

## Instruction Manual

# HI 3820 Acidity Test Kit

**HANNA**  
instruments

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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:

- Reagent 1, 1 bottle with dropper (10 mL);
- Reagent 2, 1 bottle with dropper (10 mL);
- Reagent 3, 1 bottle with dropper (10 mL);
- Reagent 4, 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 500 mg/L (ppm) CaCO <sub>3</sub>
Smallest Increment	1 mg/L [in the 0-100 mg/L range] 5 mg/L [in the 0-500 mg/L range]
Analysis Method	Base titration using phenolphthalein and bromphenol blue indicators
Sample Size	5 mL and 25 mL
Number of Tests	110 (average)
Case Dimensions	260x120x60 mm (10.2x4.7x2.4")
Shipping Weight	910 g (34.0 oz.)

ISTR3820RT 10/99 PRINTED IN ITALY

## SIGNIFICANCE AND USE

Acidity is the quantitative capacity of a water sample to neutralize a base to a set pH. Therefore, the greater acidity, the more potentially corrosive the water. Acidity can be caused by mineral acids, organic acids and carbon dioxide in the form of carbonic acid. Today, our water supplies are becoming more contaminated with corrosive chemicals from industrial dumping or acid rain. Therefore, acidity measurements are an essential monitoring device to define and control pollution in sewers, lakes and rivers.

Acidity of water is equally important to monitor in soils and fish farming to maximize the growing environment.

The Hanna Acidity Test Kit is equipped with all you need to determine acidity of water. The kit is quick, easy to use and portable. This makes it practical for field as well as laboratory use. The design makes the kit easy to handle and, except for Reagent 4, practically prevents accidental injury or damage due to spills.

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

## CHEMICAL REACTION

Strong acids (such as mineral acids) and organic acids can contribute to the acidity of a water sample. With the use of diluted sodium hydroxide as the titrant and bromphenol blue or phenolphthalein indicators, the contribution of strong or organic acids can be determined. The measurement of the strong acid contribution to the sample acidity is known as methyl orange acidity. This is carried out by titrating with sodium hydroxide until the solution turns from yellow to green/blue (pH endpoint about 4.5). The total acidity caused by both mineral and organic acids is determined by titrating to an endpoint pH of 8.3, using phenolphthalein as an indicator. This is known as phenolphthalein acidity.

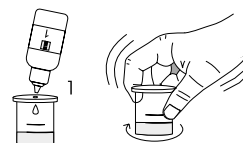
## INSTRUCTIONS

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

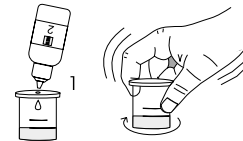
Note: Push and twist pipet tip onto tapered end of syringe ensuring an air tight-fit.

Determination of Methyl Orange Acidity

- Remove the cap from the small plastic vessel. Rinse the vessel with water sample, fill to the 5 mL mark and replace the cap.
- Add 1 drop of reagent 1 through the cap port and mix by carefully swirling the vessel in tight circles.



- Through the cap port, add 1 drop of Reagent 2 and

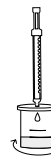


mix. If the solution is green or blue, then record the methyl orange acidity as zero. Proceed with procedure for the determination of phenolphthalein acidity. If the solution is yellow proceed with the next step.

- Take the titration syringe and push the plunger completely into the syringe. Insert tip into Reagent 4 solution 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 drop-wise, swirling to mix after each drop. Continue adding titration solution until the solution in the plastic vessel changes from yellow to green.

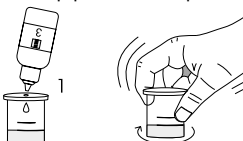


- Read off the milliliters of titration solution from the syringe scale and multiply by 500 to obtain mg/L (ppm) CaCO<sub>3</sub>.

$$\text{Syringe Scale} \times 500 = \text{mg/L CaCO}_3$$

Determination of Phenolphthalein Acidity

- Remove the cap from the small plastic vessel. Rinse the vessel with water sample, fill to the 5 mL mark and replace the cap.
- Through the cap port, add 1 drop of Reagent 3 and

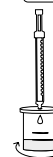


mix. If the solution turns red or pink, then the solution is alkaline and an alkalinity test must be carried out (see Hanna Alkalinity Test Kit – HI 3811). If the solution remains colorless, proceed to next step.

- Take the titration syringe and push the plunger completely into the syringe. Insert tip into Reagent 4 solution 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 pink.



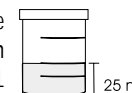
- Read off the milliliters of titration solution from the syringe scale and multiply by 500 to obtain mg/L (ppm) CaCO<sub>3</sub>.

$$\text{Syringe Scale} \times 500 = \text{mg/L CaCO}_3$$

Low Range Determinations

If result is lower than 100 mg/L, the precision of the test can be improved.

- Remove the cap from the large plastic vessel. Rinse the vessel with water sample, fill to the 25 mL mark and replace the cap.
- Proceed with the test as explained for high range measurements.
- To obtain the results for both methyl orange and phenolphthalein acidity, multiply the read off the syringe by 100.



$$\text{Syringe Scale} \times 100 = \text{mg/L CaCO}_3$$

## 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, page 618.

Standard Methods for the Examination of Water and Wastewater, 18<sup>th</sup> Edition, 1992, pages 2-23, 2-24.

## ACCESSORIES

HI 3820-100 Spare reagents (100 tests)

## 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.

**HI 3820 ACIDITY TEST KIT**

**METHYL ORANGE ACIDITY**

**1**

0-500 mg/L    0-100 mg/L

**2**

x1

**3**

x1

**4**

**5**

x 500 = mg/L CaCO<sub>3</sub>

5 mL sample

x 100 = mg/L CaCO<sub>3</sub>

25 mL sample

**PHENOLPHTHALEIN ACIDITY**

**1**

0-500 mg/L    0-100 mg/L

**2**

x1

**3**

**4**

x 500 = mg/L CaCO<sub>3</sub>

5 mL sample

x 100 = mg/L CaCO<sub>3</sub>

25 mL sample