Pool Master Test Kit

Pool Master (2315001)

DOC326.97.00089

Test preparation

CAUTION: ⚠ Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.

NOTICE: This product has not been evaluated to test for chlorine and chloramines in medical applications in the United States.

- Put the color disc on the center pin in the color comparator box (numbers to the front).
- Use sunlight or a lamp as a light source to find the color match with the color comparator box.
- Rinse the tubes with sample before the test. Rinse the tubes with deionized water after the test.
- If the color match is between two segments, use the value that is in the middle of the two segments.
- If the color disc becomes wet internally, pull apart the flat plastic sides to open the color disc. Remove the thin inner disc. Dry all parts with a soft cloth. Assemble when fully dry.
- Hold the dropper vertically above the sample. Do not let the dropper touch the bottle during the titration.

Alkalinity

- To record the test result as gpg $CaCO_3$, divide the result in mg/L by 17.1.

Chlorine

- Analyze samples immediately after collection.
- Undissolved reagent does not have an effect on test accuracy.
- For free chlorine, read the result immediately after the reagent is added to prevent interference from monochloramine. If the sample contains 3.0 mg/L monochloramine, the free chlorine result increases each minute by 0.1 mg/L.
- Free chlorine is a strong oxidizer and reacts quickly with ammonia and organic nitrogen in the water to form chloramines, also known as combined chlorine. Chloramines are more stable than free chlorine but are weak oxidizers. The total chlorine test measures the free and combined chlorine.

Cyanuric acid

- Cyanuric acid is added to swimming pools to make chlorine more stable.
- If the reading is below the 100-mg/L mark on the dipstick, the test result is more than 100 mg/L. If the reading is above the 20-mg/L mark on the dipstick, the test result is less than 20 mg/L.

pH

- A pH less than 8 controls the growth of algae. A pH less than 7.4 is best for chlorine disinfection. If the pH is less than 7.0, corrosion of pipes and metal can occur.
- More than 15 mg/L chlorine interferes with the test for pH. To remove chlorine from the sample, add 1 drop of 0.1 N sodium thiosulfate solution to the 5-mL sample, mix, then add the pH indicator. The sodium thiosulfate removes a maximum of 50 mg/L chlorine from the sample.
- To verify the test accuracy, use a buffer solution as the sample.

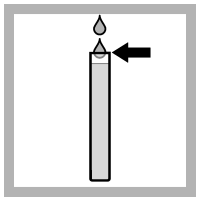
Replacement items

Description	Unit	Item no.
Bromcresol Green-Methyl Red Indicator Powder Pillows	100/pkg	94399
CalVer® 2 Calcium Indicator Powder Pillows	100/pkg	94799
Cyanuric Acid 2 Reagent Powder Pillows	50/pkg	246066
DPD Free Chlorine Reagent Powder Pillows, 5 mL	100/pkg	1407799
DPD Total Chlorine Reagent Powder Pillows, 5 mL	100/pkg	1407699
EDTA Standard Solution, 0.035 N	100 mL MDB	2349932
Phenol red pH indicator solution	100 mL MDB	21132
Potassium Hydroxide Standard Solution, 8.00 N	100 mL MDB	28232H
Sodium thiosulfate standard solution, 0.1 N	100 mL MDB	32332
Sulfuric acid standard solution, 0.035 N	100 mL MDB	2349732
Clippers	each	96800
Color disc, DPD chlorine, 0–3.4 mg/L	each	990200
Color disc, pH, phenol red, 6.6–8.4 pH units	each	9261100
Color comparator box	each	173200
Cylinder, graduated, polymethylpentene, 25 mL	each	217240
Dipstick, cyanuric acid	each	4681300
Measuring tube, plastic, 5.83 mL	each	43800
Plastic viewing tubes, 18 mm, with caps	4/pkg	4660004
Sample cell, 1-inch square plastic, 25 mL, with cap	2/pkg	2410222

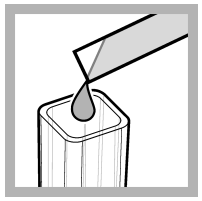
Optional items

Description	Unit	Item no.
Brush, test tube	each	69000
Caps for plastic viewing tubes (4660004)	4/pkg	4660014
pH 7.0 buffer solution, colorless	500 mL	1222249
Water, deionized	500 mL	27249

Test procedure—Total Alkalinity (0–400 mg/L $CaCO_3$)

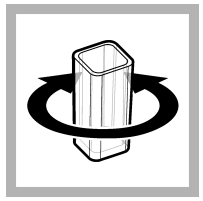


1. Fill the measuring tube with sample.

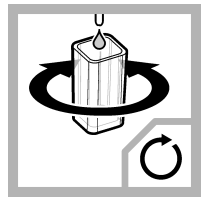


2. Pour the sample into the sample cell.

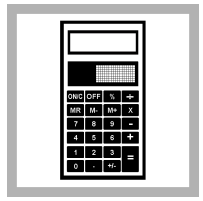
3. Add one Bromcresol Green-Methyl Red Powder Pillow.



4. Turn the sample cell left and right to mix.

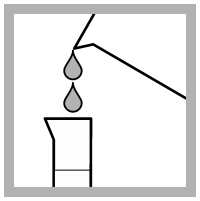


5. Add the Sulfuric Acid Standard Solution by drops. Mix after each drop. Count the drops until the color changes from green to pink.

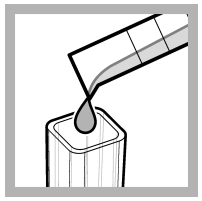


6. Multiply the total number of drops by 20 to get the total (methyl orange) alkalinity result as $CaCO_3$.

Test procedure—Total Alkalinity (0–100 mg/L $CaCO_3$)

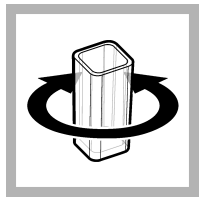


1. Fill the graduated cylinder to the 23-mL mark with sample.

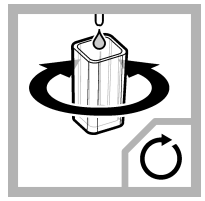


2. Pour the sample into the sample cell.

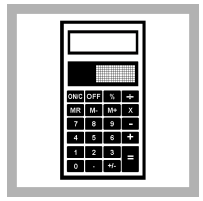
3. Add one Bromcresol Green-Methyl Red Powder Pillow.



4. Turn the sample cell left and right to mix.

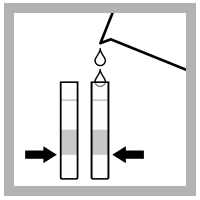


5. Add the Sulfuric Acid Standard Solution by drops. Mix after each drop. Count the drops until the color changes from green to pink.

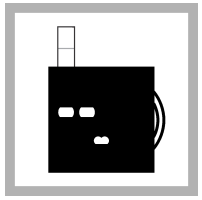


6. Multiply the total number of drops by 5 to get the total (methyl orange) alkalinity result as $CaCO_3$.

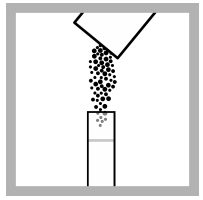
Test procedure—Free or total chlorine (0–3.4 mg/L Cl_2)



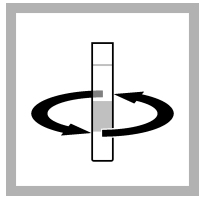
1. Fill two tubes to the first line (5 mL) with sample.



2. Put one tube into the left opening of the color comparator box.

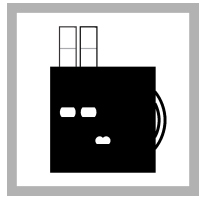


3. Add one DPD (Free or Total) Chlorine Powder Pillow to the second tube.

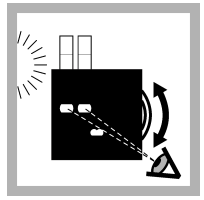


4. Swirl to mix. A pink color develops.

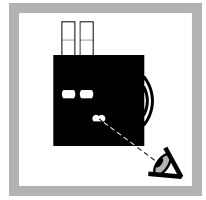
5. For free chlorine, read the result within 1 minute.
For total chlorine, wait 3 minutes. Read the result within 6 minutes.



6. Put the second tube into the color comparator box.

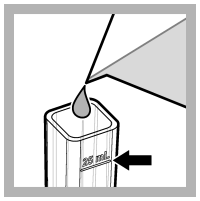


7. Hold the color comparator box in front of a light source. Turn the color disc to find the color match.



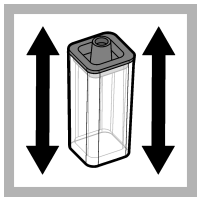
8. Read the result in mg/L in the scale window.

Test procedure—Cyanuric acid (20–100 mg/L)



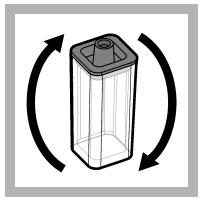
1. Fill the sample cell to the 25-mL mark with sample.

2. Add one Cyanuric Acid 2 Reagent Powder Pillow.



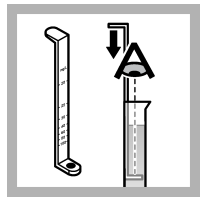
3. Put the cap on the sample cell. Shake the sample cell for 15 seconds.

4. Wait 3 minutes. Read the result within 10 minutes.

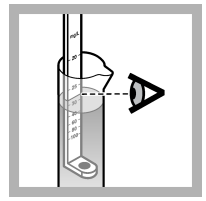


5. Invert the sample cell slowly two to three times to mix.

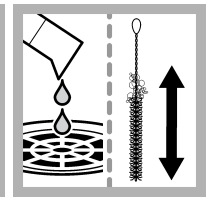
6. Remove the cap. Pour the solution into the graduated cylinder.



7. Look in the graduated cylinder from the top. Slowly put the cyanuric acid dipstick into the cylinder until the black dot is not seen.

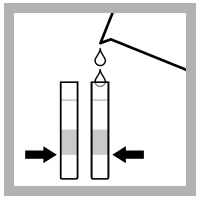


8. Look at the scale on the dipstick. The number on the dipstick scale at the surface of the solution is the result in mg/L.

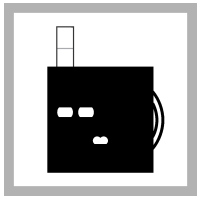


9. Discard the solution. Clean the sample cell and graduated cylinder with soap and a brush.

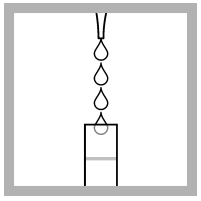
Test procedure—pH (6.6–8.4 pH units)



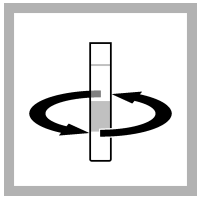
1. Fill two tubes to the first line (5 mL) with sample.



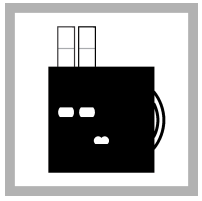
2. Put one tube into the left opening of the color comparator box.



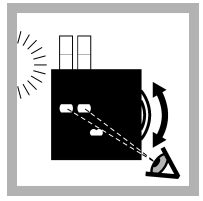
3. Add 4 drops of phenol red pH indicator solution to the second tube.



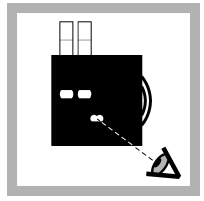
4. Swirl to mix.



5. Put the second tube into the color comparator box.

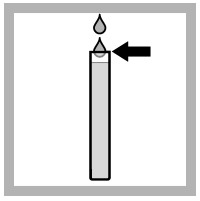


6. Hold the color comparator box in front of a light source. Turn the color disc to find the color match.

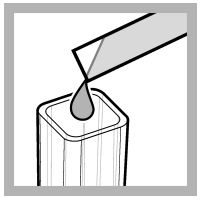


7. Read the result in pH units in the scale window.

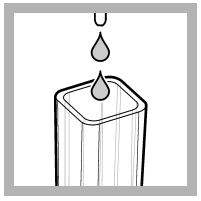
Test procedure—Calcium hardness (20–400 mg/L $CaCO_3$)



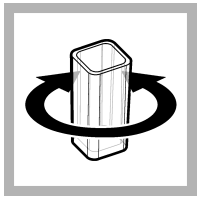
1. Fill the measuring tube with sample.



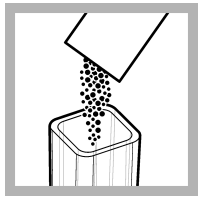
2. Pour the sample into the sample cell.



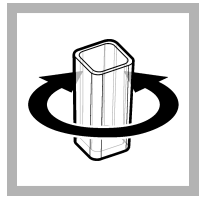
3. Add two drops of the 8 N Potassium Hydroxide Solution.



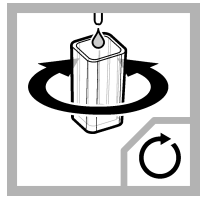
4. Turn the sample cell left and right to mix.



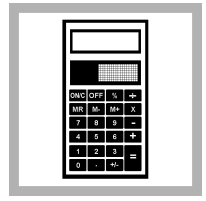
5. Add one CalVer 2 Calcium Indicator Powder Pillow.



6. Turn the sample cell left and right to mix.



7. Add the EDTA Titrant Solution by drops. Mix after each drop. Count the drops until the color changes from pink to blue.



8. Multiply the number of drops of the titrant solution by 20 to get the test result.

Interferences—Calcium hardness

Substance	Interference level
Iron	More than 8 mg/L iron causes an orange-red to green endpoint. Results are accurate to 20 mg/L iron with the orange-red to green endpoint.
Manganese	Manganese interferes at more than 5 mg/L manganese.
Aluminum	Aluminum causes a slow endpoint. The sample can contain a maximum of 200 mg/L aluminum if sufficient time is given for the color change.
Magnesium	The formation of magnesium hydroxide at the high test pH prevents interference from 200 mg/L magnesium. Samples with more than 200 mg/L magnesium do not give a good endpoint.
Orthophosphate	Orthophosphate forms calcium phosphate and causes a slow endpoint. If sufficient time is given to let the calcium phosphate dissolve during the titration, the orthophosphate will not interfere with the test.
Polyphosphates	Polyphosphates interfere directly and are included in the test result.
Barium and strontium	Barium and strontium interfere with this test, but it is unusual to have high levels of barium or strontium in natural waters.
Chloride	The chloride level in seawater does not interfere. Solutions that are saturated with chloride do not show a sharp endpoint.
Acidity or alkalinity	10,000 mg/L acidity or alkalinity as $CaCO_3$ do not interfere.
Temperature	Titrate samples that are at 20 °C (68 °F) or less slowly near the endpoint to give sufficient time for the color change.