Instruction Manual

HI 38083

Gypsum Requirement & Exchangeable Sodium 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:

- HI 38083A-0 Calcium Sulfate, 1 bottle (10 g);
- Buffer Solution 10.2 ± 0.2, 1 bottle with dropper (30 mL);
- HI 38083C-0 EDTA Solution, 3 bottles (3 x 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 2-mm soil sieve;
- 1 plastic test tube (14 mL) with screw cap;
- 1 plastic test tube (50 mL) with screw cap;
- 1 small funnel;
- filter paper discs ∅ 80 mm (100 pcs);
- 1 brush;
- 1 calibrated plastic vessel (50 mL);
- 2 calibrated plastic vessels (20 mL) with cap;
- 1 plastic pipette (3 mL);
- 1 plastic pipette (1 mL);
- 1 syringe (1 mL) with tip;
- 2 spoons.

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

ISTR38083 02/00 PRINTED IN ITALY

SPECIFICATIONS

Range	*GR:* 0 to 213 metric ton/ha (0 to 95 ton/acre) *EES:* 0 to 56.4 meq/100 g soil
Smallest Increment	3.8 metric ton/ha (1.7 ton/acre) as GR 1.95 meq/100 g soil as EES
Analysis Method	Drop count titration
Sample Size	0.5 mL of soil
Number of Tests	100
Case Dimensions	235x175x115 mm (9.2x6.9x4.5")
Shipping Weight	883 g (31.1 oz.)

Note: GR is Gypsum Requirement and EES is Estimated Exchangeable Sodium; meq/100 g is milliequivalent per 100 grams.

SIGNIFICANCE AND USE

Alkaline soils are characterized by a low electrical conductivity (EC), high exchangeable sodium percentage (ESP) and presence of carbonate and bicarbonate sodium salts. Hydrolysis of carbonate causes also an increase in pH, such that it is always greater than 8.5.

The "saline-sodic" soil group, which possesses the following peculiarities, also belongs to this alkaline group:

EC > 4 mmhos, ESP > 15, pH ≤ 8.5

High alkalinity causes impairment to plant growth since it gives rise to an incomplete solubilization of necessary nutrients such as iron, copper and manganese. Chlorosis, for instance, is a typical disease of leaves due to iron deficiency.

It is possible to correct soil alkalinity by adding a proper compound (generally gypsum) that removes sodium and decreases the pH. The exact quantity of gypsum needed for correction can be calculated with the Hanna Gypsum Requirement Test Kit.

CHEMICAL REACTION

The extraction method is the saturated calcium sulfate method.

The Hanna Test Kit determines Gypsum Requirement by titration of Calcium. The indicator chelates with Calcium ions to form a red colored complex. As EDTA is added, calcium complexes with it: the reaction endpoint is indicated by a change in color of the indicator from red to blue.

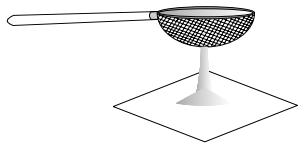
SAMPLING PROCEDURE

WHEN TO TEST YOUR SOIL

Soil should be tested not only when the plant appears to be unhealthy (yellow leaves or stunted growth), but prior to seeding, planting and fertilizing as well as when other material such as manure or compost has been added.

SAMPLING

1) Soil Sample Extraction
   - Within a large homogeneous area, take 1 or 2 samples per 1000 m^2 (0.25 acre).
   - Even for smaller areas, 2 samples are recommended (the more samples, the better the end-results, because the end sample is more representative).
   - For a small garden or plot, 1 sample is sufficient.
2) Avoid extracting samples from soil presenting obvious anomalies and from border areas (near ditches and roads).
3) Sample quantity:
   Take the same quantity of soil for each sample. For example, use bags with similar dimensions (1 bag per sample).
4) Depth of extraction:
   General: dig and discard 5 cm (2") of topsoil
   For lawns: take the sample at a depth of 5 to 15 cm (from 2" to 6").
   For other plants (flowers, vegetables, shrubs): from 20 to 40 cm of depth (8" to 16").
   For trees: Samples from 20 to 60 cm of depth (8" to 24").
5) Mix all the samples together to obtain a homogeneous mixture of soil, discarding stones and vegetable residues.
6) From this mixture, take the quantity of soil that you need for the analysis.
7) Crumble the large chunks and distribute the soil sample on paper or plastic to air dry it.
8) Use a small bar to crush the air dried sample and pass it through the 2-mm soil sieve.

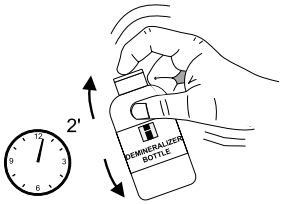


INSTRUCTIONS

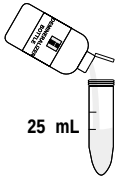
READ THE ENTIRE INSTRUCTIONS BEFORE USING THE KIT

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

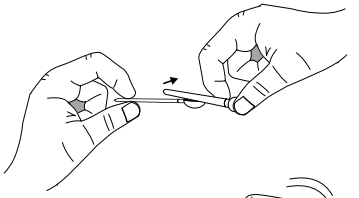
- Replace the cap and shake gently for at least 2 minutes. The demineralized water is now ready.



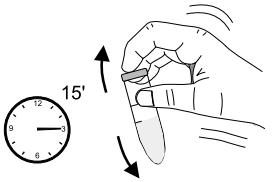
- Flip open the top of the Demineralizer Bottle cap. By gently squeezing the bottle, add demineralized water to the large (50 mL) test tube up to the 25 mL mark.



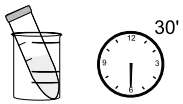
- Add 1 spoon of HI 38083A-0 Calcium Sulfate (discard the excess soil by using the handle of the other spoon).



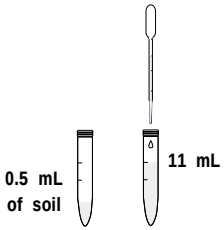
- Place the cap on the tube and shake it several times during a 15 minute period.



- Place the tube into the large (50 mL) vessel and wait for 30 minutes. The saturated calcium sulfate extractant solution is ready.

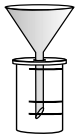


- To obtain the soil extract measure in the small (14 mL) test tube 0.5 mL of the prepared soil and add with the 3 mL pipette the saturated calcium sulfate extractant solution up to the 11 mL mark.

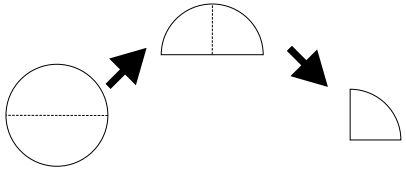


- Replace the cap and shake vigorously by striking the tube against the palm of your hand, to completely suspend the soil. Shake the tube three times for 1 minute at 10 minute intervals.

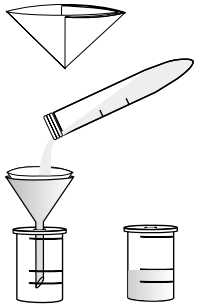
- Place the cap on one of the small (20 mL) calibrated vessels and insert the funnel into the cap hole.



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

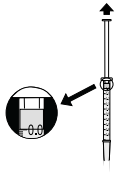


- Separate one side from the other three to form a cone.
- Place the folded filter disc into the funnel and filter the sample by pouring the soil extract into the cone. The extracted sample in the beaker is now ready for analysis.

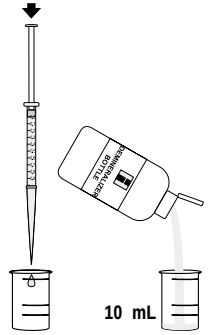


DETERMINATION OF GYPSUM REQUIREMENT

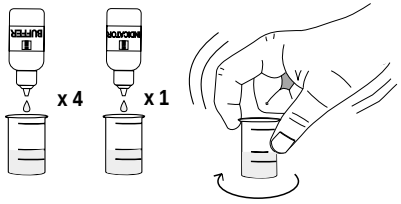
- Take the syringe and push the plunger completely down into the syringe. Insert tip into sample and pull the plunger out until the lower edge of the seal is on the 0.0 mL mark of the syringe.



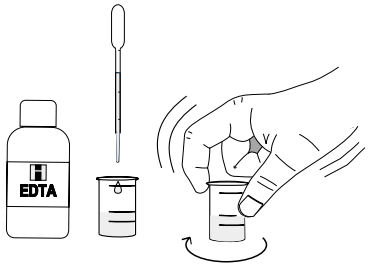
- Insert the syringe into the other small plastic vessel and push the plunger out until the lower edge of the seal is on the 1.0 mL mark. Add to the vessel demineralized water from the Demineralizer Bottle up to the 10 mL mark.



- Add 4 drops of Buffer Solution 10.2 ± 0.2, 1 drop of Calmagite Indicator and swirl to mix.



- Using the 1 mL plastic pipette, add drops of HI 38083C-0 EDTA Solution, swirling after each drop, while keeping an accurate count of the number of drops being added to the solution.



- Continue adding EDTA Solution until the solution in the vessel changes from red-violet to pure blue. If necessary refill the pipette with EDTA Solution, while keeping count of the drops being added. Record the number of drops needed to obtain the final color change (from wine red to pure blue).

- Calculate the Gypsum Requirement as follows:

GR (meq/100 grams of soil) = 56 - drops added
GR (ton/acre) = (meq/100 g) x 1.7
GR (metric ton/ha) = (meq/100 g) x 3.81

Note: if more than 56 drops need to be added, there is no Gypsum Requirement.

- Calculate the Estimated Exchangeable Sodium as follows:

EES (meq/100 grams of soil) = 0.99 x GR (meq/100 g) + 0.96

REFERENCES

P. Sequi, *Chimica del suolo*, Patron Editore, Ed. 1991

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.