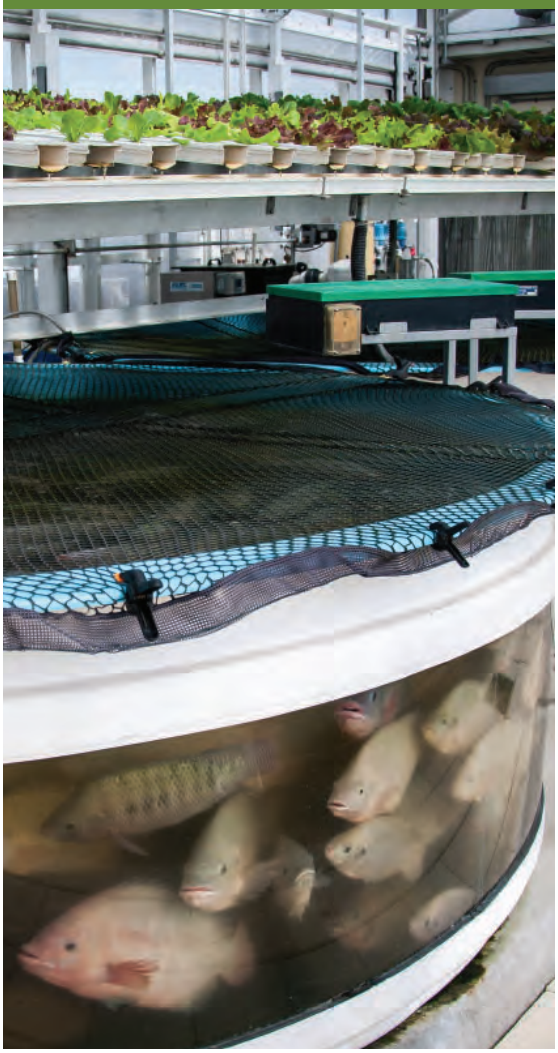
Aquaponics



Test Kit Instruction Manual
Code 3637

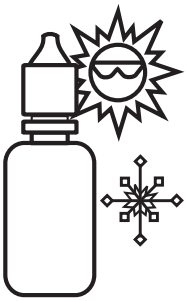
LaMotte

1.888.610.7664 www.calcert.com sales@calcert.com

Review the instructions thoroughly before attempting to perform the tests by the short-form instructions contained in the case lid. To order individual reagents or test kit components, use the specified code number.

TESTING HINTS / REAGENT CARE

Tightly close all reagent containers immediately after use. Be sure not to interchange caps and pipets from different containers.

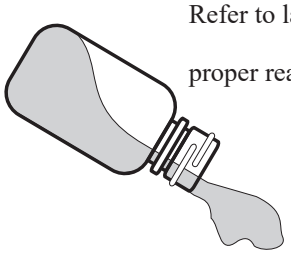


Avoid prolonged exposure of equipment and reagents to direct sunlight. Protect reagents and components from extreme heat and cold.

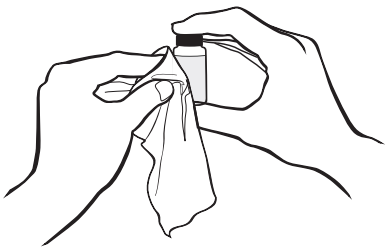
Wipe up any reagent chemical spills, liquid or powder, as soon as they occur.

Refer to label and SDS

proper reagent disposal.

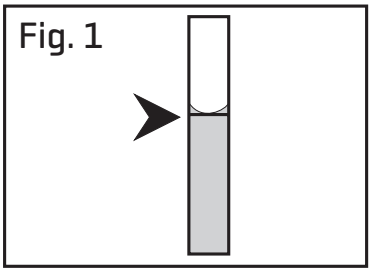


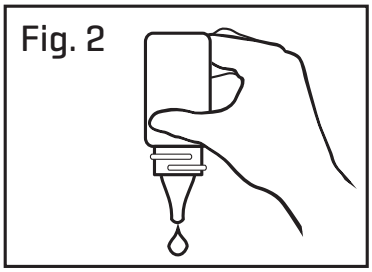
Use care when dispensing or handling all reagents. Some reagents also may cause permanent stains if spilled.

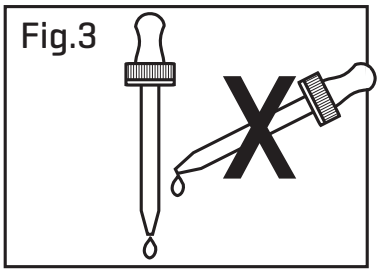


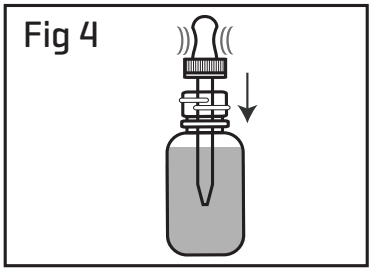
ANALYTICAL TECHNIQUE

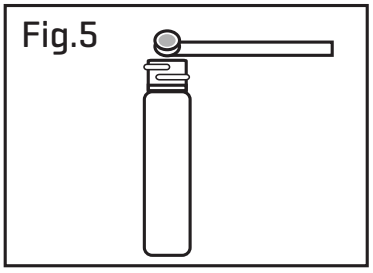
1. Clean glassware is a must for accurate results. Thoroughly rinse test tubes before and after each test. Caps and stoppers should also be cleaned after each use.
2. Use test tube caps, not your fingers, to cover test tubes and flasks during shaking or mixing.
3. When adding sample to calibrated test tube, be sure vial is filled to the appropriate mark. The bottom of the liquid (meniscus) should be level with the desired mark. (Fig. 1)
4. When dispensing reagents from bottles filled with dropper plug and cap, be sure to hold bottle vertically and gently squeeze to dispense the appropriate number of uniform drops. (Fig. 2)
5. For those reagents to be added with the screwcap pipet assemblies enclosed, remove polyseal cap on bottle and replace with the screwcap pipet. NOTE: Place the polyseal caps back on the reagent bottles for longer periods of storage. Be sure that both pipet assemblies and polyseal caps are thoroughly cleaned before placing on bottles to avoid contamination.
6. When dispensing reagents from pipets, hold pipet vertically to assure uniform drop size. This is extremely important when performing drop count titrations. (Fig. 3)
7. To fill pipets, squeeze rubber bulb and immerse into reagent. Release bulb to fill. (Fig. 4)
8. To accurately dispense powdered reagents with spoon, tap spoon on edge of reagent container to remove excess reagent. (Fig. 5)
9. When performing tests that use the Octa-Slide 2 Comparator, the comparator should be positioned between the operator and non-direct sunlight. This allows the light to enter through the light-diffusing screen at the back of the comparator for optimum color comparison.



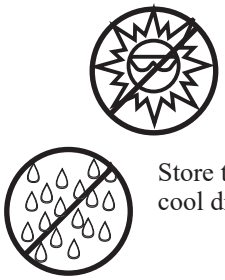








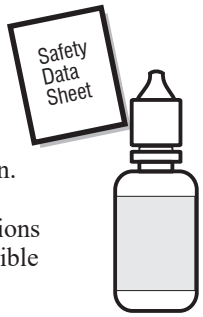
GENERAL SAFETY PRECAUTIONS

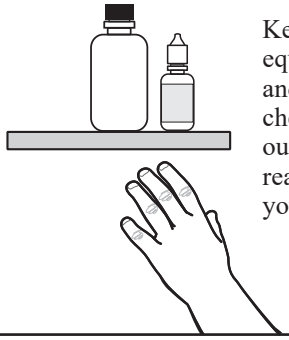


Store the test kit in a cool dry area.

Read all instructions and note precautions before performing the test procedure. Read all Safety Data Sheets (SDS) at

Read the labels on all reagent bottles. Note warnings and first aid information. Reagents marked with a * on instructions are considered possible health hazards.





Keep all equipment and reagent chemicals out of the reach of young children.

Avoid contact between reagent chemicals and skin, eyes, nose, and mouth.

Wear safety glasses when performing test procedures.

*WARNING: Reagents marked with an * are considered to be potential health hazards. To view or print a Safety Data Sheet

TEST METHODS

This test kit uses two basic analytical procedures common to field test kits. A brief explanation of each follows:

COLORIMETRIC: OCTA-SLIDE 2 VIEWER

In a visual colorimetric test, a sample is treated with reagent(s) to produce a color reaction, generally in proportion to the amount of test factor present. The sample color is then compared against color standards representing known concentrations of the factor being tested over a specific range.

1

Insert Octa-Slide 2 Bar into the Octa-Slide 2 Viewer (1101).

2

Insert test tube containing reacted sample into the Octa-Slide 2 Viewer (1101).

3

Hold the Octa-Slide 2 Viewer so that non-direct light enters through the back of the viewer.

4

Match sample color to color standard. Record results.

NOTE: If sample color is between two standards, the midpoint is taken as the result.

If the sample is darker than the highest standard, a dilution may be performed on a fresh sample, and the test repeated to bring the concentration within range.

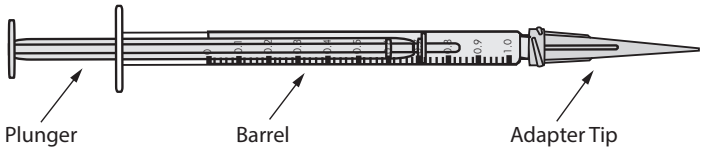
DILUTIONS

The calibrated test tubes (0106) included in this kit may be used to perform dilutions for the Ammonia Nitrogen, Iron, Nitrate-Nitrogen and Nitrite Nitrogen tests. Distilled or deionized water is needed to perform dilutions.
The following table provides a quick reference guide for dilutions of various proportions. Once the dilution is prepared, use this diluted sample to perform the test, and multiply the result by the dilution factor to obtain the actual concentration.

Sample Size	Distilled Water to Bring to 10 mL	Dilution Factor
5.0 mL	5.0 mL	2
2.5 mL	7.5 mL	4

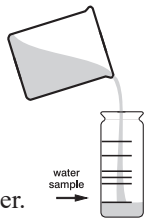
TITRIMETRIC: DIRECT READING TITRATOR

In a titrimetric method, titrating solution (or titrant) is added to a treated sample until a color change occurs. The volume of titrant required to reach this endpoint is proportional to the concentration of the factor being tested. Direct Reading Titrators provide results directly in the appropriate concentration for the test - no counting of drops, no calculations.



The Titrator consists of a plastic barrel, a plastic plunger, and a plastic adapter tip. The adapter tip reduces the size of the drops that are dispensed, increasing the precision of the test results. DO NOT remove the plunger or adapter tip from the Titrator.

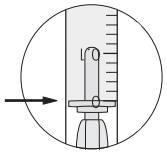
1 Fill the test tube to the appropriate line with sample water.



2 Add reagents as specified in the instructions for the individual test method. Cap with the special test tube cap. Mix by swirling gently.

3 Depress the Titrator plunger to expel air. Insert Titrator into the plastic fitting of the titrating solution bottle and invert.

4 To fill Titrator, slowly withdraw the plunger until the bottom of the plunger is opposite the zero mark on the scale.

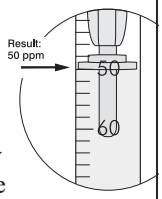


NOTE: If small air bubbles appear in the barrel, expel them by partially filling the barrel and pumping the titration solution back into the reagent container. Repeat until bubble disappears.

5 Turn the bottle right-side-up and remove the Titrator.

6 Insert the Titrator into the center hole of the test tube cap. While gently swirling tube, add titrating solution one drop at a time until the desired color changes occur. Follow individual test instructions.

7 Read the test result directly from the scale where the large ring on the Titrator meets the Titrator barrel.



8 When testing is complete, discard titrating solution in Titrator. Do not return the titrant to the reagent bottle. Rinse Titrator and titration tube thoroughly. Do not remove the plunger or the adapter tip from the Titrator.

TEST PROCEDURES

INTRODUCTION

Proper control of water quality is an essential part of successful aquaponics operation. Immediate test results provided by on-site water analysis equipment can confirm a healthy environment, or give early warning signals for required treatment.

1. Develop a routine testing schedule.
2. Keep records! Historical data is extremely important if treatments are required. Note environmental conditions, fish activity, feeding habits, etc.
3. Observe fish to note any particular behavior or feeding rates, as this may be a sign of stress.
4. Observe plants for signs of distress.
5. Stable characteristics, such as alkalinity, do not have to be tested as frequently as ones that fluctuate, such as ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, pH, dissolved oxygen and temperature. Keep in mind that these factors fluctuate throughout the day and in some cases are interdependent.
6. Be alert to sudden changes in one factor, as it may be a clue to perform further analysis.

1 part per million (ppm) = 1 milligram per liter (mg/L)

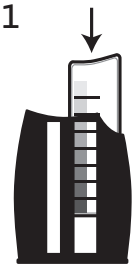
Ammonia Nitrogen

DESCRIPTION	CODE
*Salicylate Ammonia #1	*3978LWT-H
*Salicylate Ammonia #2	*3979WT-G
Salicylate Ammonia #3	3982WT-G
Test Tube, 2.5-5-10 mL, plastic, w/cap	0106
Ammonia Nitrogen Octa-Slide 2 Bar, 0-2 ppm, fresh water	3441-01-FW
Ammonia Nitrogen Octa-Slide 2 Bar, 0-2 ppm, salt water	3441-01-SW
Octa-Slide 2 Viewer	1101

*WARNING: Reagents marked with an * are considered to be potential health hazards. See page 6 for futher details.

AMMONIA NITROGEN TEST PROCEDURE

1

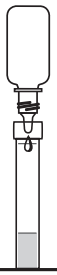


Insert Ammonia Nitrogen Octa-Slide 2 Bar (3441-01-FW or 3441-01-SW) into the Octa-Slide 2 Viewer (1101).

2

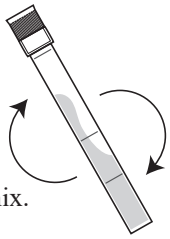
Fill a test tube (0106) to the 5 mL line with sample water.

3



Add 10 drops of Salicylate Ammonia #1 (3978LWT).

4

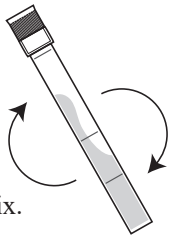


Cap and mix.

5

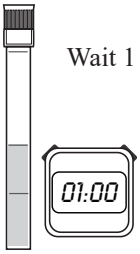
Add 7 drops of Salicylate Ammonia #2 (3979WT).

6



Cap and mix.

7

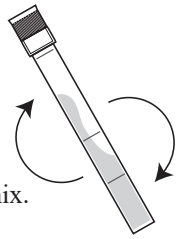


Wait 1 minute.

8

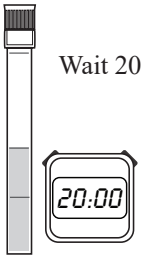
Add 7 drops of Salicylate Ammonia #3 (3982WT).

9



Cap and mix.

10

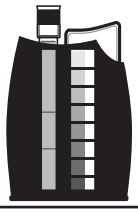


Wait 20 minutes.

11

Insert test tube into Octa-Slide 2 Viewer (1101).

12



Match sample color to a color standard. Record as ppm Ammonia Nitrogen (NH_3-N).

13

To express results as Unionized Ammonia (NH_3) multiply the test result by 1.2:

Unionized Ammonia (NH_3) = ppm Ammonia Nitrogen (NH_3-N) x 1.2

To express results as Ionized Ammonia (NH_4^+) multiply the test result by 1.3:

Ionized Ammonia (NH_4^+) = ppm Ammonia Nitrogen (NH_3-N) x 1.3

Ammonia in water occurs in two forms: toxic unionized ammonia (NH3) and the relatively non-toxic form, ammonium ion (NH_4^+). This test method measures both forms as ammonia-nitrogen (NH_3-N) to give the total ammonia-nitrogen concentration in water. The actual proportion of each compound depends on temperature, alkalinity, and pH. A greater concentration of unionized ammonia is present when the pH value and salinity increase.

1. Consult the table below to find the percentage that corresponds to the temperature, pH and salinity of the sample.
2. To express the test result as ppm Unionized Ammonia Nitrogen (NH_3-N), multiply the total ammonia-nitrogen test result by the percentage from the table.
3. To express the test result as ppm Ionized Ammonia Nitrogen (NH_4-N), subtract the unionized ammonia nitrogen, determined in Step 2, from the total ammonia-nitrogen.

Percentage of Free Ammonia as (NH_3) in Freshwater[1] (FW) and Seawater[2] (SW) at varying pH and temperature.

	10°C		15°C		20°C		25°C	
pH	FW1	SW2	FW	SW	FW	SW	FW	SW
7.0	0.19		0.27		0.40		0.55	
7.1	0.23		0.34		0.50		0.70	
7.2	0.29		0.43		0.63		0.88	
7.3	0.37		0.54		0.79		1.10	
7.4	0.47		0.68		0.99		1.38	
7.5	0.59	0.459	0.85	0.665	1.24	0.963	1.73	1.39
7.6	0.74	0.577	1.07	0.836	1.56	1.21	2.17	1.75
7.7	0.92	0.726	1.35	1.05	1.96	1.52	2.72	2.19
7.8	1.16	0.912	1.69	1.32	2.45	1.90	3.39	2.74
7.9	1.46	1.15	2.12	1.66	3.06	2.39	4.24	3.43
8.0	1.83	1.44	2.65	2.07	3.83	2.98	5.28	4.28
8.1	2.29	1.80	3.32	2.60	4.77	3.73	6.55	5.32
8.2	2.86	2.26	4.14	3.25	5.94	4.65	8.11	6.61
8.3	3.58	2.83	5.16	4.06	7.36	5.78	10.00	8.18
8.4	4.46	3.54	6.41	5.05	9.09	7.17	12.27	10.10
8.5	5.55	4.41	7.98	6.28	11.18	8.87	14.97	12.40

[1]*Freshwater data from Trussel (1972).*
[2]*Seawater values from Bower and Bidwell (1978). Salinity for Seawater values = 34 ppt at an ionic strength of 0.701 m.*

FOR EXAMPLE:
A fresh water sample at 20°C has a pH of 8.5 and the test result is 1.0 ppm as total Ammonia-Nitrogen.

1. The percentage from the table is 11.18% (or 0.1118).
2. 1 ppm total Ammonia-Nitrogen x 0.1118 = 0.1118 ppm Unionized Ammonia-Nitrogen
3. Total Ammonia-Nitrogen 1.0000 ppm
   Unionized Ammonia-Nitrogen – 0.1118 ppm
   Ionized Ammonia-Nitrogen = 0.8882 ppm

Iron

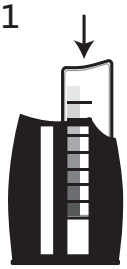
CONTENTS	CODE
*Iron Reagent #1	*4450-G
*Iron Reagent #2 Powder	*4451-S
*Ferrous Iron Reagent	*4453-S
Spoon, 0.05 g, plastic	0696
Test Tubes, 2.5-10 mL, plastic, w/cap	0106
Iron Octa-Slide 2 Bar, 0.5 - 10.0 ppm	4448-01
Octa-Slide 2 Viewer	1101

*WARNING: Reagents marked with an * are considered to be potential health hazards. See page 6 for futher details.

IRON TEST PROCEDURE

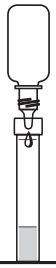
TOTAL IRON

1 Insert Iron Octa-Slide 2 Bar (4448-01) into the Octa-Slide 2 Viewer (1101).

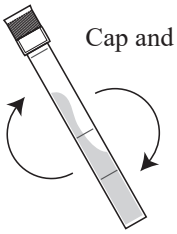


2 Fill test tube (0106) to 5 mL line.

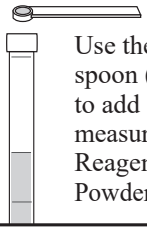
3 Add 5 drops of *Iron Reagent #1 (4450).



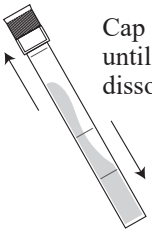
4 Cap and mix.



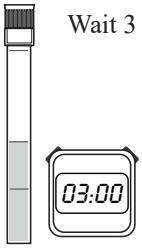
5 Use the 0.05g spoon (0696) to add one level measure of *Iron Reagent #2 Powder (4451).



6 Cap and shake until powder dissolves.



7 Wait 3 minutes.



8 Insert test tube into Octa-Slide 2 Viewer.

9 Match sample color to a color standard. Record as ppm Total Iron.

FERROUS IRON

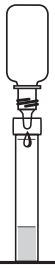
1

Insert Iron Octa-Slide 2 Bar (4448-01) into the Octa-Slide 2 Viewer (1101).

2

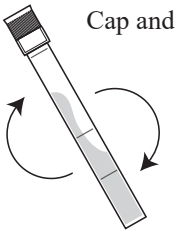
Fill test tube (0106) to 5 mL line.

3



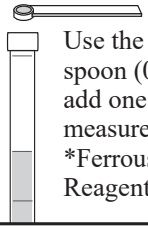
Add 5 drops of *Iron Reagent #1 (4450).

4



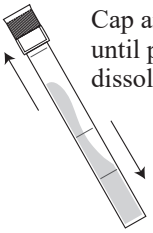
Cap and mix.

5



Use the 0.05g spoon (0696) to add one level measure of *Ferrous Iron Reagent (4453).

6



Cap and shake until powder dissolves.

7

Insert test tube into Octa-Slide 2 Viewer.

8

Match sample color to a color standard. Record as ppm Ferrous Iron.

To calculate ppm Ferric Iron:
Ferric Iron = Total Iron - Ferrous Iron

pH

DESCRIPTION	CODE
*Wide Range Indicator	*2218-G
Test Tube, plastic, w/cap	0106
Octa-Slide 2 Viewer	1101
Wide Range pH Octa-Slide 2 Bar, 5.0-10.0	3483-01

*WARNING: Reagents marked with an * are considered to be potential health hazards. See page 6 for futher details.

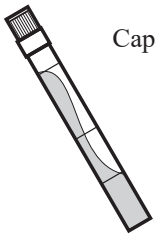
pH TEST PROCEDURE

1 Insert Wide Range pH Octa-Slide 2 Bar (3483-01) into the Octa-Slide2 Viewer (1101).

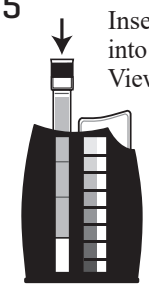
2 Fill a test tube (0106) to the 10 mL line with the water sample.

3 Add 8 drops of *Wide Range pH Indicator (2218).

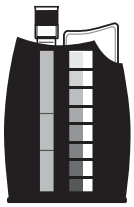
4 Cap and mix.



5 Insert test tube into Octa-Slide2 Viewer (1101).



6 Match sample color to color standard. Record as pH.



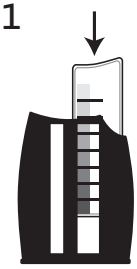
Nitrate Nitrogen

DESCRIPTION	CODE
Nitrate #1 Tablets	2799A-H
*Nitrate #2 CTA Tablets	*NN-3703A-H
Test Tubes, 2.5-10.0 mL, plastic, w/caps	0106
Protective Sleeves	0106-FP
Nitrate-Nitrogen Octa-Slide 2 Bar, 0-15 ppm	3494-01
Octa-Slide 2 Viewer	1101

*WARNING: Reagents marked with an * are considered to be potential health hazards. See page 6 for futher details.

NITRATE NITROGEN TEST PROCEDURE

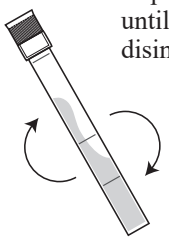
1 Insert Nitrate-Nitrogen Octa-Slide 2 Bar (3494-01) into the Octa-Slide 2 Viewer (1101)



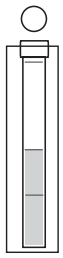
2 Fill a test tube (0106) to the 5 mL line with sample water.

3 Add one Nitrate #1 Tablet (2799A).

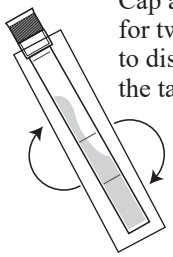
4 Cap and mix until tablet disintegrates.



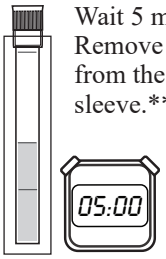
5 Add one *Nitrate #2 CTA Tablet (NN-3703A). Immediately slide the test tube into the Protective Sleeve (0106-FP).



6 Cap and mix for two minutes to disintegrate the tablet.

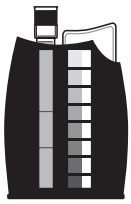


7 Wait 5 minutes. Remove the tube from the protective sleeve.**



8 Insert test tube into Octa-Slide 2 Viewer (1101)

9 Match sample color to a color standard. Record as ppm Nitrate Nitrogen.



NOTE: To convert to Nitrate, multiply results by 4.4. Record as ppm Nitrate.

** Nitrate #2 CTA Tablets (NN-3707) are sensitive to UV light. The Protective Sleeve (0106-FP) will protect the reaction from UV light. If testing indoors, there is no need to use the Protective Sleeve in this procedure.

Nitrite Nitrogen

DESCRIPTION	CODE
*Mixed Acid Reagent	*V-6278-H
*Color Developing Reagent	*V-6281-D
Spoon, 0.1 g, plastic	0699
Test Tube, plastic, w/cap	0106
Dispenser Cap	0692
Octa-Slide 2 Viewer	1101
Nitrite Nitrogen Octa-Slide 2 Bar, 0.05-0.8 ppm	3437-01

*WARNING: Reagents marked with an * are considered to be potential health hazards. See page 6 for futher details.

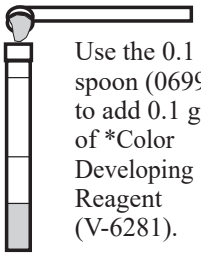
NOTE: Place Dispenser Cap (0692) on *Mixed Acid Reagent (V-6278-H). Save this cap for refill reagents.

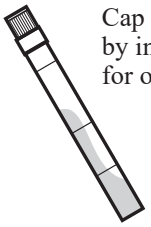
NITRITE NITROGEN TEST PROCEDURE

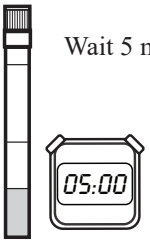
1 
Insert Nitrite-Nitrogen Octa-Slide 2 Bar (3437-01) into the Octa-Slide2 Viewer (1101).

2 
Fill a test tube (0106) to the 2.5 mL line with the water sample.

3 
Dilute to the 5mL line with *Mixed Acid Reagent (V-6278).

4 
Use the 0.1 g spoon (0699) to add 0.1 g of *Color Developing Reagent (V-6281).

5 
Cap and mix by inverting for one minute.

6 

Wait 5 minutes.

7 
Insert test tube into Octa-Slide2 Viewer (1101).

8 
Match sample color to color standard. Record results as ppm Nitrite Nitrogen.

9 To convert to Nitrite, multiply results by 3.3. Record as ppm Nitrite.

Nitrite-N (NO_3-N) x 3.3 = ppm Nitrite (NO_2-)

Alkalinity

DESCRIPTION	CODE
BCG/MR Indicator Tablets	2311A-H
*Alkalinity Titration Reagent B	*4493DR-H
Test Tube, 5-10-12.9-15-20-25 mL, glass, w/cap	0608
Direct Reading Titrator, 0-200 Range	0382
Alkalinity Endpoint Color Chart	4491-CC

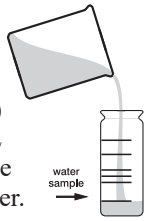
*WARNING: Reagents marked with an * are considered to be potential health hazards. See page 6 for futher details.

The Direct Reading Titrator is calibrated in terms of total alkalinity expressed as parts per million (ppm) Calcium Carbonate ($CaCO_3$). Each minor division on the Titrator scale equals 4 ppm $CaCO_3$.

ALKALINITY TEST PROCEDURE

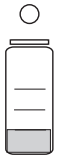
1

Fill the test tube (0608) to the 5 mL line with the sample water.



2

Add 1 BCG-MR Indicator Tablet (2311A).



3

Cap and swirl until tablet dissolves. Solution will turn blue-green.

4

Fill Direct Reading Titrator (0382) with *Alkalinity Titration Reagent B (4493DR).

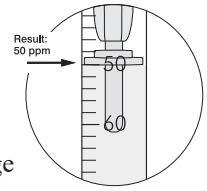
5

Insert the Titrator into the center hole of the test tube cap.

6

While gently swirling the tube, slowly press the plunger to titrate until blue-green color changes to purple. Consult Alkalinity Endpoint Color Chart (4491-CC).

7



Read the test result directly from the scale where the large ring on the Titrator meets the Titrator barrel. Record Total Alkalinity as ppm Calcium Carbonate ($CaCO_3$).

8

NOTE: If the plunger tip reaches the bottom line on the scale (200 ppm) before the endpoint color change occurs, refill the Titrator and continue the titration.

When recording the test result, be sure to include the value of the original amount of reagent dispensed (200 ppm).

Dissolved Oxygen

DESCRIPTION	CODE
*Manganous Sulfate Solution	*4167-G
*Alkaline Potassium Iodide Azide Reagent	*7166-G
*Sulfuric Acid, 1:1	*6141WT-G
Sodium Thiosulfate, 0.025N	4169-H
Starch Indicator Solution	4170PS-G
Direct Reading Titrator, 0-10 Range	0377
Test Tube, 5-10-12.9-15-20-25 mL, glass, w/cap	0608
Pipet, plain, plastic, w/cap	0392
Water Sampling Bottle, 60 mL, glass	0688-DO

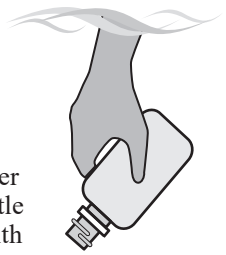
*WARNING: Reagents marked with an * are considered to be potential health hazards. See page 6 for futher details.

The Titrator is calibrated in terms of Dissolved Oxygen expressed as ppm Dissolved Oxygen. Each minor division on the Titrator scale equals 0.2 ppm Dissolved Oxygen.

DISSOLVED OXYGEN TEST PROCEDURE

Part 1 - Collecting the Water Sample

1



Rinse the Water Sampling Bottle (0688-DO) with the sample water.

2

Tightly cap the bottle, and submerge it to the desired depth.

3

Remove the cap and allow the bottle to fill.

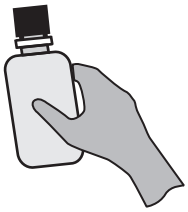
4

Tap the sides of the bottle to dislodge any air bubbles.

5

Replace the cap while the bottle is still submerged.

6



Retrieve the bottle and make sure that no air bubbles are trapped inside.

Part 2 - Adding the Reagents

NOTE: Be careful not to introduce air into the sample while adding the reagents.

1

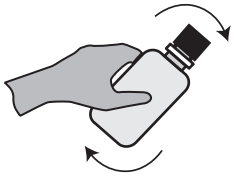
Remove the cap from the bottle.

2

Immediately add 8 drops of *Manganous Sulfate Solution (4167) and add 8 drops of *Alkaline Potassium Iodide Azide (7166).

3

Cap the bottle and mix by inverting several times. A precipitate will form.



4

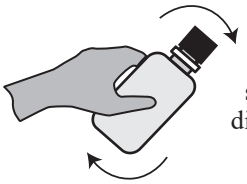
Allow the precipitate to settle below the shoulder of the bottle.

5

Add 8 drops of *Sulfuric Acid, 1:1 (6141WT).

6

Cap and gently invert the bottle to mix the contents until the precipitate and the reagent have totally dissolved. The solution will be clear yellow to orange if the sample contains dissolved oxygen.



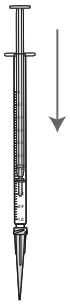
NOTE: At this point the sample has been “fixed” and contact between the sample and the atmosphere will not affect the test result. Samples may be held at this point and titrated later.

Part 3 - The Titration

1

Fill the titration tube (0608) to the 20 mL line with the fixed sample. Cap the tube.

2



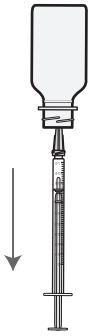
Depress plunger of the Titrator (0377).

3

Insert the Titrator into the plug in the top of the *Sodium Thiosulfate, 0.025N (4169) titrating solution.

4

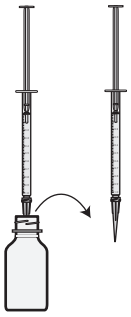
Invert the bottle and slowly withdraw the plunger until the large ring on the plunger is opposite the zero (0) line on the scale.



NOTE: If small air bubbles appear in the titrator barrel, expel them by partially filling the barrel and pumping the titration solution back into the reagent container. Repeat until bubble disappears.

5

Turn the bottle upright and remove the Titrator.



NOTE: If the sample is a very pale yellow, go to Step 9.

6

Insert the tip of the Titrator into the opening of the titration tube cap.

7

Slowly depress the plunger to dispense the titrating solution until the yellow-brown color changes to a very pale yellow. Gently swirl the tube during the titration to mix the contents.

8

Carefully remove the Titrator and cap. Do not disturb the Titrator plunger.

9

Add 8 drops of Starch Indicator Solution (4170WT). The sample should turn blue.

10

Cap the titration tube. Insert the tip of the Titrator into the opening of the titration tube cap.

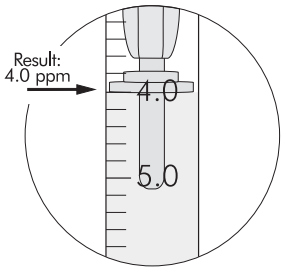
11

Continue titrating until the blue color disappears and the solution becomes colorless.

NOTE: If the plunger ring reaches the bottom line on the scale (10 ppm) before the endpoint color change occurs, refill the Titrator and continue the titration. Include the value of the original amount of reagent dispensed (10 ppm) when recording the test result.

12

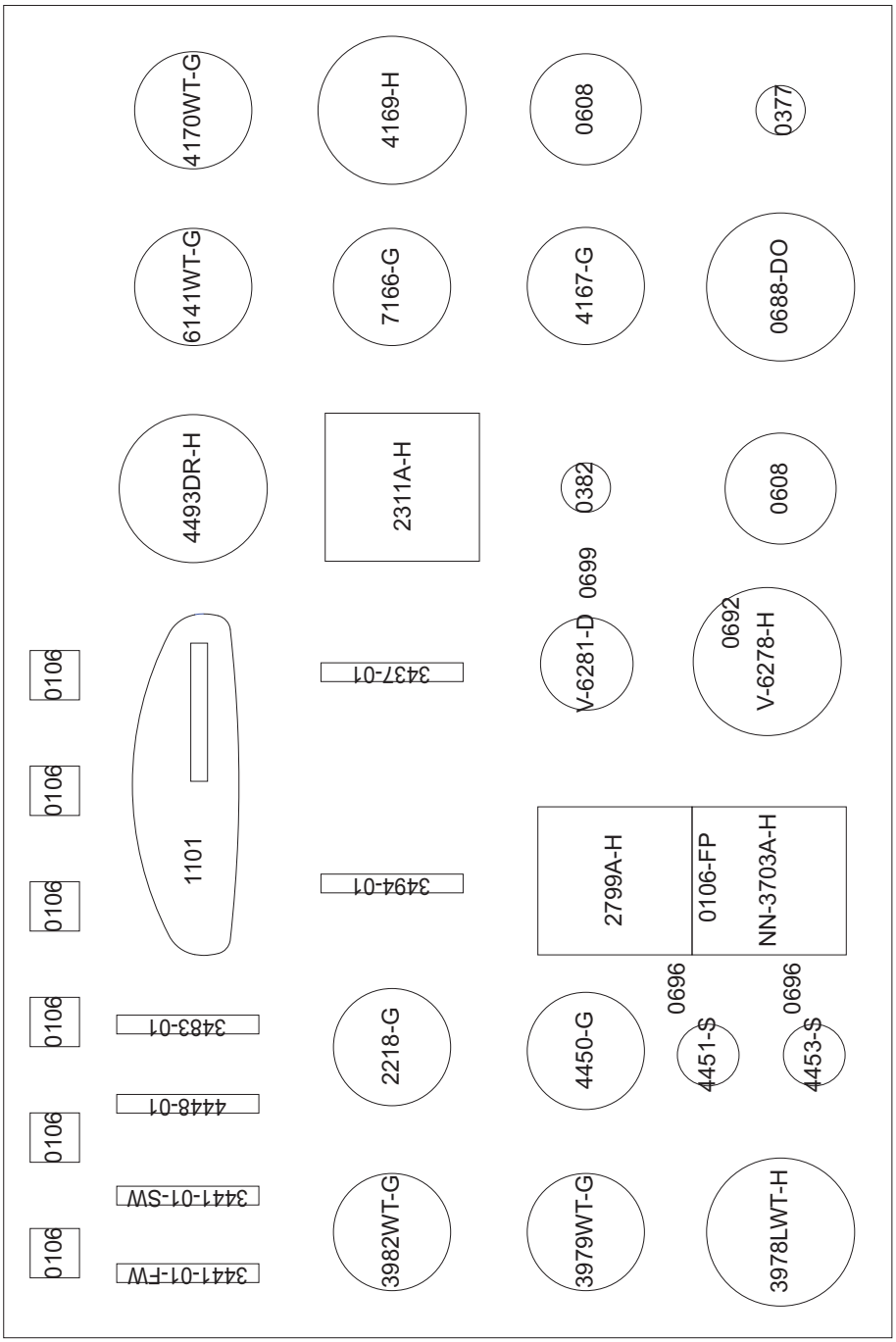
Read the test result directly from the scale where the large ring on the Titrator meets the Titrator barrel. Record as ppm Dissolved Oxygen. Each minor division on the Titrator scale equals 0.2 ppm.



NOTE: When testing is complete, discard the titrating solution in the Titrator. Rinse Titrator and titration tube thoroughly. DO NOT remove plunger or adapter tip.

KIT CONTENTS

QUANTITY	CONTENTS	CODE
1	Salicylate Ammonia #1	3978LWT-H
1	Salicylate Ammonia #2	3979WT-G
1	Salicylate Ammonia #3	3982WT-G
1	Iron Reagent #1	4450-G
1	Iron Reagent #2 Powder	4451-S
1	Ferrous Iron Reagent	4453-S
1	Wide Range Indicator	2218-G
1	Nitrate #1 Tablets	2799A-H
1	Nitrate #2 Tablets	NN-3703A-H
1	Mixed Acid Reagent	V-6278-H
1	Color Developing Reagent	V-6281-D
1	BCG/MR Indicator Tablets	2311A-H
1	Alkalinity Titration Reagent B	4493DR-H
1	Manganous Sulfate Solution	4167-G
1	Alkaline Potassium Iodide Azide	7166-G
1	Sulfuric Acid 1:1	6141WT-G
1	Sodium Thiosulfate, 0.025 N	4169-H
1	Starch Indicator Solution	4170WT-G
6	Test Tubes, w/cap	0106
2	Test Tube, w/cap	0608
2	Spoon, 0.05 g	0696
1	Spoon, 0.1 g	0699
1	Protective Sleeve	0106-FOP
1	Dispenser Cap	0692
1	Direct Reading Titrator, 0 – 200 Range	0382
1	Direct Reading Titrator, 0 – 1- Range	0377
1	Water Sampling Bottle, 60 mL, glass	0688-DO
1	Octa-Slide 2 Viewer	1101
1	Ammonia-Nitrogen Octa-Slide 2 Bar for Fresh Water	3441-01-FW
1	Ammonia-Nitrogen Octa-Slide 2 Bar for Salt Water	3441-01-SW
1	Iron Octa-Slide 2 Bar	4448-01
1	Wide Range Octa-Slide 2 Bar	3483-01
1	Nitrate Nitrogen Octa-Slide 2 Bar	3494-01
1	Nitrite Nitrogen Octa-Slide 2 Bar	3437-01
1	Alkalinity Endpoint Color Chart	4491-CC



RECOMMENDED PRODUCTS

Phosphate Test Kit Code 3114-02

Range 0.5–10.0 ppm and 10.0–100.0 ppm, Ascorbic Acid Method, Octa-Slide 2 Comparator

Chlorine Test Kit Code 3308-01

Range 0.2–3.0 ppm, DPD Method, Octa-Slide 2 Comparator

Carbon Dioxide Test Kit Code 7297-DR-01

Range 0–50 ppm, Titration to phenolphthalein endpoint, Direct reading Titrator

Potassium Test Kit Code 3138-01

Range 6–50 ppm, Turbidity Reading Tube

Sulfate Test Kit Code 7778-01

Range 20–200 ppm, Barium Tablet Method, Octa-Slide 2 Comparator

Hardness Test Kit Code 4824-DR-LT-01

Range 0–200 ppm Calcium, Magnesium and Total Hardness, EDTA Titration, Direct Reading Titrator

Plant Tissue Test Kit – Macronutrients Code 5026-01

Quantitative results (abundant/adequate/deficient) for Nitrogen, Phosphorus and Potassium

Plant Tissue Test Kit – Micronutrients Code 5261-01

Presence/absence for Boron, Manganese, Copper, Zinc and Ferrous/Ferric Iron

Dissolved Oxygen Sampler Code 1054-DO

Armored Thermometer Code 1066