

Greenhouse Soil Testing Outfit

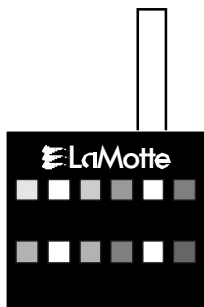
 **LaMotte**
Code 5269-02



TABLE OF CONTENTS

	<u>Page</u>
Use of the Octet Comparator	3
Accessories	3
Sampling Procedure	4
Preparing the Soil Extract.....	5
Conductivity.....	6
PH	7
Nitrate Nitrogen	8
Phosphorus	9
Potassium.....	10
Calcium and Magnesium	11

USE OF THE OCTET COMPARATOR



The Octet Comparator contains eight permanent color standards. A test sample is inserted into the openings in the top of the comparator. The sample can then be compared to four color standards at once, and the value read off the comparator. For optimum color comparison, the comparator should be positioned between the operator and a light source, so that the light enters through the special light-diffusing screen in the back of the comparator. Avoid viewing the comparator against direct sunlight or an irregularly lighted background.

ACCESSORIES

QUANTITY	CONTENTS	CODE
1	Demineralizer Bot tle	1155
1	Graduated Cylinder, 25 mL, glass	0417
6	Syringes, 60 mL, plastic	0943
6	Beakers, 50 mL, plastic	0944
2	Filter Paper, 2.5 cm, 100/pk	0947
1	Extraction Stand	1110

To order individual reagents or test kit components, use the specified code number.

SAMPLING PROCEDURE

It is important to gather a representative soil sample to achieve meaningful results. The following instructions will help achieve a representative sample.

- 1.** Use a soil probe or similar device to collect sample.
- 2.** Wait at least six hours after watering to sample.
- 3.** If dry fertilizer is used, wait 5 days after application to sample. If fertilizer is applied through a liquid injector system, wait at least 24 hours after application to sample.
- 4.** Scrape away mulch and top ¼" of soil.
- 5.** Collect sufficient soil cores (10 - 15) to gather at least 1 pint of soil.

WHEN TO SAMPLE

Many fertilizer problems may be avoided by sampling stockpiles of soil mixes before adding any fertilizer. Once the fertility level of the basic soil mix is established, a suitable soil fertility program can be established. Fertilizer should be mixed with the soil according to the soil test results, taking into account the use of a fertilizer injection system.

For all greenhouse crops, the soil should be sampled and tested prior to seeding or planting. No additional sampling is necessary for bedding plants and potted plants unless a problem develops. A greenhouse operation specializing in continuous production of one or two crops will want to sample the soil as the crop is finishing out. This will give a good indication of the fertility level which has been maintained.

For bench crops, the soil should be sampled every three months. This will enable greenhouse operators to maintain good soil fertility levels and avoid nutritional problems.

For vegetables, the soil should be sampled before fertilization or planting. This will enable the grower to use the proper kinds and amount of fertilizer. Sampling the soil which the crop is growing will indicate whether adequate nutrient levels are being maintained.

PREPARING THE SOIL EXTRACT

A single soil extract is used for all the tests. Between 17 and 18 mL of soil extract are needed to complete the series of tests. Because of the variable nature of greenhouse mixes, it is not always possible to obtain the required amount of extract from a single extraction. Therefore, it is recommended that the operator carry out the extraction in duplicate until it has been determined that a single extraction will provide a sufficient amount of extract.

NOTE: The Demineralizer Bottle (1115) will be the source of all deionized water for these procedures. Read the Demineralizer Bottle Instructions before proceeding.

1. Remove plunger from 50 mL syringe (0943).
2. Place filter paper on disc (0947) in the barrel of syringe, centering it over the discharge hole. Moisten paper with a few drops of deionized water.
3. Cover the discharge tip of the syringe with a black rubber bulb.
4. Fill the syringe to within 1½" of the top with well mixed, unscreened soil sample.
5. Use the Demineralizer Bottle (1155) to add deionized water to the soil. Continue adding deionized water a little at a time until the soil is saturated, and a ¼" layer of water is standing on top of the soil.
6. Place the syringe in foam stand. Wait at least 2 hours for the extraction to occur.
7. Place the syringe in the Extraction Stand (1110). Remove the black rubber bulb from the tip of the syringe.
8. Place a plastic beaker (0944) under the syringe top. Insert the plunger, and exerting pressure on the plunger, force the water through the soil, into the beaker. The extract is now ready to be used in the tests.

ALTERNATIVE LABORATORY PROCEDURE

If laboratory facilities are available, the following procedure may be used to obtain the soil extract.

1. Measure 150 to 250 mL of well mixed, but not screened, soil.
2. Wet soil until saturated. Mix to form a paste. Let sit for at least 2 hours.
3. Place soil on a piece of dry filter paper in a Buchner funnel. Apply suction until 10 to 20 mL of extract is collected.

CONDUCTIVITY

QUANTITY	CONTENTS	CODE
1	Test chamber	0966
1	Conductivity Meter	26094-22C

Read the Conductivity Meter Instruction Manual before proceeding.

PROCEDURE

1. Fill plastic test chamber (0966) with soil extract.
2. Insert the conductivity probe.
3. Measure the conductivity. Multiply reading by 0.7. Record as ppm Soluble Salts.
4. Remove probe and transfer extract to the probe column for the pH test. Rinse probe and test chamber with deionized water.

pH

QUANTITY	CONTENTS	CODE
120 mL	pH Buffer, 10.00	2896-J
120 mL	pH Buffer, 4.01	2866-J
120 mL	pH Buffer, 7.00	2881-J
1	Probe Column	0945
1	pH Meter	26094-20C
1	pH Electrode	1904

Read the pH Meter Instruction Manual before proceeding. Standardize meter before proceeding.

PROCEDURE

1. Insert the probe and measure pH.
Turn meter off when reading is completed.
2. Rinse the electrode and probe with deionized water.
3. Return soil extract to plastic beaker to use for the remaining tests.

NITRATE NITROGEN

QUANTITY	CONTENTS	CODE
60 mL	*Mixed Acid Reagent	*V-6278-H
120 mL	*Mixed Acid Reagent	*V-6278-J
5 g	*Nitrate Reducing Reagent	*V-6279-C
3	Test Tubes, 2.5 & 5 mL, glass	0820
1	Spoon, 0.1 g, plastic	0699
1	Nitrate Nitrogen Comparator	5300

***WARNING:** Reagents marked with a * are considered hazardous substances. Material Safety Data Sheets (MSDS) are supplied for these reagents. For your safety, read label and accompanying MSDS before proceeding.

NOTE: Place Dispenser Cap (0692) on *Mixed Acid Reagent (V-6278). Save this cap for refill reagents.

PROCEDURE

1. Use a 1 mL pipet (0354) to transfer 1 mL of soil extract to the 25 mL graduated cylinder (0417). Dilute to 25 mL line with deionized water.
2. Fill a test tube (0820) to the first mark with diluted soil extract.
3. Dilute to second mark with *Mixed Acid Reagent (V-6278). Cap and mix. Wait 2 minutes.
4. Use the 0.1 g spoon (0699) to add one level measure (avoid any excess) of *Nitrate Reducing Powder (V-6279). Cap and mix 30 to 40 times in one minute. Wait 10 minutes.
5. Insert test tube into Nitrate Nitrogen Comparator (5300). Match sample color to a color standard. Record as ppm Nitrate Nitrogen.

PHOSPHORUS

QUANTITY	CONTENTS	CODE
60 mL	*VM Phosphate Reagent	*4410-H
30 mL	*Reducing Reagent	*6405-G
2	Pipets, 1.0 mL, plastic	0354
1	Pipet, plain	0352
2	Test Tubes, 5 mL, glass	0230
1	Phosphorus Comparator	5274

***WARNING:** Reagents marked with a * are considered hazardous substances. Material Safety Data Sheets (MSDS) are supplied for these reagents. For your safety, read label and accompanying MSDS before proceeding.

PROCEDURE

1. Use a 1 mL pipet (0354) to add 1 mL of soil extract to a test tube (0230). Dilute to 5 mL mark with deionized water.
2. Use a second 1 mL pipet (0354) to add 1 mL of *VM Phosphate Reagent (4410). Cap and mix. Wait 5 minutes.
3. Use the plain pipet (0352) to add 3 drops of *Reducing Reagent (6405). Cap and invert to thoroughly mix contents.
4. Insert test tube into the Octet Comparator (5274). Match sample color to a color standard. Record as ppm Phosphorus.

POTASSIUM

QUANTITY	CONTENTS	CODE
50	*Potassium Reagent B Tablets	*5161-H
250 mL	*Potassium Reagent C	*5162-K
1	Pipet, plastic, transfer	0364
3	Test Tubes, Potash "A"	0245
2	Test Tubes, Potassium, glass	0232
1	Potassium Reading Stand	0946

***WARNING:** Reagents marked with a * are considered hazardous substances. Material Safety Data Sheets (MSDS) are supplied for these reagents. For your safety, read label and accompanying MSDS before proceeding.

PROCEDURE

1. Use a 1 mL pipet (0364) to add 1 mL of soil extract to the Potash "A" tube (0245). Dilute to line with deionized water.
2. Add one *Potassium Reagent B Tablet (5161). Cap and shake until tablet disintegrates.

NOTE: The temperature of Potassium Reagent C and the sample must be kept between 20 - 27° C (68 - 80° F). On warm days, the Potassium Reagent C and test tube containing Potassium Reagent B may be cooled by placing them in cold water before mixing.

3. Slowly fill test tube to upper mark with *Potassium Reagent C (5162), allowing Potassium Reagent C to run down the side of the tube. Swirl to mix. A precipitate will form if potassium is present.
4. Place an unmarked tube (0232) in the clip of the Potassium Reading Stand (0946).
5. Use the pipet (0364) to add the reacted sample slowly, allowing it to run down the side of the tube. Looking down through the tube, slowly add reacted sample until the black line just disappears.
6. With the bottom of the tube resting on the plate, compare the sample level to the scale. Read result from scale.
7. Multiply reading by 3. Record as Potassium.

NOTE: The test result is multiplied by 3 because the original dilution was 1:3. If a different dilution factor is used, multiply by the appropriate factor.

CALCIUM AND MAGNESIUM

The Schwarzenbach EDTA titration, used to determine calcium and magnesium levels, involves two separate titrations. The first titration determines the combined calcium and magnesium level, and the second titration indicates the calcium level only. Magnesium is determined by calculation.

Carefully read the LaMotte Direct Reading Titrator Instruction Manual before performing titrations.

QUANTITY	CONTENTS	CODE
30 mL	Calcium-Magnesium Inhibitor	3922-G
30 mL	*Calcium & Magnesium Buffer	*5126-G
2 x 15 mL	*CM Indicator Reagent	*6522-E
250 mL	Standard EDTA Reagent	5254-K
15 mL	*Inhibitor Solution	*9258-E
15 mL	*TEA Reagent	*3921-E
30 mL	*Sodium Hydroxide Reagent w/Metal Inhibitors	*4259-G
100	Calcium Hardness Indicator Tablets	T-5250-J
1	pH Hydriion Test Papers, 4.5-7.5	2953
1	Graduated Cylinder, 25mL	0417
1	Beaker, 50 mL	0944
1	Test Tube, 5-10-15 mL, w/cap	0778
1	Direct Reading Titrator, 0 - 1000 Range	0384

***WARNING:** Reagents marked with a * are considered hazardous substances. Material Safety Data Sheets (MSDS) are supplied for these reagents. For your safety, read label and accompanying MSDS before using.

CALCIUM & MAGNESIUM PROCEDURE

DILUTION OF SOIL EXTRACT

- 1.** Use the graduated cylinder (0417) to transfer 10 mL of soil extract to a 50 mL beaker (0944).
- 2.** Add 10 mL of deionized water. Mix.

TITRATION A: CALCIUM & MAGNESIUM

- 1.** Fill test tube (0778) to 5 mL line with diluted soil extract. Dilute to 10 mL line with deionized water.
- 2.** Add 5 drops of Calcium-Magnesium Inhibitor Reagent (3922). Swirl to mix. Wait 5 minutes.
- 3.** Add 5 drops of *Calcium & Magnesium Buffer (5126). Swirl to mix.
- 4.** Add 10 drops of *CM Indicator (6522). Swirl to mix. Solution will turn red.
- 5.** Fill the Direct Reading Titrator (0384) with Standard EDTA Reagent (5254). Insert Titrator tip into the center hole of the test tube cap.
- 6.** While swirling the tube, slowly press the plunger to titrate sample until color changes from red to blue.
- 7.** Read the result where the plunger tip meets the scale. Multiply by 5.16. Record as Value A.



LaMOTTE COMPANY

Helping People Solve Analytical ChallengesSM

PO Box 329 • Chestertown • Maryland • 21620 • USA
800-344-3100 • 410-778-3100 (Outside U.S.A.) • Fax 410-778-6394

Visit us on the web at www.lamotte.com