

## Instruction Manual

# HI 3811 Alkalinity Test Kit

**HANNA**  
instruments  
www.hannainst.com

Dear Customer,

Thank you for choosing a Hanna Product. Please read the instructions carefully before using the chemical test kit. It will provide you with the necessary information for correct use of the kit.

Remove the chemical test kit from the packing material and examine it carefully to make sure that no damage has occurred during shipping. If there is any noticeable damage, notify your Dealer or the nearest Hanna office immediately.

Each kit is supplied with:

- Phenolphthalein Indicator, 1 bottle (10 mL) with dropper;
- Bromophenol Blue Indicator, 1 bottle (10 mL) with dropper;
- HI 3811-0, 1 bottle (120 mL);
- 2 calibrated vessels (10 and 50 mL);
- 1 calibrated syringe.

Note: Any damaged or defective item must be returned in its original packing materials.

## SPECIFICATIONS

Range	0 to 100 mg/L (ppm) CaCO <sub>3</sub> 0 to 300 mg/L (ppm) CaCO <sub>3</sub>
Smallest Increment	1 mg/L [in the 0-100 mg/L range] 3 mg/L [in the 0-300 mg/L range]
Analysis Method	Acid titration using phenolphthalein and bromophenol blue
Sample Size	5 mL and 15 mL
Number of Tests	110 (average)
Case Dimensions	200x120x60 mm (7.9x4.7x2.4")
Shipping Weight	460 g (17.2 oz.)

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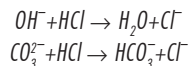
## SIGNIFICANCE AND USE

Alkalinity is the quantitative capacity of a water sample to neutralize an acid to a set pH. This measurement is very important in determining the corrosive characteristics of water due primarily to hydroxide, carbonate and bicarbonate ions. Other sources of alkalinity can be from anions that can be hydrolyzed such as phosphates, silicates, borates, fluoride and salts of some organic acids. Alkalinity is critical in the treatments of drinking water, wastewater, boiler & cooling systems and soils. The Hanna Alkalinity Test Kit makes monitoring easy, quick and safe. The compact size gives the user the versatility to use the kit anywhere. The design makes the kit easy to handle and, except for HI 3811-0, practically prevents accidental injury or damage due to spills.

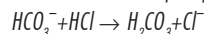
Note: mg/L is equivalent to ppm (parts per million).

## CHEMICAL REACTION

Alkalinity can be measured as Phenolphthalein Alkalinity and Total Alkalinity. The Phenolphthalein Alkalinity is determined by neutralizing the sample to a pH of 8.3 using a dilute hydrochloric acid solution, and a phenolphthalein indicator. This process converts hydroxide ions to water, and carbonate ions to bicarbonate ions:



Since bicarbonate ions can be converted to carbonic acid with additional hydrochloric acid, the Phenolphthalein Alkalinity measures total hydroxide ions, but only half of the bicarbonate contribution. To completely convert the carbonate ions, hydrochloric acid is added until the sample's pH is 4.5:



This is known as Total Alkalinity.

## INSTRUCTIONS

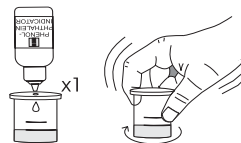
READ ALL THE INSTRUCTIONS BEFORE USING THE TEST KIT  
LOOK AT THE BACK PAGE FOR THE ILLUSTRATED PROCEDURE

### Determination of Phenolphthalein Alkalinity

- Remove the cap from the small plastic vessel. Rinse the plastic vessel with water sample, fill to the 5 mL mark and replace the cap.



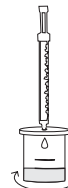
- Add 1 drop of Phenolphthalein indicator through the cap port, and mix carefully swirling the vessel in tight circles. If the solution remains colorless, record the phenolphthalein alkalinity as zero, and proceed with the procedure for the determination of Total Alkalinity (see below). If the solution is pink or red, proceed to next step.



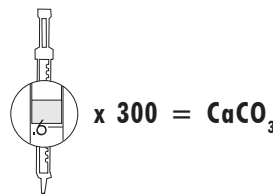
- Take the titration syringe and push plunger completely into the syringe. Insert tip into HI 3811-0 solution and pull plunger out until the lower edge of the plunger seal is on the 0 mL mark of the syringe.



- Place syringe tip into the cap port of the plastic vessel and slowly add the titration solution dropwise, swirling to mix after each drop. Continue adding titration solution until the solution in the plastic vessel turns colorless.

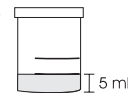


- Read off the milliliters of titration solution from the syringe scale, and multiply by 300 to obtain mg/L (ppm) CaCO<sub>3</sub>.



### Determination of Total Alkalinity

- Remove the cap from the plastic vessel. Rinse the plastic vessel with water sample, fill to the 5 mL mark and replace the cap.
- Through the cap port, add 1 drop of Bromophenol blue indicator and mix. If the solution is yellow, then it is



acidic and an acidity test must be carried out (see HI 3820 – Hanna Acidity Test Kit). If the solution is green or blue, then proceed to next step.

- Take the titration syringe and push the plunger completely into the syringe. Insert the tip into HI 3811-0, and pull the plunger out until the lower edge of the plunger seal is on the 0 mL mark of the syringe.
- Place the syringe tip into the cap port of the plastic vessel and slowly add the titration solution dropwise, swirling to mix after each drop. Continue adding titration solution until the solution in the plastic vessel turns yellow.
- Read off the milliliters of titration solution from the syringe scale and multiply by 300 to obtain mg/L (ppm) CaCO<sub>3</sub>.



### Low Range Determinations

If results are lower than 100 mg/L, the precision of the test can be improved as follows.

- Remove the cap from the large plastic vessel. Rinse the vessel with water sample, fill to the 15 mL mark and replace the cap. Proceed with the test as described before. To obtain the result for both Phenolphthalein and Total Alkalinity multiply the values on the syringe scale by 100.



Note: Push and twist pipet tip into tapered end of syringe ensuring an air-tight fit.



## REFERENCES

1987 Annual Book of ASTM Standard, Volume 11.01 Water (1), pages 151-158.  
Official Methods of Analysis, A.O.A.C., 14<sup>th</sup> Edition, 1984.  
Standard Methods for the Examination of Water and Wastewater, 18<sup>th</sup> Edition, 1992, pages 445-446.

## HEALTH AND SAFETY

The chemicals contained in this test kit may be hazardous if improperly handled. Read Health and Safety Data Sheets before performing the test.