{500.0 \text{ mL sol.}} \times \frac{1000 \text{ mg}}{1 \text{ g}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = \frac{997.0 \text{ mg}}{\text{L}} \text{ CaCO}_3$$

Step 2: Calculate concentration of EDTA in mg CaCO_3 per mL EDTA.

$$\frac{997.0 \text{ mg CaCO}_3}{\text{L}} \times 0.02500 \text{ L} = 24.925 \text{ mg CaCO}_3$$

$$\frac{24.925 \text{ mg CaCO}_3}{23.62 \text{ mL EDTA}} = \frac{1.055 \text{ mg CaCO}_3}{1.0 \text{ mL EDTA}}$$

Step 3: Calculate the mg CaCO_3 in the water sample.

$$\frac{1.055 \text{ mg CaCO}_3}{1.0 \text{ mL EDTA}} \times 30.13 \text{ mL EDTA} = 31.79 \text{ mg CaCO}_3$$

Step 4: Calculate the ppm CaCO_3 in the water sample:

$$\frac{31.79 \text{ mg CaCO}_3}{0.100 \text{ L water}} = 317.9 \text{ ppm CaCO}_3$$

Please pay attention to the experiment's data!