

## Instruction Manual

# HI 38013 Phenolphthalein and Total Alkalinity Test Kit

**HANNA**  
instruments

www.hannainst.com

Dear Customer,

Thank you for choosing a Hanna Product.

Please read the instruction sheet carefully before using the test kit. It will provide you with the necessary information for correct use of the kit. If you need additional information, do not hesitate to e-mail us at tech@hannainst.com.

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 with dropper (10 mL);
- Bromophenol Blue Indicator, 1 bottle with dropper (10 mL);
- HI 38013-0 Alkalinity Reagent, 2 bottles (2x105 mL);
- 1 calibrated plastic vessel (20 mL) with cap;
- 1 syringe (1 mL) with tip.

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

## SPECIFICATIONS

|                    |  |
|--------------------|--|
| Range              | 0 to 10 gpg CaCO <sub>3</sub><br>0 to 20 gpg CaCO <sub>3</sub> |
| Smallest Increment | 0.1 gpg in the 0-10 gpg range<br>0.2 gpg in the 0-20 gpg range |
| Analysis Method    | Acid titration using phenolphthalein and bromophenol blue      |
| Sample Size        | 5 mL and 10 mL   |
| Number of Tests    | 100 total and 100 phenolphthalein                              |
| Case Dimensions    | 370x270x80 mm (14.6x10.6x3.1")                                 |
| Shipping Weight    | 865 g (30.5 oz.)   |

ISTR38013 11/00 PRINTED IN ITALY

## SIGNIFICANCE AND USE

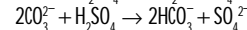
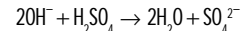
Alkalinity is the quantitative capacity of a water sample to neutralize an acid to a set pH. This measurement is very important in determining the corrosive characteristics of water due primarily to hydroxide, carbonate and bicarbonate ions. Other sources of alkalinity can be from anions that can be hydrolyzed such as phosphate, silicate, borate, 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 and quick. The compact size gives the user the versatility to use the kit anywhere. The design makes the kit easy to handle.

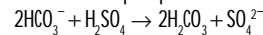
Note: 1 gpg (grain per gallon) CaCO<sub>3</sub> is equivalent to 17 ppm CaCO<sub>3</sub> (where ppm - parts per million - is equivalent to mg/L).

## 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 sulfuric 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 sulfuric acid, the Phenolphthalein Alkalinity measures total hydroxide ions, but only half of the carbonate contribution. To completely convert the carbonate ions, sulfuric acid is added until the sample's pH is 4.5:

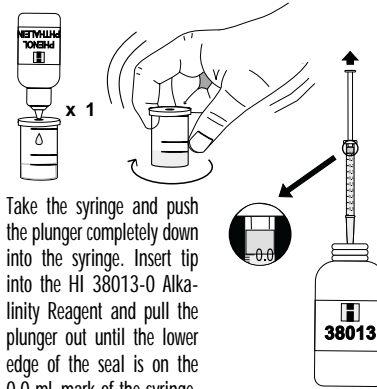


This is known as Total Alkalinity.

## INSTRUCTIONS

READ ALL THE INSTRUCTIONS BEFORE USING THE TEST KIT  
Determination of Phenolphthalein 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.
- Add 1 drop of Phenolphthalein Indicator through the cap port, and mix carefully by 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 the next step.




- Take the syringe and push the plunger completely down into the syringe. Insert tip into the HI 38013-0 Alkalinity Reagent and pull the plunger out until the lower edge of the seal is on the 0.0 mL mark of the syringe.

- Place the syringe tip into the cap port of the plastic vessel and slowly add the titration solution drop by drop, swirling 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 and multiply by 20 to obtain gpg CaCO<sub>3</sub> of Phenolphthalein Alkalinity of your sample.  
mL of titrant x 20 = gpg 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.



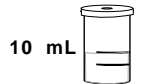
- Take the syringe and push the plunger completely down into the syringe. Insert tip into the HI 38013-0 Alkalinity Reagent and pull the plunger out until the lower edge of the seal is on the 0.0 mL mark of the syringe.

- Place the syringe tip into the cap port of the plastic vessel and slowly add the titration solution drop by drop, swirling 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 and multiply by 20 to obtain gpg CaCO<sub>3</sub> of Total Alkalinity of your sample.  
mL of titrant x 20 = gpg CaCO<sub>3</sub>

Low Range Determinations

If results are lower than 10 gpg, the precision of the test can be improved as follows.



- Remove the cap from the plastic vessel. Rinse the vessel with water sample, fill to the 10 mL mark and replace the cap. Proceed with the test as described before. Read off the milliliters of titration solution from the syringe and multiply by 10 to obtain the result for both Phenolphthalein and Total Alkalinity as gpg CaCO<sub>3</sub>.  
mL of titrant x 10 = gpg CaCO<sub>3</sub>

## 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 the relevant Health and Safety Data Sheets before performing the test.