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<tr>
<td>15 mL</td>
<td>*Sodium Hydroxide Reagent w/Metal Inhibitors</td>
<td>*4259-E</td>
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<td>50</td>
<td>Calcium Hardness Indicator Tablets</td>
<td>T-5250-H</td>
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<tr>
<td>15 mL</td>
<td>*Hardness Reagent # 5</td>
<td>*4483-E</td>
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<td>100</td>
<td>Hardness Reagent # 6 Tablets</td>
<td>4484-J</td>
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<td>60 mL</td>
<td>Hardness Reagent # 7</td>
<td>4487WT-H</td>
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<td>1</td>
<td>Test Tube, w/cap</td>
<td>4488</td>
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<tr>
<td>1</td>
<td>Pipet, 0.5 mL, plastic</td>
<td>0353</td>
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*WARNING:* Reagents marked with an * are considered to be potential health hazards. To view or print a Material Safety Data Sheet (MSDS) for these reagents go to www.lamotte.com. To obtain a printed copy, contact LaMotte by e-mail, phone or fax.

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

TOTAL HARDNESS

1. Fill the test tube (4488) to the desired line with sample water.
   To receive results in ppm, fill tube to upper line.
   To receive results in gpg, fill tube to middle line.
   If the hardness level is above 200 ppm, fill tube to lower line.

   NOTE: 1 gpg = 17.1 ppm

2. Add five drops of *Hardness Reagent #5 (4483). Swirl to mix.

3. Add one Hardness Reagent #6 Tablet (4484). Swirl to dissolve tablet.
   Solution will turn red if hardness is present. If solution is blue, there is no measurable amount of hardness.

4. While gently swirling tube, add Hardness Reagent #7 (4487WT), one drop at a time until color changes from red to clear blue.

   To determine total hardness test result, multiply the number of drops added in Step 4 by:
   lower line 20 ppm CaCO₃
   middle line 1 gpg CaCO₃
   upper line 10 ppm CaCO₃

CALCIUM HARDNESS TEST

1. Fill test tube (4488) to the desired line (see Step 1, above) with sample water.

2. Add 6 drops of *Sodium Hydroxide Reagent w/Metal Inhibitors (4259). Swirl to mix.

3. Add one Calcium Hardness Indicator Tablet (T-5250). Swirl to dissolve tablet.
   Solution will turn red if hardness is present. If solution is blue, there is no measurable amount of hardness.

4. While gently swirling tube, add Hardness Reagent #7 (4487WT), one drop at a time until color changes from red to clear blue.

   To determine calcium hardness test result, multiply the number of drops added in Step 3 by:
   lower line 20 ppm CaCO₃
   middle line 1 gpg CaCO₃
   upper line 10 ppm CaCO₃

*Indicates hazardous material.
ANALYSIS OF HARDNESS IN SALT WATER

When sea and estuarine waters containing very high levels of mineral salts are to be tested, the sample must be diluted to a practical concentration before titration. This test is supplied with a calibrated pipet for performing the simple, convenient dilutions described below.

TOTAL HARDNESS DILUTION (1 TO 17.2)

1. Use the 0.5 mL pipet (0353) to transfer 0.5 mL of the salt water to be tested to the test tube (4488).
2. Fill tube to 10 ppm line with distilled water.
3. Follow Steps 2 through 5 under the Total Hardness test procedure. Multiply the number of drops by 172 to obtain the test result expressed as Total Hardness in ppm CaCO$_3$.

CALCIUM HARDNESS DILUTION (1 TO 8.6)

1. Use the 0.5 mL pipet (0353) to transfer 1.0 mL (two measures) of the salt water to be tested to the test tube (4488).
2. Fill tube to 10 ppm line with distilled water.
3. Follow Steps 2 through 4 under Calcium Hardness test procedure.
4. Multiply the number of drops by 86 to obtain the test result expressed as Calcium Hardness in ppm CaCO$_3$.

**NOTE:** Calcium Hardness test result may be converted to ppm Calcium Chloride (CaCl$_2$) by means of the following formula:

$$\text{ppm CaCl}_2 = \text{ppm CaCO}_3 \times 1.11$$

MAGNESIUM HARDNESS OF SALT WATER

**Magnesium Hardness = Total Hardness − Calcium Hardness**

Magnesium Hardness test result may be converted to ppm Magnesium Chloride (MgCl$_2$) by means of the following formula:

$$\text{ppm MgCl}_2 = \text{CaCO}_3 \times 0.95$$