

# Hanna Titration Procedure

## Hardness in Water, Photometric Method



### Description

Method for the determination of hardness ( $\text{CaCO}_3$ ) in water, following the [photometric titration](#) method to a color change endpoint.

The result is expressed in **ppm (mg/L) of calcium carbonate**.

### Reference

Adaptation of Standard Methods for the Examination of Water and Wastewater, Hardness SM 2340C., EDTA Titrimetric Method. American Public Health Association, Washington DC, 2017.

### Meter

- Automatic Potentiometric Titrator - [HI932](#)

### Electrodes

- 525 nm Photometric Electrode - [HI900601](#)

### Reagents

- 0.02 M EDTA Titrant (1 L) - [HI70449](#)
- $\text{NH}_4 + \text{NH}_4\text{Cl}$  Buffer Solution
- Eriochrome Black T Color Indicator
- Deionized Water- [HI70436](#)

### Accessories

- 5 mL Class A Pipette
- 5 mL Eppendorf Pipette Tips
- Eppendorf Pipette
- 120 mL Beakers

### Device Preparation

- Connect the photometric electrode to the titrator.
- Press "Select Method" from the main screen. Use the arrow keys to highlight the 'Hardness Photometric' method and press "Select".
- Install a 25-mL burette with 0.02M EDTA (HI70449) on pump one and verify that no air bubbles are present in the burette or tubing. If necessary, prime the burette until all the air has been removed completely.
- For the determination of the exact concentration of the 0.02M EDTA, follow HI0206EN titrator procedure for 0.02M EDTA Titrant Concentration.

### Electrode Preparation

- Remove the electrode from the protective storage cap.
- Put the titrator into mV mode by pressing "Mode".
- Then, select analog board 1, and press "mV1".
- Fill a 120 mL beaker with deionized water.
- Submerge the electrode into the deionized water.
- Swirl the electrode gently in the beaker in order to remove air bubbles.
- Remove the green protective cap from the electrode (it looks like a traditional electrode fill cap, and is located beneath the word "CAL").
- Use the provided calibration screwdriver to turn the calibration screw until the mV reading on the titrator reads  $1000 \pm 5$  mV.
- Press "Mode" and then "Titrator" to return to titration mode.

### Sample Preparation

- Use a Class A glass pipette to transfer exactly 25.00 mL of sample to a clean 120 ml plastic beaker.
- Using the 5 mL Eppendorf pipette, transfer 5 mL of the  $\text{NH}_4\text{OH} + \text{NH}_4\text{Cl}$  buffer solution to your sample beaker.
- Using the Eppendorf pipette, transfer 0.1 mL of Eriochrome Black T color indicator solution to the beaker.
- Using deionized water, bring the volume of liquid up to approximately 75 mL or enough liquid to submerge the electrode.

### Analysis

- Place the beaker under the stirrer assembly and lower it to immerse the photometric electrode and stirrer.\* Ensure that the optical cell of the electrode is 5-6 mm below the surface.  
**NOTE:** The dispensing tip should be in contact with the surface of the sample (slightly submerged).
- Press "Start". The titrator will start the analysis.
- At the end of titration, when the equivalence point is reached, 'titration complete' will appear with the calcium carbonate concentration. The result is expressed in ppm (mg/L) calcium carbonate.
- Remove the photometric electrode and stirrer from the and rinse them thoroughly with deionized water.
- Record the result.

**\*To avoid the generation of air bubbles,  
the stir speed should not exceed 800 RPM.**