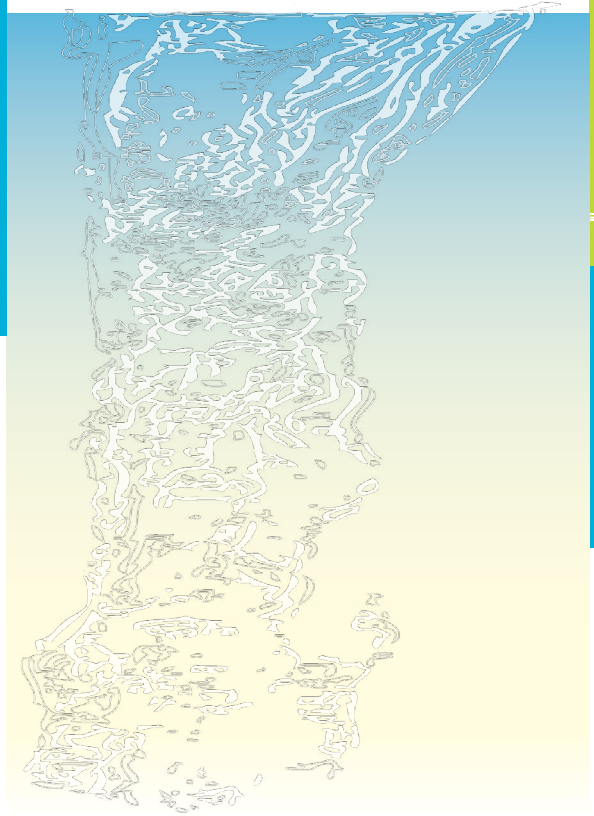
Model S/DuoSoft
with Octa-Slide 2

water quality **DEMO OUTFIT**



AT 38/40

LaMotte®

Table of Contents

Safety Information

Read the instruction manual thoroughly to familiarize yourself with the test procedures before you begin. Make note of any precautions in the instructions.

*Reagent is a potential health hazard. **READ SDS:** lamotte.com

Emergency information:
Chem-Tel USA 1-800-255-3924
Int'l, call collect, 813-248-0585

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

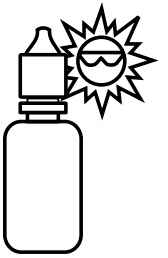
Protect Yourself and Equipment: Use Proper Analytical Techniques

Testing Hints

1

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

2

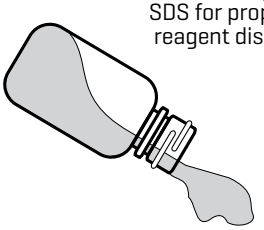


Avoid prolonged exposure of equipment and reagents to direct sunlight.

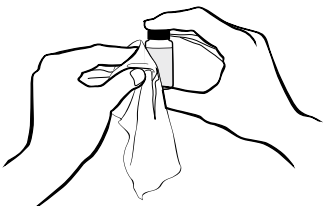
3

Protect reagents and components from extreme heat and cold.

4 Wipe up any reagent chemical spills, liquid or powder, as soon as they occur. Refer to label and accompanying SDS for proper reagent disposal.



5 Use care when dispensing or handling all reagents due to safety reasons. Some chemicals also may cause permanent stains if spilled.



ANALYTICAL TECHNIQUES

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 or stoppers, 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. (Figure 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. (Figure 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. (Figure 3)
7. To fill pipets, squeeze rubber bulb and immerse into reagent. Release bulb to fill. (Figure 4)
8. To accurately dispense powdered reagents with spoon, tap spoon on edge of reagent container to remove excess reagent. (Figure 5)
9. When performing tests that include Octa-Slide 2 Comparators, 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.

FIG. 1

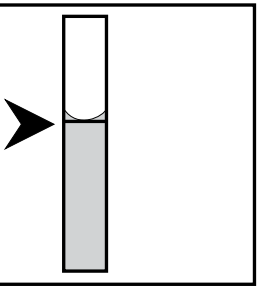


FIG. 2

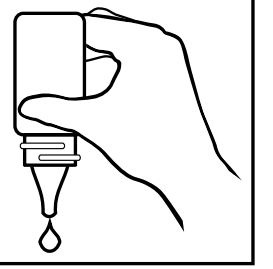


FIG. 3

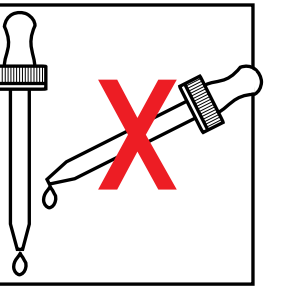


FIG. 4

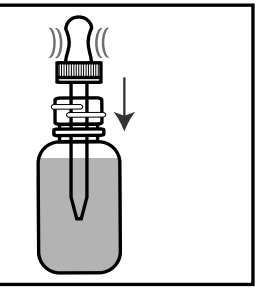
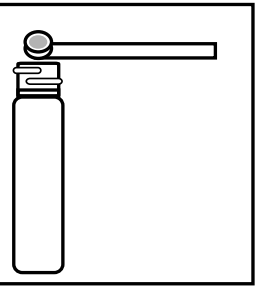


FIG.5



Model S and DuoSoft Softeners

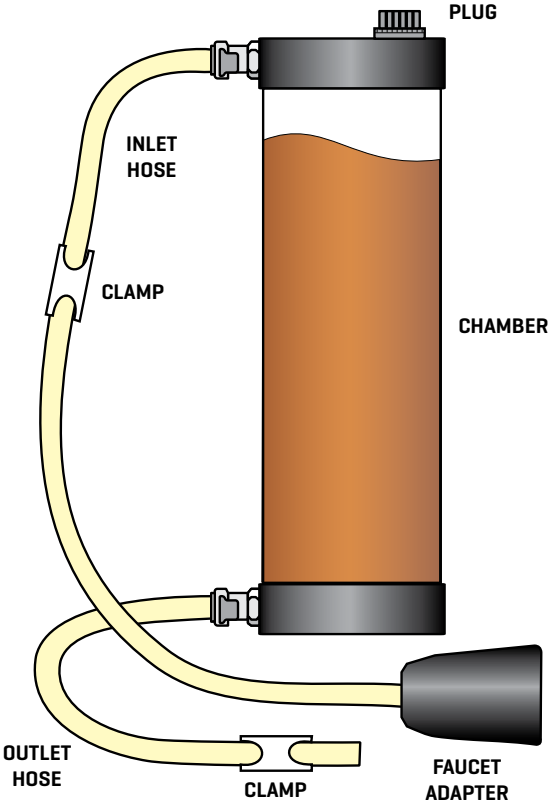
INTRODUCTION

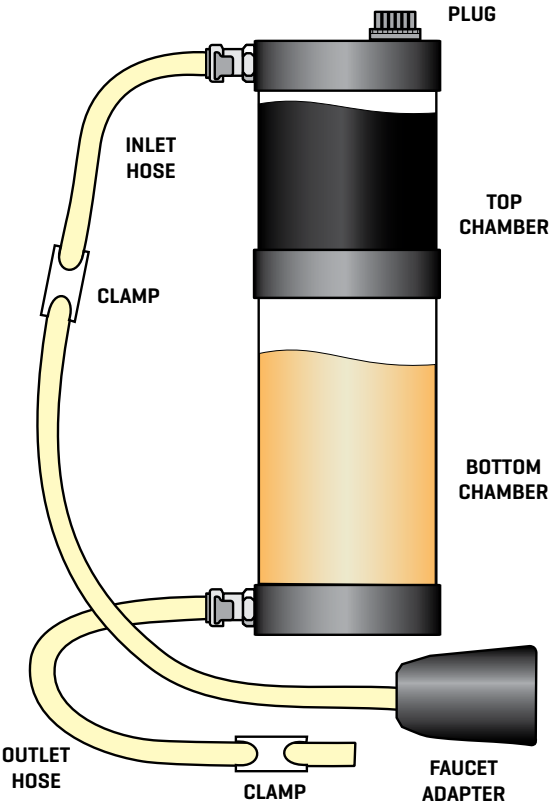
The **Model S** and the **DuoSoft Water Softeners** are designed to produce high quality softened water. As water passes through the Model S chamber, the resin column causes scale-forming calcium and magnesium ions to be exchanged for non-scale-forming sodium ions. When the resin is exhausted it must be replaced or regenerated. Inexpensive resin refill packages are available, or the original resin can be regenerated by chemical treatment.

In the DuoSoft, water passes through both chambers and will be treated by both types of media. The two chambers of the DuoSoft may be easily filled with the media of choice for specific problem water.

NOTE: These softeners DO NOT yield water suitable for drinking .

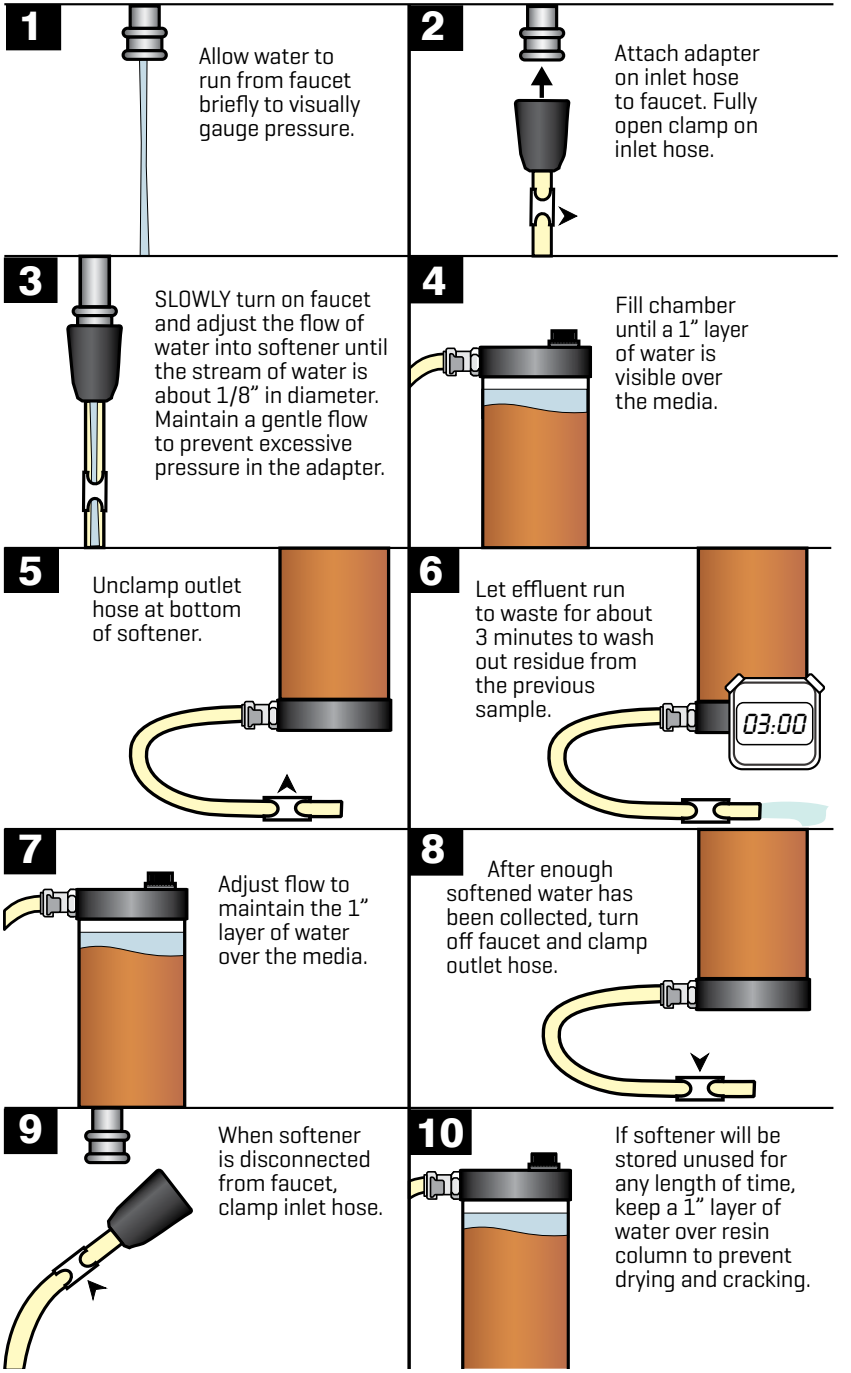
READ INSTRUCTIONS BEFORE USE.





Instructions for Use

PROCEDURE **A** — Use of the Softeners

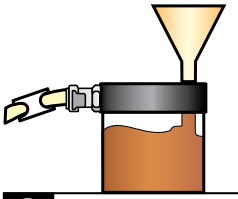


PROCEDURE **B** — Replacing the Media in the Softeners

ADDITION

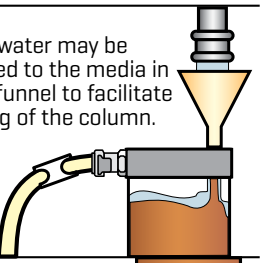
1

With the aid of a funnel, add the fresh media to the column.



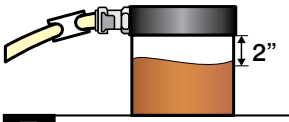
2

Tap water may be added to the media in the funnel to facilitate filling of the column.



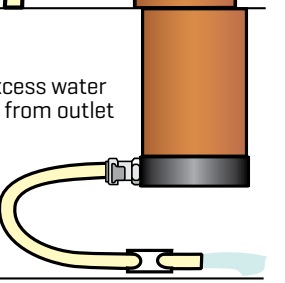
3

Continue adding media to the column until the resin is about 2" from the top of the column.

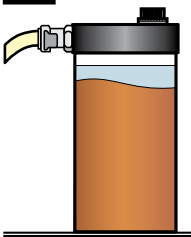


4

Allow excess water to drain from outlet hose.



5



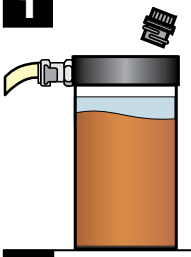
Clean threaded area completely and replace the black plug in the top of column.

DuoSoft Unit

To add the media in the bottom chamber, turn unit upside down and repeat Addition Steps 1-5. When media has been added to both chambers, proceed with Procedure A. When using carbon media, it is suggested that it be used in the top chamber.

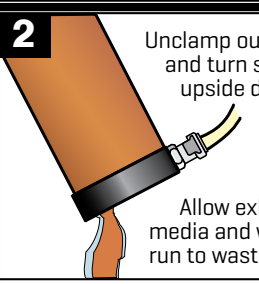
REMOVAL

1



To replace media, remove black plug from the top of dispenser.

2

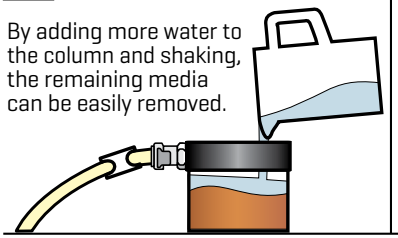


Unclamp outlet hose and turn softener upside down.

Allow exhausted media and water to run to waste.

3

By adding more water to the column and shaking, the remaining media can be easily removed.



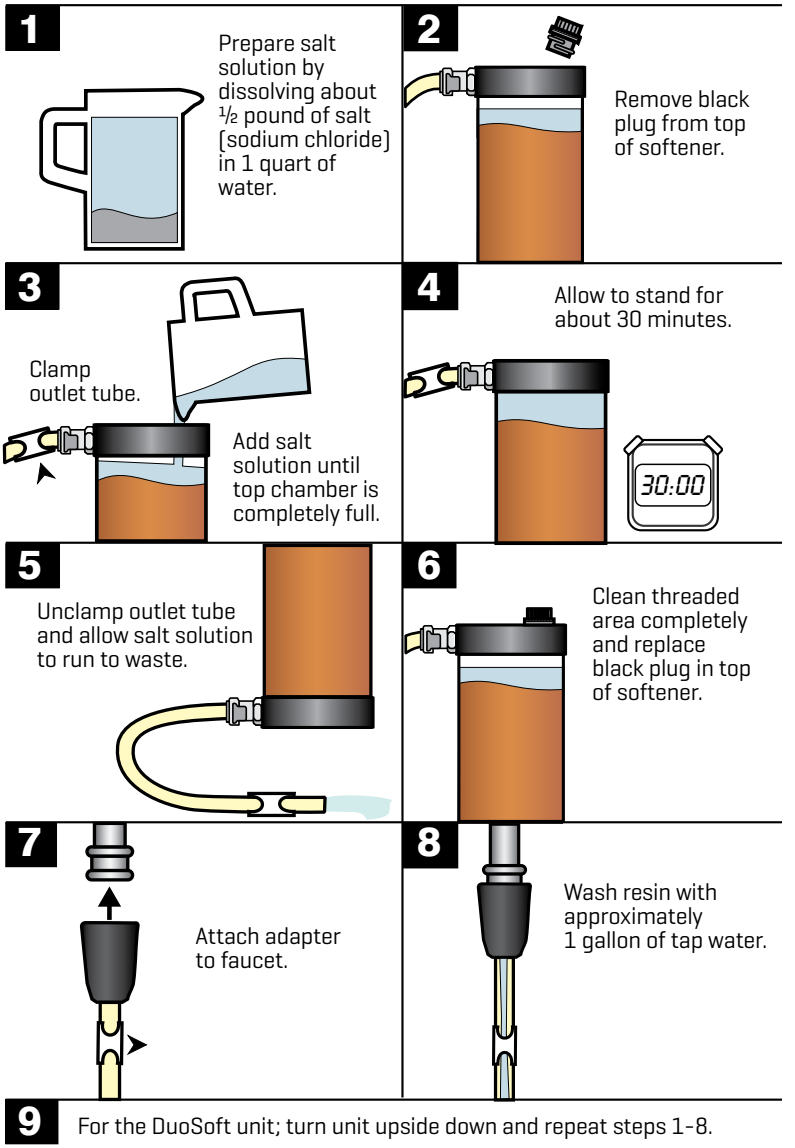
DuoSoft Unit

To remove the media in the bottom chamber, turn unit upside down and repeat Removal Steps 1-3. To add new media, follow Addition Steps 1-5 for both chambers.

PROCEDURE **C** — Regeneration of Media

Follow manufacturers' instructions for regeneration of media. Cation exchange resin may be regenerated in the following manner.

NOTE: Due to build up of air pressure, it is not possible to regenerate both chambers of the DuoSoft unit at the same time. Follow steps 1-8 to regenerate top chamber, then see step 9 to regenerate bottom chamber.



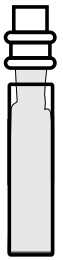
Total Hardness

Total Hardness of a water supply generally represents the total concentration of Calcium and Magnesium ions expressed as Calcium Carbonate (CaCO3). Other ions may contribute, however, they are usually present in insignificant quantities. Hard waters may form scale on plumbing fixtures, consume excessive quantities of soap, and leave deposits of film on glassware, fabrics, etc. Excessive hardness may be removed by various treatment methods.

*Reagent is a potential health hazard. **READ SDS:** lamotte.com
Emergency information:
Chem-Tel USA 1-800-255-3924
Int'l, call collect, 813-248-0585

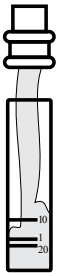
TEST PROCEDURE

1



Thoroughly rinse the sample tube (4488) with the water to be tested.

2

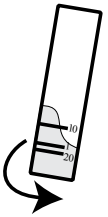


Fill the sample tube (4488) to the desired line** with the sample water.

3

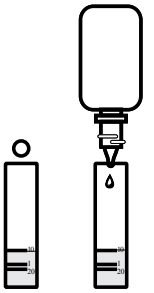
Add 5 drops of *Hardness Reagent #5 (4483).

4



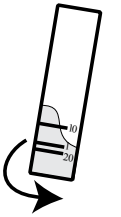
Swirl to mix.

5



Add either 1 Hardness Reagent #6 Tablet (4484A) or 5 drops of *Hardness Reagent #6 (4485WT).

6



Swirl to mix. Solution will turn red if harness is present. If solution is blue, there is no measurable amount of hardness.

7

Counting the number of drops and swirling between drops, add Hardness Reagent #7 (4487WT) one drop at a time until the red color changes to clear blue.

8

Multiply the number of drops used in Step 7 as follows:
Tube filled to upper line: each drop equals 10 ppm Hardness as CaCO3
Tube filled to middle line: each drop equals 1 gpg Hardness as CaCO3
Tube filled to lower line: each drop equals 20 ppm Hardness as CaCO3

** When the tube is filled to upper line. Each drop of Hardness Reagent #7 is equal to 10 ppm.
When the tube is filled to middle line. Each drop of Hardness Reagent #7 is equal to 1gpg.
When the hardness level is over 200 ppm, fill to lower line. Each drop of Hardness Reagent #7 is equal to 20 ppm.

Soap Demonstration

Calcium and Magnesium ions present in a water supply are the principle contributors to the total hardness. Hard water tends to consume excessive quantities of soap and forms curds and deposits on glassware, fabrics, etc.

*Reagent is a potential health hazard. **READ SDS:** lamotte.com
Emergency information:
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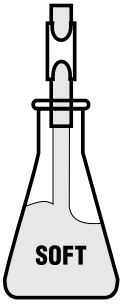
Int'l, call collect, 813-248-0585

TEST PROCEDURE

1

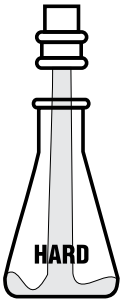


Thoroughly rinse the "SOFT" water flask (0453) with softened water.

2

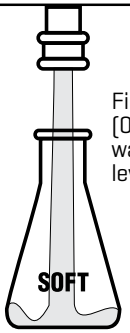
Thoroughly rinse the "HARD" water flask (0452) with untreated water.

3



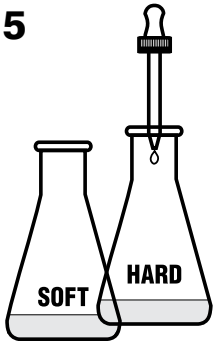
Fill the "HARD" flask (0452) with untreated water until the bottom surface is covered with a layer of water about ½" deep.

4



Fill the "SOFT" flask (0453) with softened water to the same level.

5



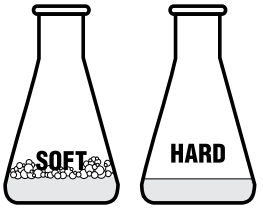
With the pipet (0392), add 4 drops of *Soap Reagent #4 (4767) to each flask.

6

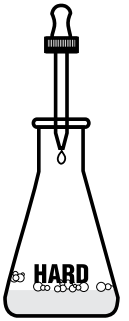
Cap and shake the flask.

7

A thick lather will form in the softened water.

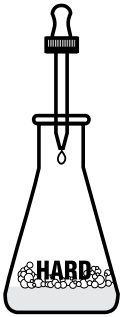


8



Continue to add *Soap Reagent #4 (4767), one drop at a time, to the untreated "HARD" water, shake periodically until a lather forms. Count the number of drops added.

9



Extremely hard water may require 30, 40, or even 60 drops of *Soap Reagent #4 to produce a lasting lather.

Precipitation Demonstration

Calcium and Magnesium ions are the major contributors to water hardness. The chemical reagents in this demonstration pull the Calcium and Magnesium ions out of solution to form a cloudy precipitate in hard water. The water that has been run through the ion exchange column has had these ions removed, therefore, the sample should remain clear.

NOTE: This portion of the AT-38/40 Water Quality Demo Kit is ONLY a visual demonstration illustrating the removal of Calcium and Magnesium ions from tap water after treatment by the ion exchange process. The results should not be interpreted beyond the intent of the demonstration.

*Reagent is a potential health hazard. **READ SDS:** lamotte.com
Emergency information:
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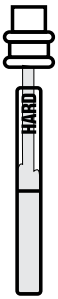
Int'l, call collect, 813-248-0585

TEST PROCEDURE

1

Thoroughly rinse the "SOFT" water Demo Tube (0298) with softened water.

2



Thoroughly rinse the "HARD" water Demo Tube (0297) with untreated water.

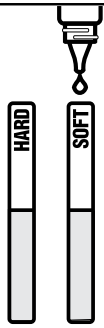
3

Fill the "SOFT" Demo tube (0298) to the line with softened water.

4

Fill the "HARD" Demo tube (0297) to the line with untreated water.

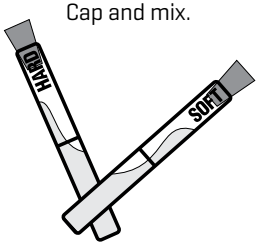
5



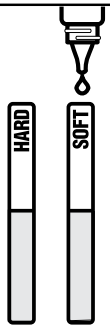
Add 7 drops of *Precipitation Reagent A (4542WT) to each tube.

6

Cap and mix.



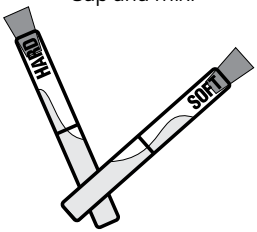
7



Add 7 drops of Precipitation Reagent B (4543WT) to each tube.

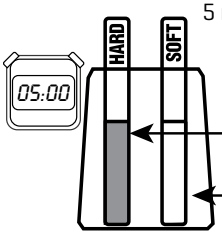
8

Cap and mix.



9

Place tubes in the Precipitation Rack (0879) and allow the tubes to stand for 5 minutes.



Heavy Precipitate

Remains clear

pH Test

Simply, the term pH can be considered to be an "index" of the amount of hydrogen ions present in a substance. This "index" can be used to quickly identify the acid, neutral, or alkaline (basic) nature of water. On the scale of 0.0 to 14.0, 7.0 is considered to be neutral, acidic water is less than 7.0, and basic or alkaline water is greater than 7.0. Water that is acidic in nature may cause corrosion of plumbing and equipment while alkaline water may contribute to scale buildup. Neutralization by various methods is used to correct pH for proper operation of equipment.

pH measurement may be made electronically with a pH meter or as below with a colorimetric method. The pH indicator used is a mixture of dyes that produces a specific color at various pH levels.

*Reagent is a potential health hazard. **READ SDS:** lamotte.com

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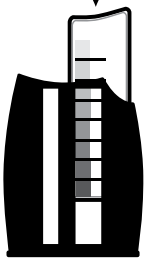
Int'l, call collect, 813-248-0585

TEST PROCEDURE

1



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

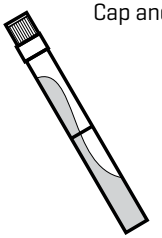
2

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

3

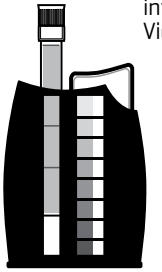
Add 8 drops of *Wide Range pH Indicator (2218).

4



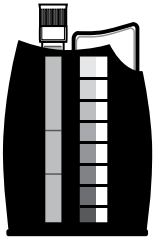
Cap and mix.

5



Insert test tube into Octa-Slide 2 Viewer.

6



Hold the Viewer so that non-direct light enters through the back. Match sample color to a color standard. Record as pH.

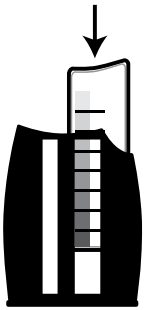
Iron Test

Most natural waters contain iron, varying from trace to very large amounts in various forms. In the dissolved state (ferrous), iron water is often colorless. Upon exposure to air, or an oxidized state, ferrous iron will undergo a chemical reaction to the suspended (ferric) state causing discoloration, staining, and possibly an objectionable taste. Several methods are available for iron removal, the selection of which is dependent upon the state in which it exists.

*Reagent is a potential health hazard. **READ SDS:** lamotte.com
Emergency information:
Chem-Tel USA 1-800-255-3924
Int'l, call collect, 813-248-0585

TEST PROCEDURE

1



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

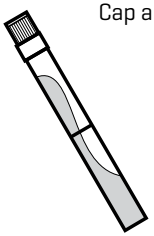
2

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

3

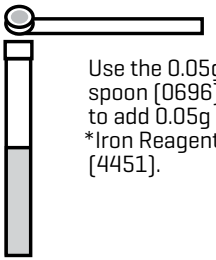
Add 5 drops of *Iron Reagent #1 (4450).

4



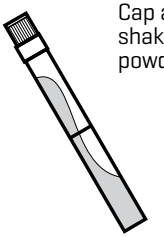
Cap and mix.

5



Use the 0.05g spoon (0696) to add 0.05g of *Iron Reagent #2 (4451).

6

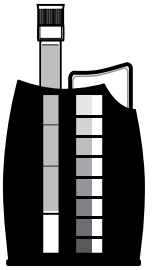


Cap and gently shake to dissolve powder.

7

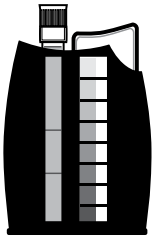
Wait 3 minutes.

8



Insert test tube into Octa-Slide 2 Viewer.

9



Hold the Viewer so that non-direct light enters through the back. Match sample color to a color standard.Record as ppm Iron.

Optional AT Kit Test Modules

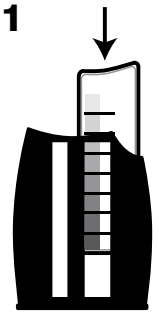
Nitrate-Nitrogen · CODE 4-3004-01

Nitrogen is essential for plant growth, but the presence of excessive amounts in water supplies presents a major pollution problem. Nitrogen compounds may enter water as nitrates or be converted to nitrates from agricultural fertilizers, sewage, industrial and packing house wastes, drainage from livestock feeding areas, farm manures, and legumes.

*Reagent is a potential health hazard. **READ SDS:** lamotte.com
Emergency information:
Chem-Tel USA 1-800-255-3924
Int'l, call collect, 813-248-0585

TEST PROCEDURE

1



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

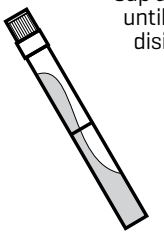
2

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

3

Add one Nitrate #1 Tablet (2799A).

4

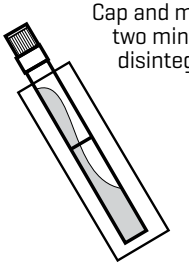


Cap and mix until tablet disintegrates.

5

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

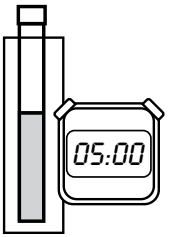
6



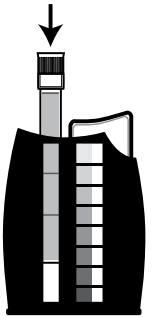
Cap and mix for two minutes to disintegrate the tablet.

7

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

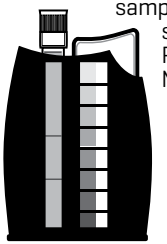


8



Insert test tube into Octa-Slide 2 Viewer.

9



Hold the Viewer so that non-direct light enters through the back. Match sample color to a color standard. Record as ppm Nitrate-Nitrogen.

To convert to Nitrate, multiply results by 4.4.

NOTE: Nitrate #2 CTA Tablets (NN-3703A) are sensitive to UV light. If testing indoors, there is no need to use the Protective Sleeve in this procedure.

Chlorine · CODE 4-3006-01

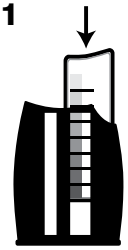
Water for cities and communities is usually sanitized. Even waters that come from clean sources, protected watersheds, reservoirs, and deep wells are commonly sanitized to assure safety. Chlorine is most commonly used because it is effective against a wide range of microorganisms, its cost is low, and the methods of applying it have been well developed.

*Reagent is a potential health hazard. **READ SDS:** lamotte.com
Emergency information:
Chem-Tel USA 1-800-255-3924
Int'l, call collect, 813-248-0585

TEST PROCEDURE

Free Available Chlorine

1 Insert DPD Octa-Slide 2 Bar (3401-01) into the Octa-Slide 2 Viewer (1101).

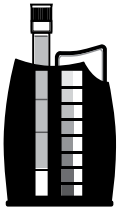


2 Fill a test tube (0106) to the 10 mL line with the water sample.

3 Add one DPD 1R Tablet (6999A).

4 Cap and mix until tablet disintegrates.

5 Insert test tube into Octa-Slide 2 Viewer.

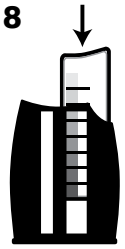


6 Hold the Viewer so that non-direct light enters through the back. Match sample color to a color standard. Record ppm Free Available Chlorine.

7 Retain this sample if Total Residual and Combined Chlorine are to be determined. (Steps 8-12)

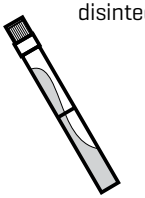
Total Residual Chlorine & Combined Chlorine

8 Insert DPD Octa-Slide 2 Bar (3401-01) into the Octa-Slide 2 Viewer (1101).

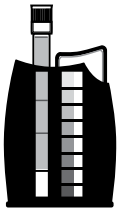


9 Add one DPD 3 Tablet (6905A) to the sample from Step 6.

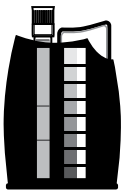
10 Cap and mix until tablet disintegrates.



11 Insert test tube into Octa-Slide 2 Viewer.



12 Hold the Viewer so that non-direct light enters through the back. Match sample color to a color standard. Record ppm Total Residual Chlorine.



TDS

Optional Test Module · CODE 1749

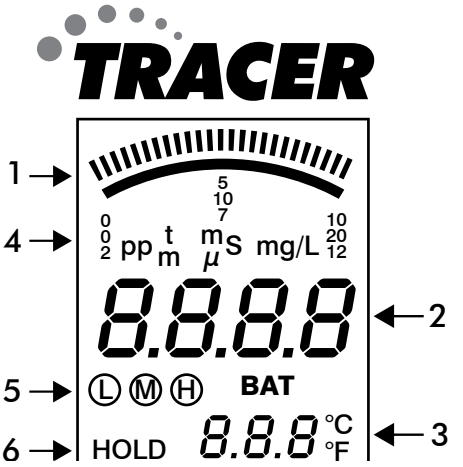
METER DESCRIPTION

Front Panel Description

1. Battery compartment cap
2. LCD Display
3. MODE button - change mode, hold data, store data
4. CAL button - calibration, change temperature units, recall data
5. ON/OFF button
6. Electrode Collar
7. Electrode
8. (Note: The Electrode cap is not shown)

TRACER Display

1. Bar graph display
2. Main display
3. Temperature display
4. Measurement units
5. Range calibration and low battery indicators
6. Reading hold indicator



BASIC OPERATION

Powering the TRACER

The Tracer uses four CR2032 Lithium Ion batteries. If the batteries are weak, the *BAT* indicator will appear on the display. Press the ON/OFF key to turn the TRACER on or off. The auto power off feature will shut the TRACER off automatically after ten minutes of inactivity.

Automatic Calibration

When the TRACER is turned on, it will enter the Automatic Calibration mode. *SELF* and *CAL* will appear while the calibration is in progress. After the calibration is completed, the *SELF* and *CAL* display icons will extinguish.

Changing Temperature Units

To change the displayed temperature units between °F or °C:

1. With the TRACER off, press and hold the CAL button.
2. With the CAL button pressed, momentarily press the ON/OFF button. When SELF CAL appears in the display, release the CAL button. The TRACER will return to the operational mode with the temperature displayed in the new units.

Low Battery Indicator

The "*BAT*" indicator will be displayed when the batteries become weak. Refer to the maintenance section for battery replacement information.

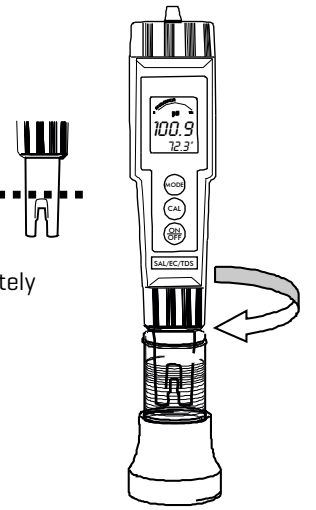
TESTING

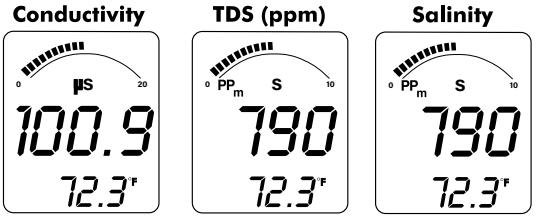
Getting Started

1. Remove the cap from the bottom of the TRACER to expose the electrode.
2. Before the first use, rinse the electrode in deionized water and dry.
3. For best results, calibrate for conductivity with a standard in the expected range of the sample. For maximum accuracy calibrate from low conductivity value standards to high conductivity value standards.
4. Store dry.

Measurement

1. Fill a sample cup to the 20 mL line with the test sample. Sample depth must be greater than or equal to 1.5 inches.
2. Immerse the TRACER electrode in the sample. Make sure the electrode is completely submersed.
3. Press the ON/OFF button. (8888 and then SELF CAL will appear in the display during the initial diagnostics).
4. Press and hold the MODE button to scroll to the desired measurement mode.
5. Insert the electrode into the sample making sure that the electrodes are completely submerged.
6. Slowly stir the sample with the TRACER to remove air bubbles.
7. The meter will autorange to the proper range and the reading will be displayed.
8. Rinse the electrode in distilled water. Replace the cap.





CALIBRATION

For the most accurate results, allow sufficient time for the temperature of the probe to reach the temperature of the sample before calibrating. This will be indicated by a stable temperature reading on the display

1. Fill a sample cup to 20 mL line with a Salt Calibration Standard, 3ppt (6005)
2. Press the ON/OFF button to turn the TRACER on. Press MODE button and advance to salinity mode.
3. Insert electrode standard. Tap or stir the sample with TRACER to dislodge air bubbles.
4. Press and hold the CAL button for approximately 2 seconds. “CAL” will appear and the display will flash.
5. The meter will automatically recognize and calibrate to the calibration standard. The display will briefly indicate “SA” and “End” and then return to the measurment mode.
   NOTE: “SA” will not appear if the calibration fails.
6. Meter is now calibrated for salinity, TDS and conductivity.

NOTE: Each time the calibration mode is entered all calibration range indicators will be cleared, but only the calibration data for the currently selected range will be replaced. In the conductivity/TDS modes, the calibrations for the other two ranges will be saved even though the indicators for those ranges are no longer displayed. Calibration of all three ranges must be performed during one power on period for all three calibration range indicators to be displayed.

Electrode Care

1. Always rinse the electrode in distilled or deionized water between measurements to avoid cross-contamination of the samples. Double rinsing is recommended when high accuracy is required.
2. Do not touch the electrodes. Touching the surface of the platinized electrodes may damage and reduce the life of the electrodes.

Replacing the Electrode

1. Unscrew and remove the electrode collar. Turn collar counter-clockwise.
2. Gently rock the electrode side to side, while pulling it away from the meter, until it disconnects from the electrode socket.
3. To attach an electrode, align the slots and carefully plug the electrode into the meter socket. CAUTION: Take care to align pins carefully. Bent or broken pins will cause the meter to malfunction.
4. Firmly tighten the electrode collar to create a seal with the rubber gasket between the electrode and the meter.

Replacement Parts

Model AT-38 & AT-40

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

CODE	DESCRIPTION	CODE	DESCRIPTION
		1002	Model S Softener (AT-38)
*2218-G	*pH, Wide Range Reagent, 25mL	1022	DuoSoft Softener (AT-40)
*4767-H	*Soap Reagent #4, 60 mL	1028	DirectFLO Duo-Soft Softener
*4767-L	*Soap Reagent #4, 500mL	0879	Precipitation Rack, acrylic
*4483WT-H	*Hardness Reagent #5,60mL	0392	Pipet, plain, plastic, w/cap
*4483-L	*Hardness Reagent #5, 500 mL	0670	Stopper, rubber, #6, for flasks
4484A-J	Hardness Reagent #6 Tablets. 100	0655	Stopper, rubber, #3, for Hardness tube
4487WT-H	Hardness Reagent #7, 60 mL	0651	Stopper, rubber 00, for Precipitation tubes
*4542WT-H	*Precipitation Reagent A, 60 mL	0106	Test Tube, plastic, w/cap
*4542-L	*Precipitation Reagent A, 500 mL	1101	Octa-Slide 2 Viewer
4543WT-H	Precipitation Reagent B, 60 mL	3483-01	Wide Range, pH Octa-Slide 2 Bar, 5-10
4543-L	Precipitation Reagent B, 500 mL	*4450-G	*Iron Reagent #1, 25 mL
0452	Flask, 250 mL, "HARD", w/cap	*4451-S	*Iron Reagent #2 Powder, 4.5g
0453	Flask, 250 mL, "SOFT", w/cap	0696	Spoon, 0.05g
0297	Test Tube, "HARD", 15 x 120 mm, w/cap	4448-01	Iron Octa-Slide 2 Bar, 0.5-10 ppm
0298	Test Tube, "SOFT", 15 x 120 mm, w/cap	2-2011	150 mL beaker
4488	Test Tube, Hardness, w/cap		
*4485WT-H	*Hardness Reagent #6, 60 mL		
*4485-L	*Hardness Reagent #6, 500 mL		

*Reagent is a potential health hazard. **READ SDS:** lamotte.com
Emergency information:
Chem-Tel USA 1-800-255-3924
Int'l, call collect, 813-248-0585

Replacement Parts

For Optional Test Modules

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

CODE	DESCRIPTION
2799A-NN3703ABX	Nitrate #1 Tablet (50) and *Nitrate #2 Tablet (50)
0106	Test tubes, plastic, 2.5, 5 & 10 mL, w/caps (2)
0106-FP	Protective Sleeve
3494-01	Nitrate-Nitrogen Octa-Slide 2 Bar, 0–15 ppm
6905A-6999ABOX	DPD 1R Tablet (50) and DPD 3R Tablet (50)
0106	Test Tube, Plastic, 2.5, 5 & 10 mL, w/caps (2)
3401-01	Chlorine Octa-Slide 2 Bar, 0.2–3.0 ppm
6354-L	Conductivity Standard, 1413 µmhos/cm (990 ppm TDS), 500 mL
6418-L	Conductivity Standard, 6,668 µmhos/cm (4,668 ppm TDS), 500 mL

*Reagent is a potential health hazard. **READ SDS:** lamotte.com
Emergency information:
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Int'l, call collect, 813-248-0585

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