

AT

water quality
DEMO OUTFIT

CODE 4-3003-01

38

 **LaMotte**

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LaMOTTE COMPANY

Helping People Solve Analytical ChallengesSM

PO Box 329 • Chestertown • Maryland • 21620 • USA

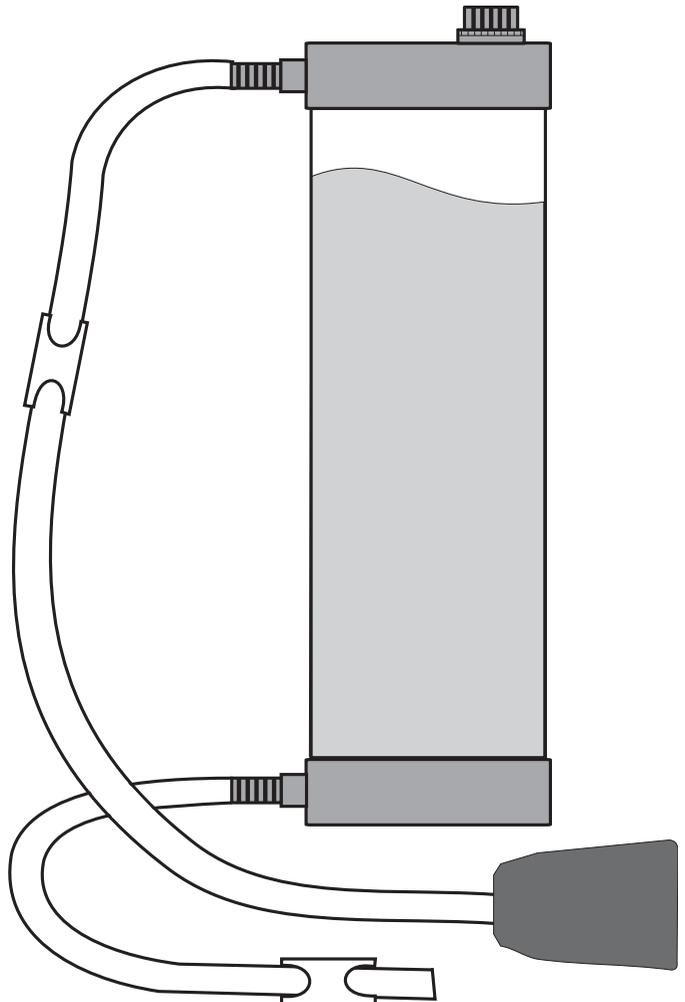
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Introduction.....

LaMotte Company is the leading manufacturer of specialized outfits for water treatment sales demonstration and control testing of all types of water treatment systems. The Model AT-38 is the most popular and effective sales outfit for on-site demonstration of treated water benefits. The tests are fast and simple, with visually dramatic and technically accurate results. Customize your own demo kit with the optional test modules.

This unit is designed to effectively demonstrate the differences between treated and untreated waters. The Model S Softener attaches to faucet and produces high quality softened water for convincing before and after demonstrations and quantitative analysis with the test equipment included.



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.

Read the labels on all LaMotte reagent containers prior to use. Some containers include precautionary notices and first aid information. Certain reagents are considered hazardous substances and are designated with a * in the instruction manual. Material Safety Data Sheets (MSDS) are supplied for these reagents on a MSDS CD and are available at www.lamotte.com. Read the MSDS before using these reagents. Additional emergency information for all LaMotte reagents is available 24 hours a day from the Poison Control Center listed in the front of the phone book. Be prepared to supply the name and four-digit LaMotte code number found on the container label or at the top of the MSDS. LaMotte reagents are registered with a computerized poison control information system available to all local poison control centers.

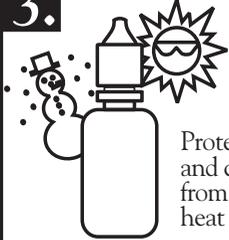
Keep equipment and reagent chemicals out of the reach of young children.

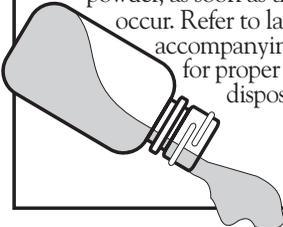
Protect Yourself and Equipment: Use Proper Analytical Techniques

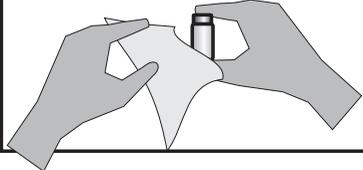
Testing Hints.....

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 MSDS for proper reagent disposal.

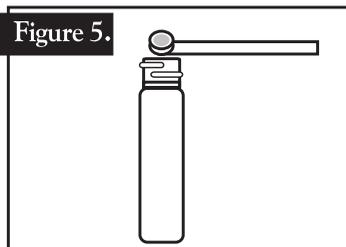
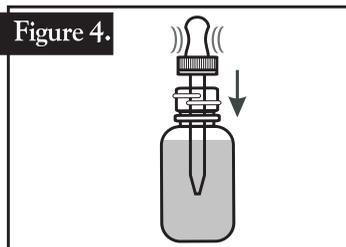
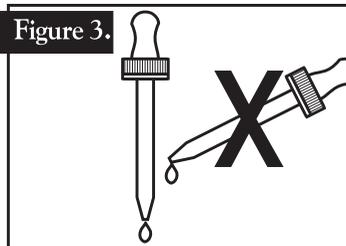
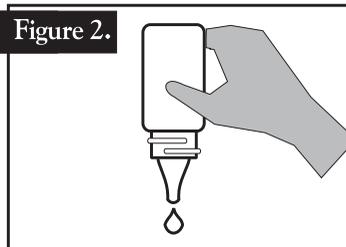
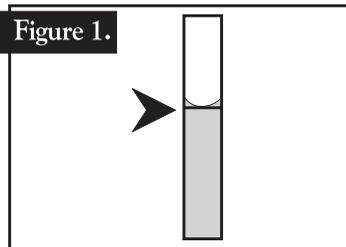
5.  Use care when dispensing or handling all reagents due to safety reasons. Some chemicals also may cause permanent stains if spilled.

ANALYTICAL 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 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 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.



Model S Water Softener.....

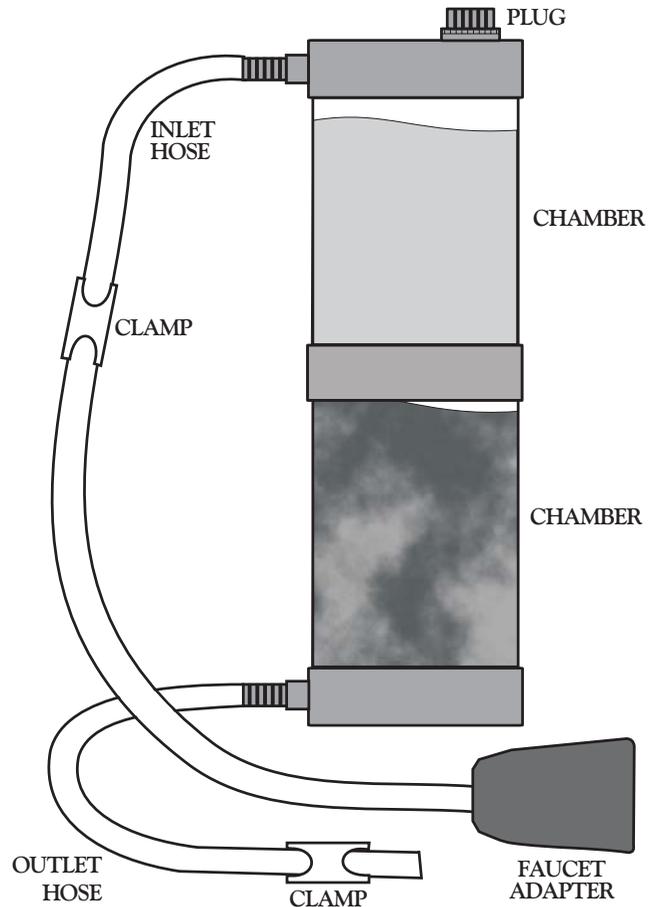
Code 1002 • Model S

INTRODUCTION

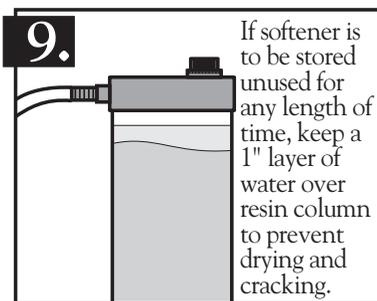
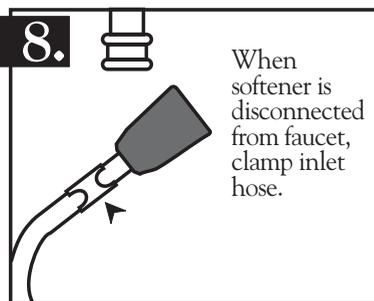
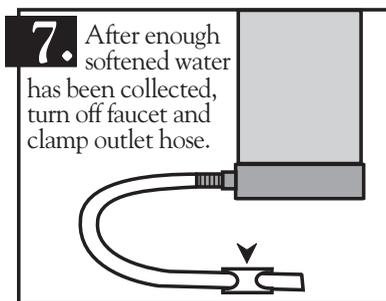
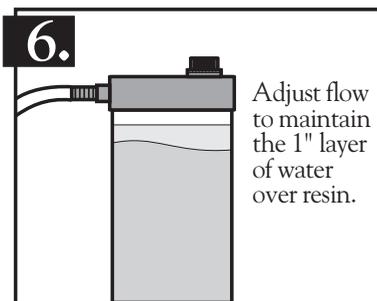
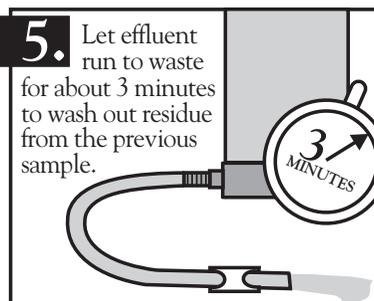
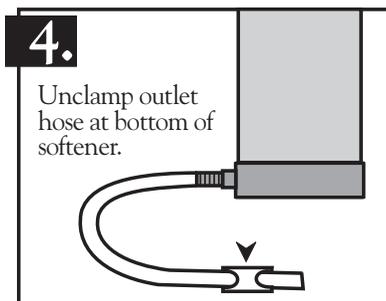
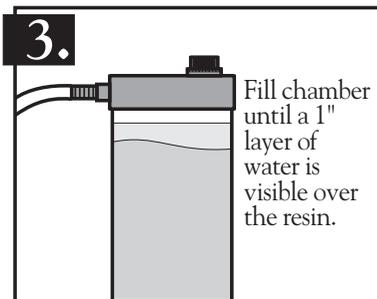
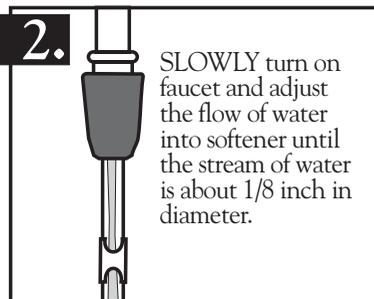
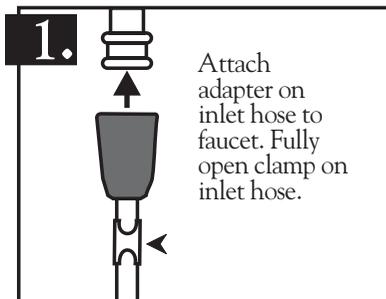
The softener in the Model S Series is designed to produce a large volume of high-quality softened water. The faucet adapter included attaches easily to any faucet. As water passes through the chamber, the resin column causes scale-forming Calcium and Magnesium ions to be exchanged for non-scale-forming Sodium ions.

Approximate capacity for the softener is as follows: 70 gallons at 60-120 ppm Hardness.

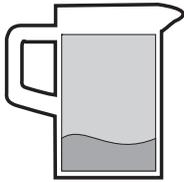
The capacity may vary according to the condition of the tap water used. The resin column may be regenerated by treatment or replaced with resin refill packages. The softener should be regenerated after each day of demonstrations.

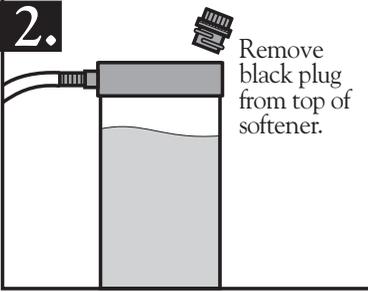


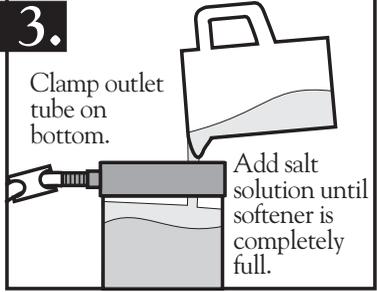
A. INSTRUCTIONS FOR USE

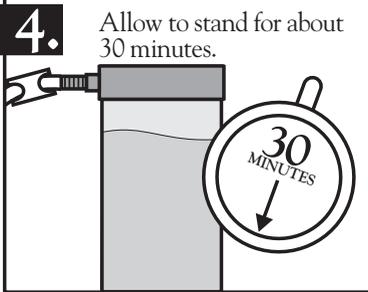


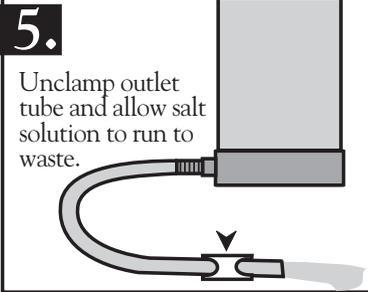
B. REGENERATION OF RESIN

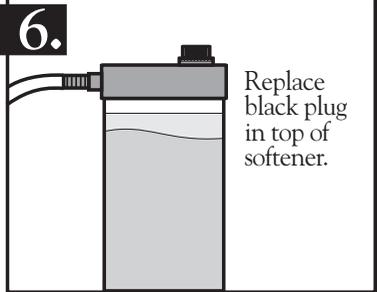
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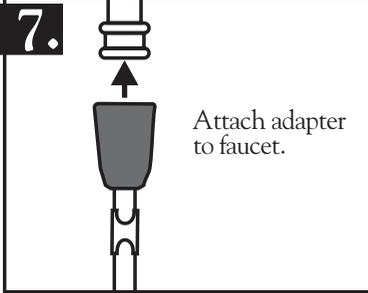
1. Prepare salt solution by dissolving about 1/2 pound of salt (sodium chloride) in 1 quart of water.
- 

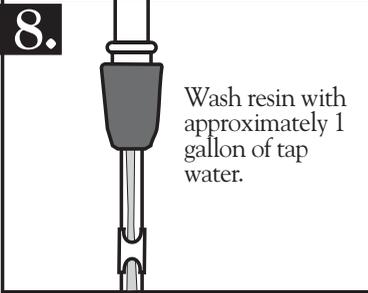
2. Remove black plug from top of softener.
- 

3. Clamp outlet tube on bottom. Add salt solution until softener is completely full.
- 

4. Allow to stand for about 30 minutes.
- 

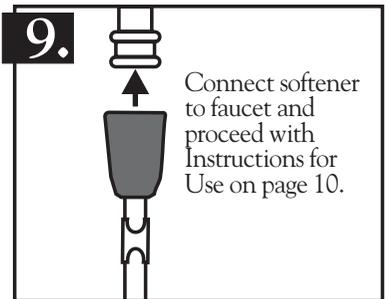
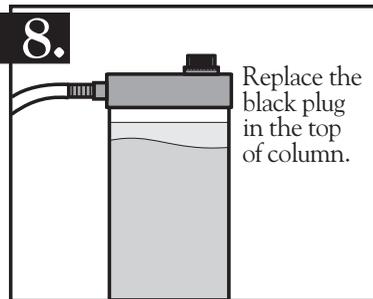
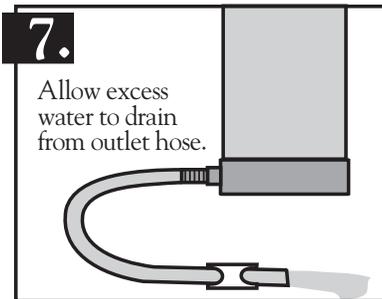
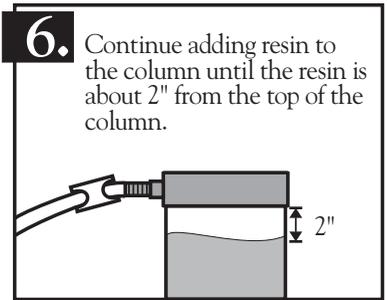
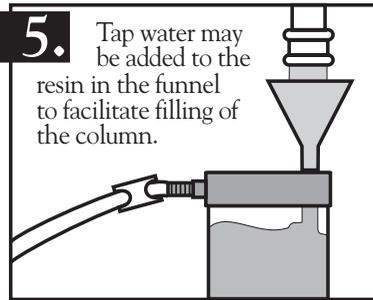
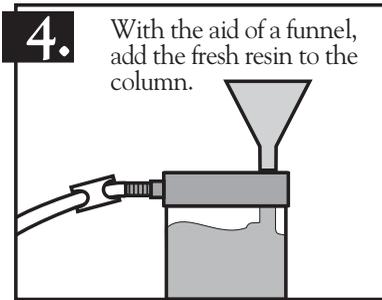
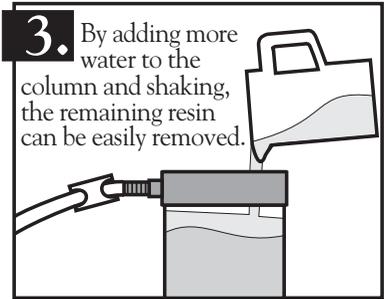
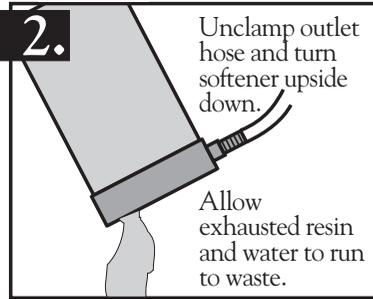
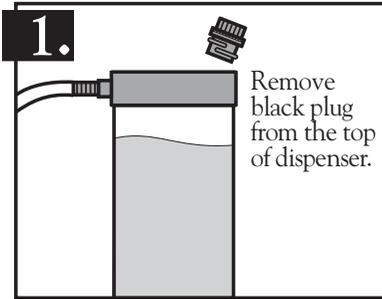
5. Unclamp outlet tube and allow salt solution to run to waste.
- 

6. Replace black plug in top of softener.
- 

7. Attach adapter to faucet.
- 

8. Wash resin with approximately 1 gallon of tap water.
9. At this point the resin should be completely regenerated.

C. REPLACEMENT OF RESIN

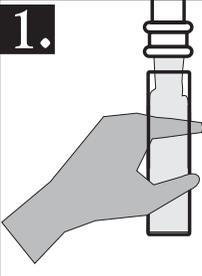
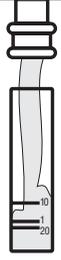
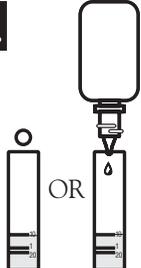


Total Hardness.....

Total Hardness of a water supply generally represents the total concentration of Calcium and Magnesium ions expressed as Calcium Carbonate (CaCO_3). 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.

***WARNING:** Reagents marked with a * are considered to be potential health hazards. To view or print a Material Safety Data Sheet (MSDS) for these reagents see MSDS CD or www.lamotte.com. To obtain a printed copy, contact LaMotte by e-mail, phone or fax.

TEST PROCEDURE

<p>1.</p>  <p>Thoroughly rinse the sample tube (4488) with the water to be tested.</p>	<p>2.</p>  <p>Fill the sample tube (4488) to the desired line** with the sample water.</p>	<p>3.</p>  <p>Add 5 drops of *Hardness Reagent #5 (4483).</p>
<p>4.</p>  <p>Swirl to mix.</p>	<p>5.</p>  <p>Add either 1 Hardness Reagent #6 Tablet (4484) or 5 drops of *Hardness Reagent #6 (4485).</p>	<p>6.</p>  <p>Swirl to mix.</p>
<p>7.</p>  <p>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.</p>	<p>8.</p> <p>Multiply the number of drops used in Step 7 as follows:</p> <ul style="list-style-type: none">Tube filled to upper line: each drop equals 10 ppm Hardness as CaCO_3Tube filled to middle line: each drop equals 1 gpg Hardness as CaCO_3Tube filled to lower line: each drop equals 20 ppm Hardness as CaCO_3	

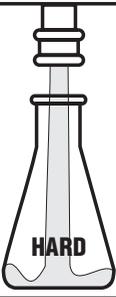
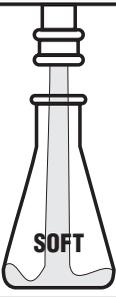
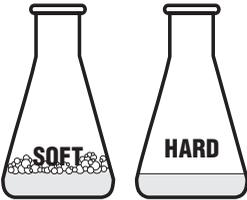
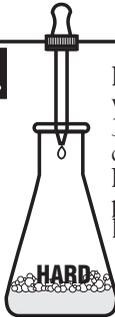
** When the tube is filled to upper line. Each drop of Hardness Reagent #7 is equal to 10 ppm.
When the tube is filled to middle line. Each drop of Hardness Reagent #7 is equal to 1 gpg.
When the Hardness level is over 200 ppm, fill to lower line. Each drop of Hardness Reagent #7 is equal to 20 ppm.

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.

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TEST PROCEDURE

<p>1. Thoroughly rinse the "SOFT" water flask (0453) with softened water.</p> 	<p>2. Thoroughly rinse the "HARD" water flask (0452) with untreated water.</p> 	<p>3. Fill the "HARD" flask (0452) with untreated water until the bottom surface is covered with a layer of water about 1/2" deep.</p> 
<p>4. Fill the "SOFT" flask (0453) with softened water to the same level.</p> 	<p>5. With the pipet (0392), add 4 drops of *Soap Reagent #4 (4767) to each flask.</p> 	<p>6. Cap and shake the flasks.</p> 
<p>7. A thick lather will form in the softened water.</p> 	<p>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.</p> 	<p>9. Extremely hard water may require 30, 40, or even 60 drops of *Soap Reagent #4 to produce a lasting lather.</p> 

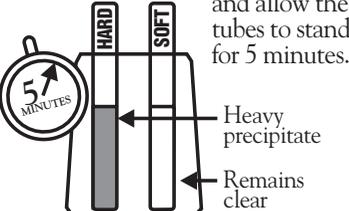
Precipitation Demonstration.....

Again, 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-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.

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TEST PROCEDURE

<p>1.</p>  <p>Thoroughly rinse the "SOFT" water Demo Tube (0298) with softened water.</p>	<p>2.</p>  <p>Thoroughly rinse the "HARD" water Demo Tube (0297) with untreated water.</p>	<p>3.</p>  <p>Fill the "SOFT" Demo tube (0298) to the line with softened water.</p>
<p>4.</p>  <p>Fill the "HARD" water Demo Tube (0297) to the line with untreated water.</p>	<p>5.</p>  <p>Use the glass pipet (0344) to add 5 drops of *Precipitation Reagent A to each tube.</p>	<p>6.</p>  <p>Cap and mix.</p>
<p>7.</p>  <p>Use the plastic pipet (0392) to add 5 drops of *Precipitation Reagent B to each tube.</p>	<p>8.</p>  <p>Cap and mix.</p>	<p>9.</p>  <p>Place tubes in the Precipitation Rack (0879) and allow the tubes to stand for 5 minutes.</p> <p>5 MINUTES</p> <p>Heavy precipitate</p> <p>Remains clear</p>

pH.....

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.

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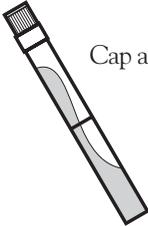
Use of the Octa-Slide Viewer

The Octa-Slide Viewer should be held so non-direct light enters through the back of the viewer. With sample tube inserted at top, slide the Octa-Slide bar through the viewer and match with color standards.

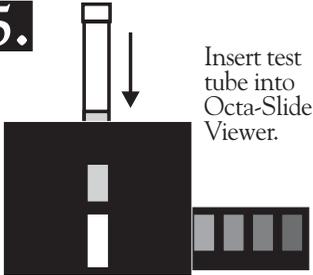
TEST PROCEDURE

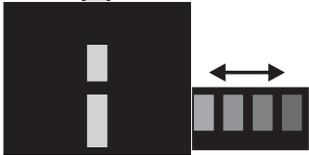
- 

1. Fill a test tube (0106) to the 5.0 mL line with sample water.
- 

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

3. Cap and mix.
- 

4. Insert Wide Range pH Octa-Slide Bar (3483) into the Octa-Slide Viewer (1100).
- 

5. Insert test tube into Octa-Slide Viewer.
- 

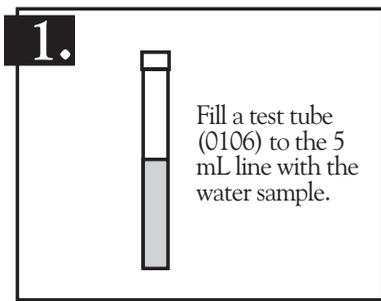
6. Match sample color to a color standard. Record as pH.

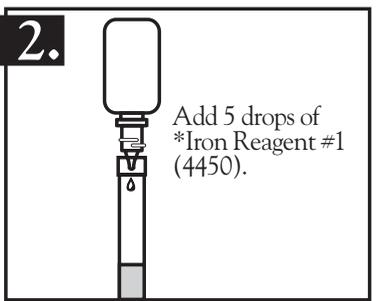
Iron

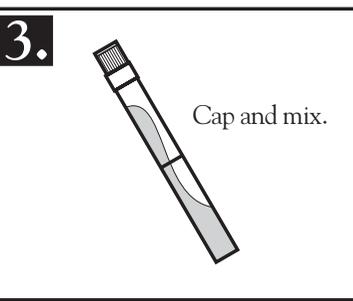
Most natural waters contain iron, varying from trace to very large amounts in various forms. In the dissolved state (ferrous), iron water is often colorless. Upon exposure to air, or an oxidized state, ferrous iron will undergo a chemical reaction to the suspended (ferric) state causing discoloration, 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.

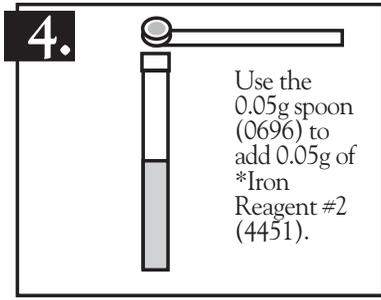
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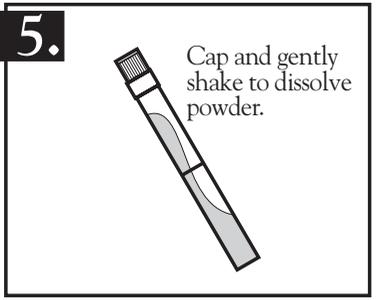
TEST PROCEDURE:

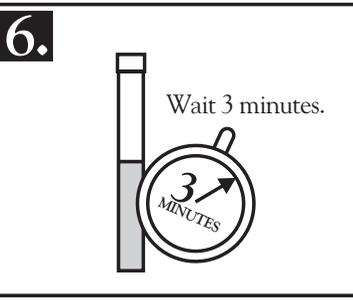
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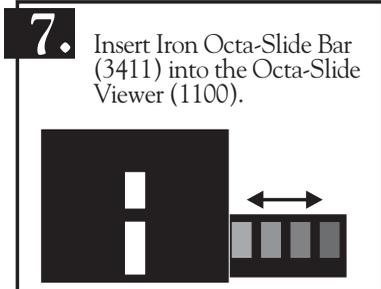
1. Fill a test tube (0106) to the 5 mL line with the water sample.
- 

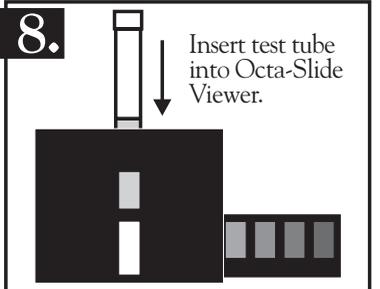
2. Add 5 drops of *Iron Reagent #1 (4450).
- 

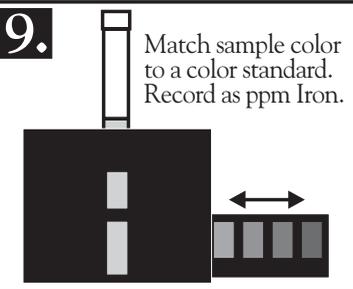
3. Cap and mix.
- 

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

5. Cap and gently shake to dissolve powder.
- 

6. Wait 3 minutes.
- 

7. Insert Iron Octa-Slide Bar (3411) into the Octa-Slide Viewer (1100).
- 

8. Insert test tube into Octa-Slide Viewer.
- 

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

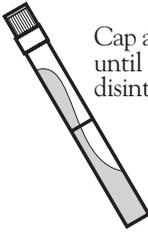
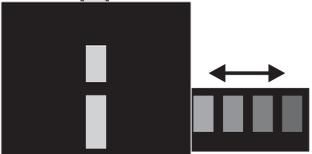
Nitrate Nitrogen

Optional Test Module • Code 4-3004

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.

***WARNING:** Reagents marked with a * are considered to be potential health hazards. To view or print a Material Safety Data Sheet (MSDS) for these reagents see MSDS CD or www.lamotte.com. To obtain a printed copy, contact LaMotte by e-mail, phone or fax.

TEST PROCEDURE

<p>1.</p>  <p>Fill a test tube (0106) to the 5 mL line with the water sample.</p>	<p>2.</p>  <p>Add one *Nitrate #1 Tablet (2799A).</p>	<p>3.</p>  <p>Cap and mix until tablet disintegrates.</p>
<p>4.</p>  <p>Add one *Nitrate #2 CTA Tablet (NN-3703A).</p>	<p>5.</p>  <p>Cap and mix until tablet disintegrates.</p>	<p>6.</p>  <p>Wait 5 minutes.</p>
<p>7.</p>  <p>Insert Nitrate-Nitrogen Octa-Slide Bar (3494) into the Octa-Slide Viewer (1100).</p>	<p>8.</p>  <p>Insert test tube into Octa-Slide Viewer.</p>	<p>9.</p>  <p>Match sample color to a color standard. Record as ppm Nitrate Nitrogen.</p>

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

Chlorine.....

Optional Test Module • Code 4-3006

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.

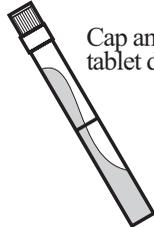
***WARNING:** Reagents marked with a * are considered to be potential health hazards. To view or print a Material Safety Data Sheet (MSDS) for these reagents see MSDS CD or www.lamotte.com. To obtain a printed copy, contact LaMotte by e-mail, phone or fax.

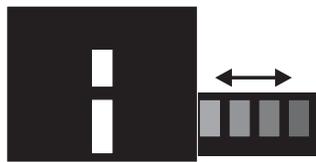
TEST PROCEDURE

Free Available Chlorine

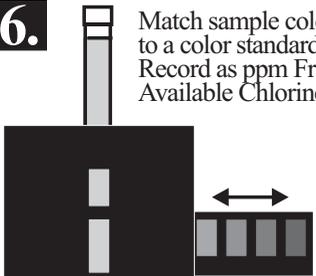
- 

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

2. Add one * Chlorine DPD #1R Tablet (6999A).
- 

3. Cap and mix until tablet dissolves.
- 

4. Insert DPD Octa-Slide Bar (3401) into the Octa-Slide Viewer (1100).
- 

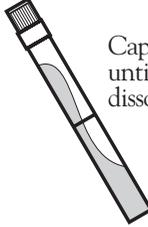
5. Insert test tube into Octa-Slide Viewer.
- 

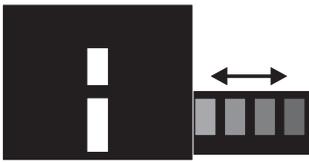
6. Match sample color to a color standard. Record as ppm Free Available Chlorine.
- 

7. Retain this sample if Total Residual and combined Chlorine are to be determined.

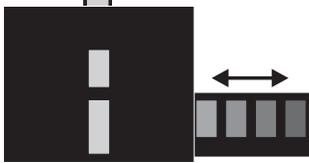
Total Residual Chlorine & Combined Chlorine

8.  Add one *Chlorine DPD #3 Tablet (6905A) to the sample from Step 6.

9.  Cap and mix until tablet dissolves.

10. Insert DPD Octa-Slide Bar (3401) into the Octa-Slide Viewer (1100). 

11.  Insert test tube into Octa-Slide Viewer. 

12.  Match sample color to a color standard. Record as ppm Total Residual Chlorine. 

TDS

Optional Test Module • Code 5-0080

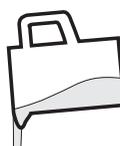
BEFORE FIRST USE

Remove the plastic strips between batteries and contacts if present. Switch unit on for 15 minutes to stabilize the batteries. Soak electrodes for a few minutes in alcohol to remove oils.

CALIBRATION (To Be Done Once a Month)

Use a calibration standard between 300 ppm and 1,900 ppm. See page 24.

1. Pour 1/2" to 1" of a Calibration Standard into 2 containers, and tap or deionized water into a third container.

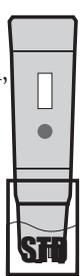


2. Open battery compartment lid (end with lanyard loop). The two white buttons are Increment (INC) and Decrement (DEC) calibration keys.

3. Rinse electrode in water. Then rinse in first container of standard, then dip into the second.

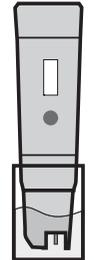


4. Turn the meter on, and wait several minutes to allow the display to stabilize.

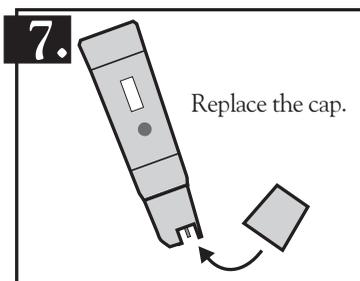
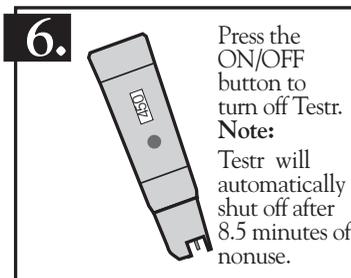
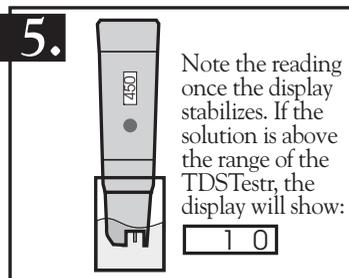
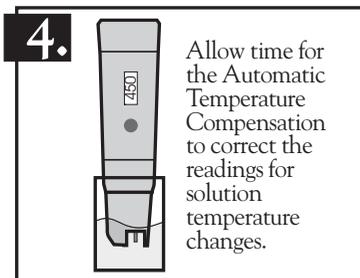
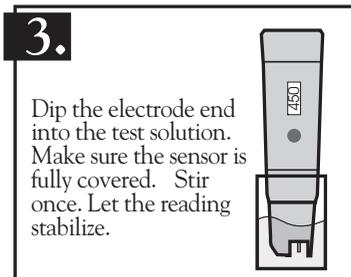
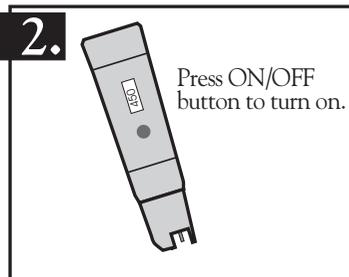
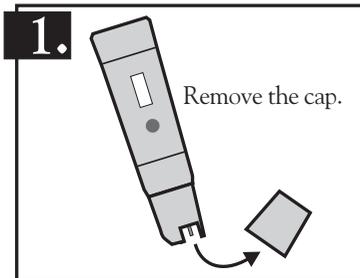


5. Press in INC or DEC keys to adjust reading to match the calibration standard value. After 3 seconds without a key press, the display flashes 3 times, then shows "ENT". The tester accepts calibration value; returns to measurements mode.

6. Replace battery cap. Rinse the electrode in the water and proceed with test procedure.



TEST PROCEDURE:



Electrode Replacement: *You can replace the electrode module at the fraction of the cost of a new Testr. When the Testr fails to calibrate or gives fluctuating readings in calibration standards, you need to change the electrode.*

1. With dry hands, grip the ribbed Testr collar with electrode facing you. Twist the collar counter clockwise. Save the ribbed Testr collar and O-ring for later use.
2. Pull the old electrode module away from the Testr.
3. Align the four tabs on the new module so they match the four slots on the Testr
4. Gently push the module onto the slots to seat in position. Push the smaller O-ring fully onto the new electrode module. Push the collar over the module and thread it onto place by firmly twisting it clockwise.

MAINTENANCE:

To improve performance, clean the stainless steel electrodes by periodically rinsing them in alcohol for 10-15 minutes. Replace all 4 batteries if the display becomes faint or disappears, or if the readings are unstable or constant. If drift is detected while electrodes are continuously exposed to solution for longer than one hour, allow electrode to fully dry off periodically.

CHANGING BATTERIES:

Open the battery compartment lid. Remove old batteries and replace with fresh ones noting polarity as shown in the battery compartment. Recalibrate Testr after battery change.

Replacement Parts

Code 4-3003-01 • Model AT-38

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

CODE	DESCRIPTION	CODE	DESCRIPTION
*2218-G	*pH, Wide Range Reagent, 25 mL	1022	Duo-Soft Softener Unit
*4767-H	*Soap Reagent #4, 60 mL	0879	Precipitation Rack, acrylic
*4767-L	*Soap Reagent #4, 500 mL	0392	Pipet, plain, plastic, w/cap
*4483WT-H	*Hardness Reagent #5, 60 mL	0670	Stopper, rubber, #6, for flasks
*4483-L	*Hardness Reagent #5, 500 mL	0655	Stopper, rubber, #3, for Hardness tube
4484-J	Hardness Reagent #6 Tablets, 100	0651	Stopper, rubber, #00, for Precipitation tubes
4487WT-H	Hardness Reagent #7, 60 mL	0106	Test Tube, plastic, w/cap
*4542-H	*Precipitation Reagent A, 60 mL	1100	Octa-Slide Viewer
*4542-L	*Precipitation Reagent A, 500 mL	3483	Wide Range, pH Octa-Slide Bar, 5-10
*4543-H	*Precipitation Reagent B, 0 mL	*4450-G	*Iron Reagent #1, 25 mL
*4543-L	*Precipitation Reagent B, 500 mL	*4450-L	*Iron Reagent #1, 500 mL
0344	Pipet, glass, w/cap, 20 mm	*4451-S	*Iron Reagent #2 Powder, 4.5g
0452	Flask, 250 mL, "HARD", w/cap	0696	Spoon, 0.05g
0453	Flask, 250 mL, "SOFT", w/cap	3411	Iron Octa-Slide Bar, 0.5-10 ppm
0297	Test Tube, "HARD", 15 x 120 mm, w/cap	*WARNING: Reagents marked with a * are considered to be potential health hazards. To view or print a Material Safety Data Sheet (MSDS) for these reagents see MSDS CD or www.lamotte.com . To obtain a printed copy, contact LaMotte by e-mail, phone or fax.	
0298	Test Tube, "SOFT", 15 x 120 mm, w/cap		
4488	Test Tube, Hardness, w/cap		
*4485WT-H	*Hardness Reagent #6, 60 mL		
*4485-L	*Hardness Reagent #6, 500 mL		

Replacement Parts for Optional Test Modules

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

CODE	DESCRIPTION
* 2799A-H	* Nitrate #1 Tablets, 50/box
* NN-3703A-H	* Nitrate #2 CTA Tablets, 50/box
3494	Nitrate-Nitrogen Octa-Slide Bar, 0–15 ppm
* 6999A-H	* Chlorine DPD #1R Tablet, 50/box
* 6999A-L	* Chlorine DPD #1R Tablet, 500/box
* 6905A-H	* Chlorine DPD #3R Tablet, 50/box
* 6905A-L	* Chlorine DPD #3R Tablet, 500/box
3401	Chlorine Octa-Slide Bar, 0.2–3.0 ppm
6354-L	Conductivity Standard, 1413 μ mhos/cm (990 ppm TDS), 500 mL

***WARNING:** Reagents marked with a * are considered to be potential health hazards. To view or print a Material Safety Data Sheet (MSDS) for these reagents see MSDS CD or www.lamotte.com. To obtain a printed copy, contact LaMotte by e-mail, phone or fax.



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