

## HI 3812 Hardness Test Kit



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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:

- Hardness Buffer, 1 bottle with dropper (30 mL);
- Calmagite Indicator, 1 bottle with dropper (10 mL);
- HI 3812-0 EDTA Solution, 1 bottle (120 mL);
- 1 plastic beaker (20 mL) with cap;
- 1 plastic beaker (50 mL) with cap;
- 1 syringe (1 mL) with tip.

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

ISTR3812R5 01/07

### Specifications

Range	0.0 to 30.0 mg/L (ppm) CaCO <sub>3</sub> 0 to 300 mg/L (ppm) CaCO <sub>3</sub>
Smallest Increment	0.3 mg/L [in the 0-30 mg/L range] 3 mg/L [in the 0-300 mg/L range]
Analysis Method	EDTA titration
Sample Size	5 mL or 50 mL
Number of Tests	100 (average)
Case Dimensions	200x120x60 mm (7.9x4.7x2.4")
Shipping Weight	460 g (1 lb.)

### Significance and Use

In history, water hardness was defined by the capacity of water to precipitate soap. The ionic species in the water causing the precipitation was later found to be primarily calcium and magnesium. In the present, therefore, water hardness is actually a quantitative measure of these ions in the water sample. It is also now known that certain other ion species, such as iron, zinc and manganese, contribute to the overall water hardness. The measure and subsequent control of water hardness is essential to prevent scaling and clogging in water pipes. The Hanna Hardness Test Kit makes monitoring easy, quick and safe. The compact size provides the versatility to use the kit anywhere. The design of the kit makes it easy to handle.

### Chemical Reaction

The hardness level as mg/L (ppm) calcium carbonate is determined by an EDTA (ethylene-diamine-tetraacetic acid) titration. The solution is first adjusted to a pH of 10 using a buffer solution. The indicator chelates with metal ions such as magnesium or calcium to form a red colored complex. As EDTA is added, metal ions complex with it. After all the free metal ions have been complexed, an excess EDTA removes the metal ions complexed with the indicator to form a blue colored solution. This color change from red to blue is the endpoint of the titration.

### Bibliography

Standard Methods for the Examination of Water and Wastewater.

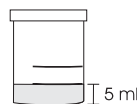
Annual Book of ASTM Standard, vol. 11.01, Water (I).

### Instructions

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

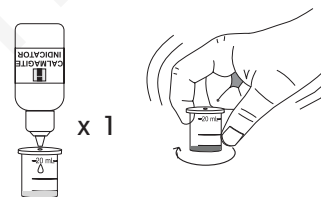
Note: push and twist pipet tip into tapered end of syringe ensuring an air-tight fit.

#### HIGH RANGE – 0 to 300 mg/L CaCO<sub>3</sub>

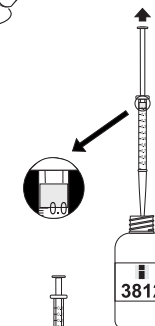
- Remove the cap from the small plastic beaker. Rinse the plastic beaker with the water sample, fill to the 5 mL mark and replace the cap. 
- Add 5 drops of Hardness Buffer through the cap port and mix carefully swirling the beaker in tight circles.



- Add 1 drop of Calmagite Indicator through the cap port and mix as described above. The solution becomes a red-violet color.



- Take the titration syringe and push the plunger completely into the syringe. Insert tip into HI 3812-0 EDTA Solution and pull the plunger out until the lower edge of the seal is on the 0 mL mark of the syringe.



- Place the syringe tip into the cap port of the plastic beaker and slowly add the titration solution dropwise, swirling to mix after each drop.



- Continue adding the titration solution until the solution becomes purple, then mix for 15 seconds after each additional drop until the solution turns blue.

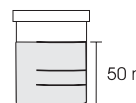


- Read off the milliliters of titration solution from the syringe scale and multiply by 300 to obtain mg/L (ppm) CaCO<sub>3</sub>.



#### LOW RANGE – 0.0 to 30.0 mg/L CaCO<sub>3</sub>

If result is lower than 30 mg/L, the precision of the test can be improved by following the procedure below.

- Remove the cap from the large plastic beaker. Rinse it with the water sample, fill to the 50 mL mark and replace the cap. 
- Proceed with the titration as for the high range test.
- Read off the milliliters of titration solution from the syringe scale and multiply by 30 to obtain mg/L (ppm) CaCO<sub>3</sub>.



### Accessories

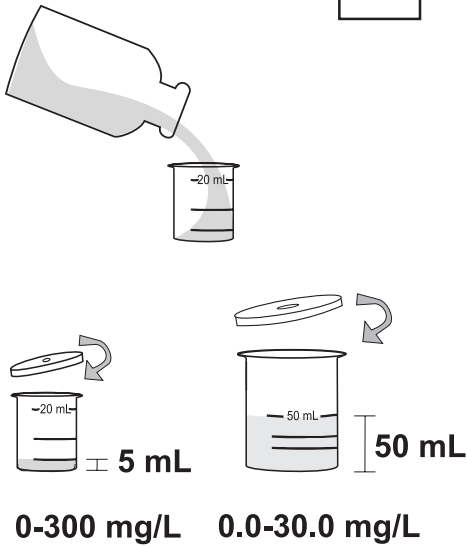
- HI 3812-100 replacement kit (100 tests average)
- HI 740032P cap for 20 ml plastic beaker (10 pcs)
- HI 740034P cap for 50 ml plastic beaker (10 pcs)
- HI 740036P 50 ml plastic beaker (10 pcs)
- HI 740037P 20 ml plastic beaker (10 pcs)
- HI 740142P 1 ml graduated syringe (10 pcs)
- HI 740144P tips for 1 ml graduated syringe (10 pcs)

### Safety Data Sheets

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

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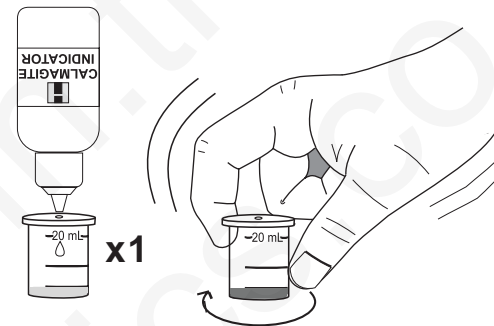
**1**



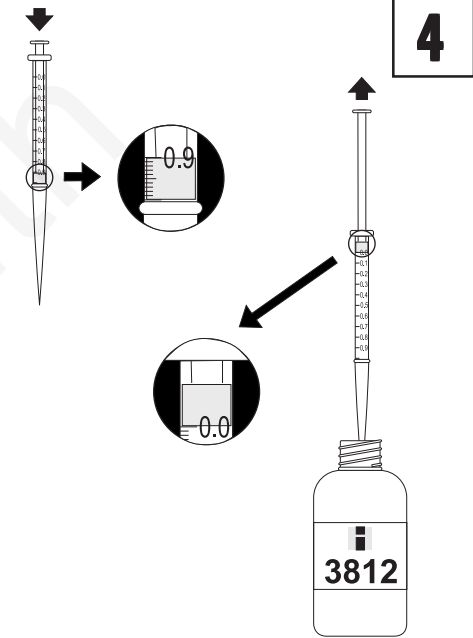
**2**



**3**



**4**



**5**

