Instruction Manual

HI 38079 Magnesium Test Kit for Irrigation Water

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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 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:

- Buffer Reagent, 1 bottle with dropper (25 mL);
- Oxalate Reagent, powder (100 pcs);
- HI 38079B-0 EDTA Solution, 1 bottle (120 mL);
- Buffer Solution pH 10.2 ± 0.2, 1 bottle (100 mL);
- Calmagite Indicator, 1 bottle with dropper (10 mL);
- Demineralizer Bottle with filter cap for about 12 liters of deionized water (depending on the hardness level of water to be treated);
- 1 calibrated plastic vessel (20 mL);
- 2 calibrated plastic vessels (50 mL);
- 1 large funnel;
- filter paper discs ∅ 110 mm (100 pcs);
- 1 plastic spoon;
- 1 plastic pipette (1 mL);
- 1 plastic pipette (3 mL);
- 1 syringe (1 mL) with tip.

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

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SPECIFICATIONS

Range	0 to 240 mg/L (ppm) as Mg (MR) 0 to 725 mg/L (ppm) as Mg (HR)
Smallest Increment	± 2.4 mg/L as Mg (MR) ± 7.3 mg/L as Mg (HR)
Analysis Method	Titration
Sample Size	25 mL
Number of Tests	100 (average)
Case Dimensions	235x175x115 mm (9.2x6.9x4.5")
Shipping Weight	873 g (30.8 oz.)

SIGNIFICANCE AND USE

Magnesium is a common constituent of natural waters; its average abundance in streams is 4 mg/L and in groundwaters is >5 mg/L. In concentration greater than 125 mg/L it can cause diuretic effect. The aqueous species is often Mg^{2+} and it does not normally result in precipitation (as dolomite) in natural waters. Magnesium is also an important contributor to the hardness of water: when heated, magnesium salts break down forming incrustation in boilers. Moreover magnesium is necessary to plant metabolism since it is an essential constituent of organic molecules such as chlorophyll.

By using the HI 38079 Hanna Test Kit, it is possible to differentiate between calcium and magnesium, since the kit determines only the magnesium ions.

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

CHEMICAL REACTION

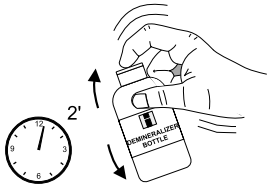
The Hanna Test Kit determines Magnesium in irrigation water via a titrimetric method. Calcium, if present, is removed by prior filtration. Then the indicator chelates with magnesium to form a red colored complex. As EDTA is added, magnesium complexes with it: the reaction endpoint is indicated by a change in color of the indicator from red to blue.

INSTRUCTIONS

READ THE ENTIRE INSTRUCTIONS BEFORE USING THE KIT

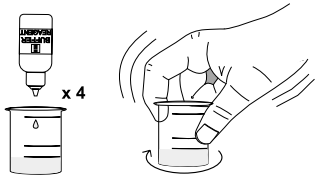
1- Remove the cap and fill the Demineralizer Bottle with tap water.

2- Replace the cap and shake for at least 2 minutes. The demineralized water is now ready.

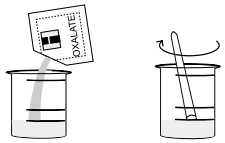


3- Fill one of the large (50 mL) plastic vessels with 25 mL of water sample, up to the mark.

4- Add 4 drops of Buffer Reagent and swirl to mix.

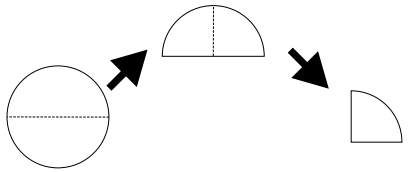


5- Add 1 packet of HI 38079A-0 Oxalate reagent and mix for 30 seconds by means of the plastic spoon. Some deposits may remain, but they do not affect the measurement.

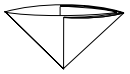


6- Wait for about 5 minutes for the reaction to complete. If Calcium is present, the solution will become turbid.

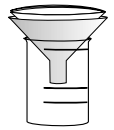
7- Fold a filter paper disc twice as shown in the figure.



8- Separate one side from the other three to form a cone.



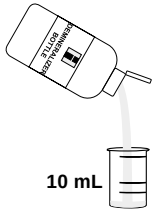
9- Place the folded filter disc in the funnel. Place the funnel over the other large plastic vessel.



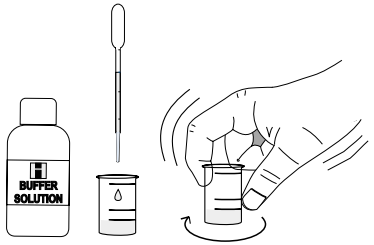
10- Pour the reacted water sample through the filter paper.

11- Using the 3 mL plastic pipette, carefully transfer 3 mL of the filtered clear water sample into the small (20 mL) plastic vessel.

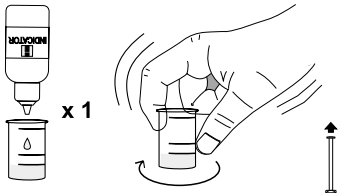
12- Flip open the top of the Demineralizer Bottle cap. By gently squeezing the bottle, add demineralized water to the vessel up to the 10 mL mark.



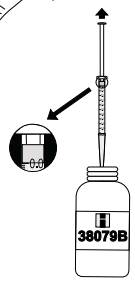
13- Using the 1 mL plastic pipette, add 1 mL of Buffer Solution 10.2 ± 0.2 and swirl to mix.



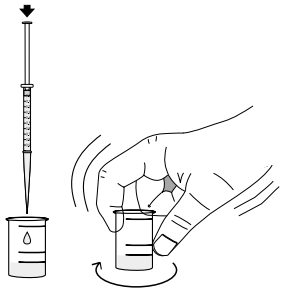
14- Add 1 drop of Calmagite Indicator and swirl to mix; if magnesium is present, the solution will turn wine red.



15- Take the syringe and push the plunger completely into the syringe. Insert tip into the HI 38079B-0 EDTA Solution bottle and pull the plunger out until the lower edge of the seal is on the 0.0 mL mark of the syringe.



16- Slowly add the titration solution drop by drop, swirling after each drop.



17- As the color changes from pink to purple, swirl for 15 seconds after each additional drop, until the solution turns pure blue. Read off the milliliters of titration solution from the syringe.

18- Calculate the mg/L (ppm) of Magnesium in your sample as follows:

ppm of Mg = mL of titrant x 243

19- If your sample requires more than 1 mL of titrant to turn pure blue, repeat the test from step 11 using, in this case, 1 mL of filtered water sample, instead of 3 mL.

20- Follow then the instructions from step 12 to 17.

21- Calculate the mg/L (ppm) of Magnesium in your sample as follows:

ppm of Mg = mL of titrant x 729

22- To convert the reading in mg/L of $CaCO_3$, multiply the ppm of magnesium by 4.114.

23- Rinse all labware with demineralized water after each analysis and shake dry.

Note: High amounts of copper in your sample will alter the final endpoint color. The solution will change from wine red to purple without turning pure blue. In this case add drops of titrant until no visible change in color is obtained.

CONVERSION TABLES

for 3 mL sample:

mL of titrant	ppm as Mg	ppm as $CaCO_3$
0.1	24	100
0.2	49	200
0.3	73	300
0.4	97	400
0.5	122	500
0.6	146	600
0.7	170	700
0.8	194	800
0.9	219	900
1.0	243	1000

for 1 mL sample:

mL of titrant	ppm as Mg	ppm as $CaCO_3$
0.1	73	300
0.2	146	600
0.3	219	900
0.4	292	1200
0.5	365	1500
0.6	437	1800
0.7	510	2100
0.8	583	2400
0.9	656	2700
1.0	729	3000

REFERENCES

Adaptation of *Standard Methods for the Examination of Water and Wastewater*, 18th edition, 1992, APA AWWA WEF.

HEALTH AND SAFETY

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