1. Fill the tube (4488) to the desired mark (see note above) with the sample water.
2. Add five drops of *Hardness Reagent #5 (4483). Cap and mix.
3. Add five drops of *Hardness Reagent #6 (4485). Cap and mix. Solution will turn red.
4. Use the pipet (0392) to add Hardness Reagent #7 (4487PS), one drop at a time, swirling the tube between each addition. Hold the pipet vertically to form uniformly-sized drops. Count each drop added. Continue adding drops until the red color changes to a clear blue.
5. To determine the Total Hardness test result, multiply the number of drops added in Step 4 by:
   - 1 gpg CaCO$_3$ (test tube filled to lower mark)
   - 10 ppm CaCO$_3$ (test tube filled to upper mark)

**BLEACH**

1. Use the glass pipet (0342) to add exactly 5 drops of the water sample to one of the small test tubes (0230).
2. Use the 0.5 mL pipet with screw cap (0369) to add 0.5 mL of *Hypochlorite Indicator (6434). Solution will turn brown.
3. Use a clean pipet (0392) to add Hypochlorite Reagent C (7941PS), one drop at a time, while shaking and counting the drops. Continue until the brown or yellow color turns colorless.
   
   Number of Drops x 0.1 = % Available Chlorine Bleach

**TURBIDITY**

1. This test measures the progressive amount of soil removed in each operation.
2. Fill one of the large, round bottom test tubes (0240) with the water sample. Allow to stand until the bubbles and suds have disappeared. Hold the tube in front of standard printed type such as these instructions or a newspaper. If the words can be read through the sample, then the solution is free of soil. If the words cannot be read, additional rinsing operations are required.

*WARNING: Reagents marked with a * are considered hazardous substances. Material Safety Data Sheets (MSDS) are supplied for these reagents. For your safety, read label and accompanying MSDS before using.

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

**ALKALINE (HIGH) pH**
1. Fill a test tube (0230) to the 5.0 mL line with the sample water.
2. Add 8 drops of Nitro Green Indicator (2301). Cap and mix.
3. Insert test tube into the Nitro Green Comparator (2197). Match sample color to a color standard. Record as pH.

**SOUR (LOW) pH**
1. Fill a test tube (0230) to the 5.0 mL line with the sample water.
2. Add 8 drops of the Sour Indicator (6432). Cap and mix.
3. Match sample color to a color standard. Compare with the table below. Record the pH.

<table>
<thead>
<tr>
<th>Color</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Orange</td>
<td>1.5</td>
</tr>
<tr>
<td>Orange</td>
<td>2.0</td>
</tr>
<tr>
<td>Yellow</td>
<td>3.0</td>
</tr>
<tr>
<td>Green Yellow</td>
<td>4.0</td>
</tr>
<tr>
<td>Yellow Green</td>
<td>5.0</td>
</tr>
<tr>
<td>Green</td>
<td>6.0</td>
</tr>
<tr>
<td>Gray Green</td>
<td>7.0</td>
</tr>
<tr>
<td>Blue</td>
<td>8.0</td>
</tr>
<tr>
<td>Bright Violet</td>
<td>8.5</td>
</tr>
</tbody>
</table>

**ALKALINITY, BREAK & SUDSING**
1. Fill a test tube (0768) to the 25 mL line with the sample water.
2. Add 3 drops of *Phenolphthalein Indicator, 1% (2246). If a red color develops, active alkali is present. Proceed to step 3. If no red color appears, skip step 3 and go to step 4.
3. Use a clean pipet with cap (0392) to add *Hydrochloric Acid, 1.0 N (6130PS) to the sample, one drop at a time, counting the drops. Continue addition, swirling to mix after each drop, until the red color disappears.

   \[
   \text{Number of Drops} \times 100 = \text{ppm Active Alkalinity as ppm CaCO}_3
   \]

4. To the same sample, add 3 drops of *Methyl Orange Indicator (2230). Mix.
5. Again add *Hydrochloric Acid, 1.0 N (6130PS), one drop at a time, until the yellow color changes to red orange.

   \[
   \text{Number of Drops} \times 10 = \text{ppm Inactive Alkalinity}
   \]

6. To calculate the Total Alkalinity:
   \[
   \text{Total Number of Drops} \times 100 = \text{Total Alkalinity in ppm CaCO}_3
   \]

**ALKALINITY, RINSE**
1. This test should be run on the supply tap water first and then on the rinse water to compare the two Alkalinity readings. If the rinse water is within 30 ppm of the tap water, the rinsing is sufficient. If the difference is greater than 30 ppm additional rinsing is needed.
2. Fill a test tube (0768) to the 25 mL line with the sample water.
3. Add 3 drops of *Phenolphthalein Indicator (2246). If a red color develops, active alkali is present. Proceed to step 4. If no red color appears, skip step 4 and go to step 5.
4. Use a clean pipet with cap (0392) to add *Hydrochloric Acid, 0.1 N (6323) to the sample, one drop at a time, counting the drops. Continue addition, swirling to mix after each drop, until the red color disappears.

   \[
   \text{Number of Drops} \times 10 = \text{ppm Active Alkalinity}
   \]

5. To the same sample, add 3 drops of *Methyl Orange Indicator (2230). Mix.
6. Again add *Hydrochloric Acid, 0.1 N (6323), one drop at a time until the yellow color changes to red orange.

   \[
   \text{Number of Drops} \times 10 = \text{ppm Inactive Alkalinity}
   \]

7. To calculate Total Alkalinity:
   \[
   \text{Total Number of Drops} \times 10 = \text{Total Alkalinity in ppm CaCO}_3
   \]

**HARDNESS**
Test results are expressed as Total Hardness in parts per million (ppm) or grains per gallon (gpg) Calcium Carbonate (CaCO$_3$). When the test tube is filled to the lower mark in Step 1, each drop of Hardness Reagent #7 added in Step 4 equals 1 gpg. When the tube is filled to the upper mark, each drop of Hardness Reagent #7 equals 10 ppm.

To receive results in ppm, fill tube to upper mark.
To receive results in gpg, fill tube to middle mark.

If the hardness level is above 200 ppm, fill tube to lower mark.

**NOTE:**
1 gpg = 17.1 ppm