

EXERCISE 16

Hardness of Water

OBJECTIVES:

1. To develop further skill in using volumetric glassware.
2. To determine hardness of a water sample.

Water Hardness:

"Hardness" in water is usually caused by the presence of Ca^{2+} , Mg^{2+} , and Fe^{2+} ions. Hardness can be determined by titrating a water sample with a standard solution of ethylenediamine-tetracetic acid (EDTA). Hardness is reported as parts per million, ppm of CaCO_3 .

Equipment

1. buret
2. 50 ml pipet
3. Erlenmeyer flask

Procedure

1. Pipet 50.00 ml of your water sample into a clean 250 ml flask that has been rinsed with distilled water. Add 1 ml of the buffer solution (should be prepared fresh) and 10 drops of indicator solution.
2. Record your initial buret reading, then titrate, with swirling, until the solution turns from wine-red to clear blue. Obtain the final buret reading.
3. Calculate the hardness of the water sample in ppm CaCO_3 equivalent.
4. Rinse the flask thoroughly with distilled water and pipet in a second 50.00 ml sample.
5. Calculate the hardness of the water in ppm now as explained above.

ANSWER SHEET

EXERCISE 16

NAME _____ SECTION _____ DATE _____

SAMPLE _____

1. Volume H₂O _____

2a. Final buret reading _____

b. Initial buret reading _____

Volume of EDTA _____

Normality of EDTA _____

3. Hardness in ppm _____