Kinetico Incorporated
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Newbury, Ohio 44065

Operator’s Manual
Test and Demonstration Kit
Kinetico Product #6692

LaMOTTE COMPANY
Helping People Solve Analytical ChallengesSM
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TABLE OF CONTENTS

Safety Information ................................................................. 3
Testing Hints
   Reagent Care ................................................................. 4
   Analytical Technique .......................................................... 4 - 5
Model S Series Water Softeners
   Introduction ........................................................................... 5
   Instructions for Use ............................................................. 6
   Regeneration of Resin ............................................................ 6
   Replacement of Resin .............................................................. 6 - 7
Total Hardness Test ................................................................. 8
Soap Demonstration .................................................................. 9
Kit Layout Diagram ............................................................... 10 - 11
Precipitation Demonstration ..................................................... 12 - 13
Iron Test .................................................................................. 14
pH Test ................................................................................... 15
Chlorine Test ........................................................................... 16
Nitrate-Nitrogen Test ............................................................... 17
Waterproof TDS Testr Low .......................................................... 18 - 19

8. After 3 seconds without a key press, the display will flash three times and show “ENT”. This indicates that the Testr has accepted the calibration. The Testr will return to the measurement mode.

9. Replace the battery cap.

TDS TESTING

1. Remove electrode cap. Switch unit on (ON/OFF key).
2. Dip electrode into test solution. Make sure electrode is fully covered.
3. Wait for reading to stabilize. Allow time for the Automatic Temperature Compensation to correct the readings for solution temperature changes. Record reading.
4. Press ON/OFF to turn Testr off. Replace electrode cap.
   NOTE: Testr will shut off automatically after 8.5 minutes of nonuse.

HOLD FUNCTION

Press HOLD key to freeze display. Press HOLD again to release.

SETTING THE TDS FACTOR

This Testr lets you select a TDS factor of 0.4 to 1.0.

1. Open battery compartment. With meter on, press the HOLD key, then press the INC key (inside the battery compartment).
2. Press INC or DEC keys to adjust the TDS factor.
3. After 3 seconds without a key press, the display flashes 3 times, then shows “ENT”. Testr accepts TDS factor and returns to measurement mode.
4. Replace battery cap.

MAINTENANCE

1. Periodically rinse electrode in alcohol for 10 to 15 minutes.
2. Replace batteries if low battery indicator appears or readings are faint or unstable.
3. If drift is detected, allow electrode to dry completely.

CHANGING THE BATTERIES

1. Open battery compartment (end with lanyard loop).
2. Remove old batteries. Replace with new batteries. Note polarity markings in battery compartment.
3. Recalibrate after battery change.
**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td>0 - 1990 ppm</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>10 ppm</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±1% FS</td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>0° to 50° C, 32° to 122° F</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>Automatic (ATC) 0° to 50° C, 32° to 122° F</td>
</tr>
<tr>
<td><strong>Compensation</strong></td>
<td>2%/°C, 1.11%/°F</td>
</tr>
<tr>
<td><strong>Battery/Life</strong></td>
<td>4 ea. 1.5V Eveready A76BP batteries/150 hrs</td>
</tr>
<tr>
<td><strong>Size (Meter Only)</strong></td>
<td>6.5” L x 1.5” Diameter, 165 x 38 mm</td>
</tr>
<tr>
<td><strong>Wt. (Meter Only)</strong></td>
<td>3.25 oz. (90 g)</td>
</tr>
<tr>
<td><strong>TDS Factor</strong></td>
<td>0.4 - 1.0 selectable</td>
</tr>
</tbody>
</table>

**BEFORE FIRST USE**

1. Remove electrode cap.
2. Soak electrode for a few minutes in alcohol to remove oils.

**CALIBRATION**

Tester is factory calibrated. To ensure accuracy, calibrate Testr on a regular basis.

1. Select a calibration standard close to the test solution value, between 200 ppm and 1990 ppm.
2. Open battery compartment (end with lanyard loop).
3. Rinse electrode in deionized water.
4. Rinse electrode in calibration standard.
5. Dip electrode in a container of calibration standard.
6. Switch unit on (ON/OFF key). Wait several minutes for display to stabilize.
7. Press the INC or DEC keys (white buttons in the battery compartment) to adjust the reading to match the calibration standard value.

**SAFETY INFORMATION**

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

Labels on each LaMotte reagent container also provide important information pertaining to the nature of the reagents. Some containers include precautionary notes or antidote information on the label.

**WARNING:** Reagents marked with a * are considered hazardous substances, and Material Safety Data Sheets (MSDS) are supplied for these reagents. For your safety read label and accompanying MSDS before using. These reagents are for chemical tests only! Keep all chemicals away from children.
TESTING HINTS

REAGENT CARE

1. Tightly close all reagent containers immediately after use. Do not interchange caps and pipets from different containers.
2. Avoid prolonged exposure of equipment and reagents to direct sunlight.
3. Protect reagents and kit 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 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. (See 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. (See 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: We recommend placing 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.

NITRATE-NITROGEN TEST

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>CONTENTS</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 60 mL</td>
<td>*Mixed Acid Reagent</td>
<td>*V-6278-H</td>
</tr>
<tr>
<td>10g</td>
<td>*Nitrate Reducing Reagent</td>
<td>*V-6279-D</td>
</tr>
<tr>
<td>1</td>
<td>Water Sample Collecting Bottle, plastic</td>
<td>0688</td>
</tr>
<tr>
<td>1</td>
<td>Spoon, 0.1g, plastic</td>
<td>0699</td>
</tr>
<tr>
<td>2</td>
<td>Test Tube, 2.5 &amp; 5.0 mL, glass, w/caps</td>
<td>0820</td>
</tr>
<tr>
<td>1</td>
<td>Nitrate-N Comparator, 0.25-10.0 ppm</td>
<td>3109</td>
</tr>
<tr>
<td>1</td>
<td>Dispenser Cap</td>
<td>0692</td>
</tr>
</tbody>
</table>

NOTE 1: Nitrites interferences at all levels. Use the following equation to compensate for nitrite interferences:

\[
\text{Test result (ppm) - Nitrite-N (ppm)} \times 5.5 = \text{true Nitrate-N reading}
\]

NOTE 2: The best results are obtained when all solutions are kept close to 23°C.

NOTE 3: Place Dispenser Cap (0692) on *Mixed Acid Reagent (V-6278). Save this cap for refill reagents.

TEST PROCEDURE

1. Fill sample bottle (0688) with sample water.
2. Fill test tube (0820) to the first line (2.5 mL) with the sample from the sample bottle.
3. Dilute to second line (5 mL) with *Mixed Acid Reagent (V-6278). Cap and mix. Wait two minutes.
4. Use the 0.1g spoon (0699) to add one level measure (avoid any excess) of *Nitrate Reducing Reagent (V-6279). Cap and invert the tube 50-60 times in one minute. Wait ten minutes.
5. Mix before inserting tube into the Nitrate-N Comparator (3109). Match sample color to a color standard. Record as ppm Nitrate Nitrogen (NO₃⁻N). To convert to ppm Nitrate, multiply result by 4.4. Record as ppm Nitrate (NO₃⁻).


CHLORINE TEST

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>CONTENTS</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>*Chlorine DPD #1R Tablets</td>
<td>*6999-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H</td>
</tr>
<tr>
<td>50</td>
<td>*Chlorine DPD #3R Tablets</td>
<td>*6905-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H</td>
</tr>
<tr>
<td>2</td>
<td>Test Tube, 10 mL, glass, w/cap</td>
<td>0822</td>
</tr>
<tr>
<td>1</td>
<td>Chlorine DPD Comparator, 0.1-1.0 ppm</td>
<td>6978</td>
</tr>
</tbody>
</table>

TEST PROCEDURE

FREE AVAILABLE CHLORINE

1. Rinse a test tube (0822) with sample water. Fill to the 10 mL line with sample water.
2. Add one *Chlorine DPD #1R Tablet (6999). Cap and shake until tablet disintegrates.
3. Immediately insert test tube into Chlorine DPD Comparator (6978). Match sample color to a color standard. Record as ppm free available chlorine.
   NOTE: Do not discard this test sample if Total Residual and Combined Chlorine are to be determined.

TOTAL RESIDUAL CHLORINE

4. Add one *Chlorine DPD #3R Tablet (6905) to the sample from Step 3. Cap and shake until tablet disintegrates.
5. Insert test tube into Chlorine DPD Comparator (6978). Match sample color to a color standard.
6. Record as ppm Total Residual Chlorine.

COMBINED CHLORINE

Combined Chlorine (including monochloramine, dichloramine, and nitrogen trichloride) can be determined in the following way:

\[
\text{Combined Chlorine (ppm)} = \frac{\text{Total Residual Chlorine} - \text{Free Available Chlorine}}{2}
\]

NOTE: Thoroughly clean and rinse test tubes after each use.

6. When dispensing reagents from pipets, hold pipet vertically to assure uniform drop size. This is extremely important when performing drop count titrations such as the hardness test. (See Figure 3)
7. To fill pipets, squeeze rubber bulb and immerse into reagent. Release bulb to fill. (See Figure 4)
8. To accurately dispense powdered reagents with spoon, tap spoon on vial to remove excess reagent. (See Figure 5)
9. When performing tests that include Octet Comparators, the comparator should be positioned between the operator and nondirect sunlight. This allows the light to enter through the light-diffusing screen at the back of the comparator for optimum color comparison.

MODEL S SERIES WATER SOFTENERS

MODEL S • CODE 1002

INTRODUCTION

Each 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. The Model S can treat 70 gallons of 60 - 120 ppm hardness water before regeneration is necessary. Naturally, 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. We recommend regenerating softeners after each day’s demonstration.
INSTRUCTIONS FOR USE

1. Attach adapter on inlet hose to faucet. Fully open clamp on inlet hose. Slowly turn on faucet and adjust the flow of water into softener until the incoming stream of water is about ½ inch in diameter.

2. Fill chamber until a one-inch layer of water is visible over resin, then unclamp outlet hose at bottom of softener. Let effluent run to waste for about 3 minutes to wash out residue from the previous sample. Adjust flow to maintain the one-inch layer of water over resin.

   NOTE: If softener was stored full of water, unclamp outlet hose as soon as faucet is turned on.

3. Once the first volume of effluent has been discarded, begin collection of the softened effluent in a suitable container.

4. After a sufficient amount of softened water has been collected, turn off faucet and clamp outlet hose. When softener is disconnected from faucet, clamp inlet hose.

5. If softener is to be stored unused for any length of time, maintain a one-inch layer of water over resin column to prevent drying and cracking.

REGENERATION OF RESIN

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

2. Remove black plug from top of softener.

3. Clamp outlet tube and add salt solution until softener is completely full.

4. Allow to stand 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 and wash resin with approximately one gallon of tap water. At this point the resin should be completely regenerated.

REPLACEMENT OF RESIN

Order Model S Resin Refill Package by Code R-1002.

1. Remove black plug from top of softener.

2. Unclamp outlet hose and turn softener upside down, allowing the exhausted resin and water to run to waste.

pH TEST

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>CONTENTS</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 mL</td>
<td>*Wide Range pH Indicator</td>
<td>2218-H</td>
</tr>
<tr>
<td>2</td>
<td>Test Tube, 5 mL, glass, w/caps</td>
<td>0230</td>
</tr>
<tr>
<td>1</td>
<td>pH Wide Range Comparator, 0.5-10.0</td>
<td>2195</td>
</tr>
</tbody>
</table>

TEST PROCEDURE

1. Thoroughly rinse test tube (0230) with sample water.

2. Fill the tube (0230) to 5 mL line with sample water.

3. Add 10 drops of *Wide Range Indicator (2218). Cap and mix.

4. Insert test tube into the pH Wide Range Comparator (2195). Match sample color to a color standard. Record as pH. If the sample color falls between the two standard values, take the mid-point between the two standard values as the test result.
IRON TEST

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>CONTENTS</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 mL</td>
<td>*Iron Reagent #1</td>
<td>4450WT-H</td>
</tr>
<tr>
<td>4.5g</td>
<td>*Iron Reagent #2 Powder</td>
<td>4451-S</td>
</tr>
<tr>
<td>2</td>
<td>Test Tubes, 5 mL, glass, w/caps</td>
<td>0230</td>
</tr>
<tr>
<td>1</td>
<td>Spoon, 0.05g, plastic</td>
<td>0696</td>
</tr>
<tr>
<td>1</td>
<td>Iron Comparator, 0.5-10.0 ppm</td>
<td>4448</td>
</tr>
</tbody>
</table>

TEST PROCEDURE

1. Thoroughly rinse a test tube (0230) with sample water.
2. Fill test tube (0230) to the 5 mL line with sample water.
4. Use the 0.05g spoon (0696) to add one level measure of *Iron Reagent #2 Powder (4451). Cap and shake until powder dissolves. Wait 5 minutes.
5. Insert test tube into the Iron Comparator (4448). Match sample color to a color standard. Record as ppm iron. If the sample color falls between two standard colors, take the mid-point between the two standard values as the test result.

3. By adding more water to the column and shaking, the remaining resin can be easily removed.
4. With the aid of a funnel, add the fresh resin to the column. Tap water may be added to the resin in the funnel to facilitate filling of the column.
5. Continue adding resin to the column until the resin is about 2 inches from the top of the column. Allow excess water to drain from outlet hose.
6. Replace black plug in top of column.
7. Connect softener to faucet and proceed with Instructions for Use.

Diagram: Model S Series

- INLET HOSE
- OUTLET HOSE
- FAUCET ADAPTER
- PLUG
- CLAMP
- CHAMBER
- ADAPTER
TOTAL HARDNESS TEST

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>CONTENTS</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 mL</td>
<td>*Hardness Reagent #5</td>
<td>4483WT-H</td>
</tr>
<tr>
<td>100</td>
<td>Hardness Reagent #6 Tablets</td>
<td>4484-J</td>
</tr>
<tr>
<td>60 mL</td>
<td>Hardness Reagent #7</td>
<td>4487WT-H</td>
</tr>
<tr>
<td>1</td>
<td>Hardness Tube, plastic, w/cap</td>
<td>4488</td>
</tr>
</tbody>
</table>

TEST PROCEDURE

1. Thoroughly rinse hardness tube (4488) to the desired line with sample water.
2. Fill Hardness tube (4488) to the desired line with sample water.
   - Upper line 1 drop = 10 ppm
   - Middle line 1 drop = 1 gpg
   - Lower line 1 drop = 20 ppm

Note: Fill tube to lower line if hardness is greater than 200 ppm.
3. Add 5 drops of *Hardness Reagent #5 (4483) to the tube. Cap and mix.
4. Add one Hardness Reagent #6 tablet (4484). Cap and shake until tablet disintegrates. Solution will turn red.
5. While gently swirling tube, add Hardness Reagent #7 one drop at a time, until red color changes to clear blue. Count the number of drops added.
6. Upper line 1 drop = 10 ppm Hardness as CaCO₃
   - Middle line 1 drop = 1 gpg Hardness as CaCO₃
   - Lower line 1 drop = 20 ppm Hardness as CaCO₃
   Example: 7 drops x 1 gpg = 7 gpg Total Hardness as CaCO₃

TEST PROCEDURE

1. Thoroughly rinse the “SOFT” water Demonstration Tube (0298) with the softened water and the “HARD” water Demonstration Tube (0297) with the untreated water.
2. Fill the “SOFT” water Demonstration Tube (0298) to line with softened water.
3. Fill the “HARD” water Demonstration Tube (0297) to line with untreated water.
4. Use the glass pipet (0344) to add 5 drops of *Precipitation Reagent A (4542) to each tube. Cap and mix.
5. Use the plastic pipet (0392) to add 5 drops of *Precipitation Reagent B (4543) to each tube. Cap and mix.
6. Place the tubes in the Precipitation Rack (0879) and allow the tubes to stand for several minutes. Note that the treated “soft” water will remain clear while the hardness in the untreated sample will cause a heavy precipitate to form.
The materials needed to perform the Precipitation Demonstration are NOT included in this test kit. Call LaMotte Company directly (1-800-344-3100) to order the Precipitation components by Code #8124. This Kinetico Precipitation Demo Package is subject to the UPS Hazardous Materials fee in addition to the freight charge.

NOTE: This Precipitation Package is a visual demonstration illustrating only the removal of Calcium and Magnesium ions from tapwater after treatment by the ion exchange process. The results should not be interpreted beyond the intent of the demonstration.

**QUANTITY** | **CONTENTS** | **CODE**
---|---|---
60 mL | *Precipitation Reagent A | *4542-H
60 mL | *Precipitation Reagent B | *4543-H
1 | Test Tube, printed Soft | 0298
1 | Test Tube, printed Hard | 0297
1 | Pipet, plain, glass, w/cap | 0344
1 | Pipet, plain, plastic, w/cap | 0392
1 | Precipitation Rack, acrylic | 0879

**QUANTITY** | **CONTENTS** | **CODE**
---|---|---
60 mL | *Kinetico Soap Reagent | *4794PS-H
1 | Flask, 250 mL, Hard | 0452
1 | Flask, 250 mL, Soft | 0453
2 | Stoppers, rubber | 0670
1 | Pipet, plain, plastic, w/cap | 0392

**TEST PROCEDURE**

1. Thoroughly rinse the “SOFT” water flask (0453) with softened water and the “HARD” water flask (0452) with untreated water.
2. Fill the “HARD” flask (0452) with untreated water until the bottom surface is covered with a layer of water approximately one-half inch deep.
3. Fill the “SOFT” flask (0453) to the same level with softened water.
4. Use the pipet (0392) to add 4 drops of *Kinetico Soap Reagent (4794) to each flask. Stopper and shake the flasks. Note that a thick lather forms in the softened water.
5. Continue to add *Kinetico Soap Reagent (4794) to the untreated “HARD” water, shaking periodically, until a lather forms. Extremely hard water may require thirty, forty, or even sixty drops of *Kinetico Soap Reagent to produce a lasting lather.