Boiler Water Test Kit

AL-94 (222403)

DOC326.97.00087

Test preparation

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

- Hold the dropper vertically above the sample. Do not let the dropper touch the bottle during the titration.
- 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.
- To verify the test accuracy, use a standard solution (buffer solution for pH test) as the sample.

Chloride:

- To record the test result as mg/L sodium chloride (NaCl), multiply the chloride result by 1.7.

Hardness:

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

Iron:

- Use the indoor light color disc when the light source is fluorescent light. Use the outdoor light color disc when the light source is sunlight.
- Undissolved reagent does not have an effect on test accuracy.
- If the sample contains rust or precipitated iron, fully mix the sample and then fill the tubes. Wait 2–5 minutes after the FerroVer reagent is added. Dissolved iron develops a color immediately.
- Samples that contain high levels of iron can give low results. If high iron levels are possible, dilute the sample as follows. Use a 3-mL syringe to add 2.5 mL of sample to each tube. Dilute the sample to the 5-mL mark with deionized water. Use the diluted sample in the test procedure and multiply the result by 2. To make a larger dilution, add 1 mL of sample to each tube. Dilute the sample to the 5-mL mark with deionized water. Use the diluted sample in the test procedure and multiply the result by 5.
- If the sample contains copper, the sample can develop a yellow, blue or violet color. To remove the copper interference, add one 0.05-g spoon of RoVer Rust Remover to the sample before the FerroVer reagent and mix. Wait 5 minutes, then add the FerroVer reagent.

pH:

- Chlorine can interfere 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.

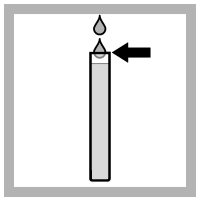
Replacement items

Description	Unit	Item no.
Bromcresol Green-Methyl Red Indicator Powder Pillows	100/pkg	94399
Phenolphthalein Indicator Powder Pillows	100/pkg	94299
Sulfuric acid standard solution, 0.035 N	100 mL MDB	2349732
Chloride 2 Indicator Powder Pillows	100/pkg	104399
Chloride Titrant, Silver Nitrate, 0.0493 N	100 mL MDB	2349832
FerroVer® Iron Reagent Powder Pillows, 5 mL	100/pkg	92799
Hardness 1 Buffer Solution	100 mL MDB	42432
Hardness 2 Indicator Solution	100 mL MDB	42532
EDTA Standard Solution, 0.035 N	100 mL MDB	2349932
Wide range pH indicator solution	100 mL MDB	2329332
Color disc, iron, indoor light, 0–4 mg/L	each	9262400
Color disc, iron, outdoor light, 0–4 mg/L	each	9263800
Color disc, pH, wide range	each	990100
Bottle, square, 29 mL, with 10, 15, 20 and 23-mL marks	6/pkg	232706
Measuring tube, plastic, 5.83 mL	each	43800
Color comparator box	each	173200
Glass viewing tubes, 18 mm	6/pkg	173006
Stoppers for 18-mm glass tubes and AccuVac Ampuls	6/pkg	173106

Optional items

Description	Unit	Item no.
Chloride standard solution, 100 mg/L Cl^-	1000 mL	2370853
pH 7.0 buffer solution, colorless	500 mL	1222249
RoVer® Rust Remover	454 g	30001
Spoon, measuring, 0.05 g	each	49200
Sodium thiosulfate, 0.1 N	100 mL MDB	32332
Standard solution, hardness (20 gpg) and iron (2 mg/L)	500 mL	47949
Syringe, Luer-Lok® Tip, 3 mL	each	4321300
Water, deionized	500 mL	27249

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

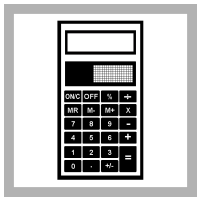


1. Fill the measuring tube with sample.

2. Pour the sample into the mixing bottle.

3. Add one Phenolphthalein Indicator Powder Pillow. Swirl to mix.
If the solution is colorless, the Phenolphthalein (P) alkalinity is zero. Go to step 6.

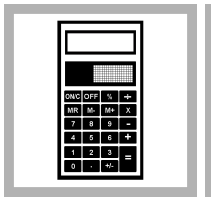
4. Add the Sulfuric Acid Standard Solution by drops. Mix after each drop. Count the drops until the color changes from pink to colorless.



5. Multiply the number of drops by 20 to get the phenolphthalein alkalinity result as $CaCO_3$.

6. Add one Bromcresol Green-Methyl Red Powder Pillow. Swirl to mix.

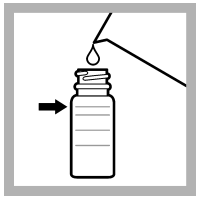
7. Add the Sulfuric Acid Standard Solution by drops. Mix after each drop. Count the drops until the color changes from green to pink.



8. Add the number of drops from step 4 and step 7.

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

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



1. Fill the bottle to the 23-mL mark with sample.

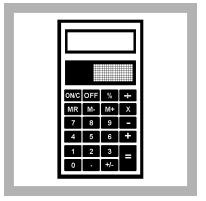
2. Add one Phenolphthalein Indicator Powder Pillow. Swirl to mix.
If the solution is colorless, the Phenolphthalein (P) alkalinity is zero. Go to step 5.

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

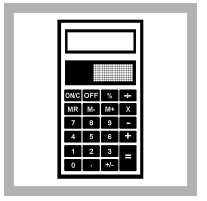
4. Multiply the number of drops by 5 to get the phenolphthalein alkalinity result as $CaCO_3$.

5. Add one Bromcresol Green-Methyl Red Powder Pillow. Swirl to mix.

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

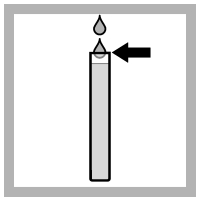


7. Add the number of drops from step 3 and step 6.



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

Test procedure—Chloride (0–400 mg/L Cl^-)



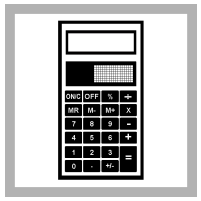
1. Fill the measuring tube with sample.

2. Pour the sample into the mixing bottle.

3. Add one Chloride 2 Indicator Powder Pillow.

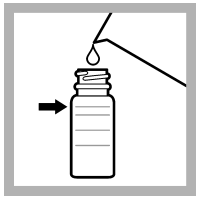
4. Turn the bottle left and right to mix.

5. Add the Silver Nitrate Titrant Solution by drops. Mix after each drop. Count the drops until the color changes to orange.



6. Multiply the total number of drops by 20 to get the result in mg/L.

Test procedure—Chloride (0–100 mg/L Cl–)

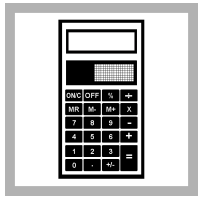


1. Fill the bottle to the 23-mL mark with sample.

2. Add one Chloride 2 Indicator Powder Pillow.

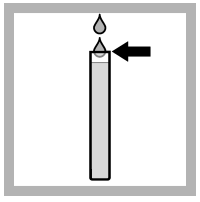
3. Turn the bottle left and right to mix.

4. Add the Silver Nitrate Titrant Solution by drops. Mix after each drop. Count the drops until the color changes to orange.



5. Multiply the total number of drops by 5 to get the result in mg/L.

Test procedure—Hardness (0–20 gpg $CaCO_3$)



1. Fill the measuring tube with sample.

2. Pour the sample into the mixing bottle.

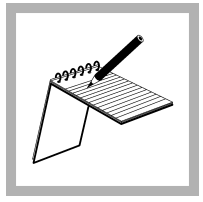
3. Add three drops of the Hardness 1 Buffer Solution.

4. Turn the bottle left and right to mix.

5. Add one drop of the Hardness 2 Indicator Solution. A pink color develops.

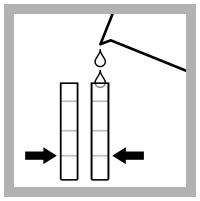
6. Turn the bottle left and right to mix.

7. Add the Hardness 3 Titrant Solution by drops. Mix after each drop. Count the drops until the color changes from pink to blue.

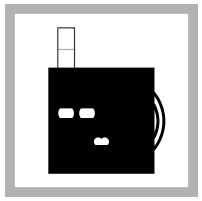


8. Record the number of drops. The number of drops of the titrant solution is the result in gpg.

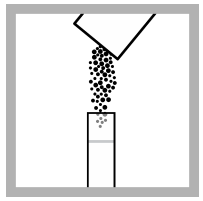
Test procedure—Iron (0–4 mg/L Fe)



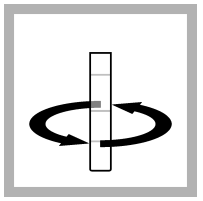
1. Fill two tubes to the first line (5 mL) with sample.



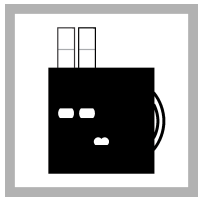
2. Put one tube into the left opening of the color comparator box.



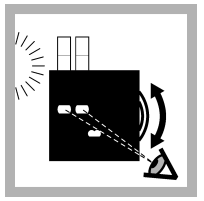
3. Add one FerroVer Iron Reagent Powder Pillow to the second tube.



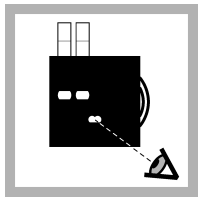
4. Swirl to mix. An orange color develops.



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

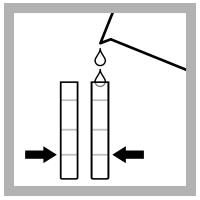


6. Hold the color comparator box in front of a light source. Turn the color disc to find the color match.

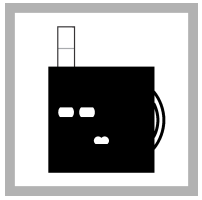


7. Read the result in mg/L in the scale window.

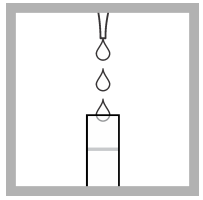
Test procedure—pH (4–10 pH units)



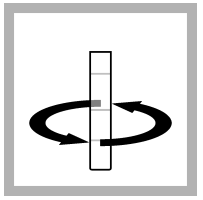
1. Fill two tubes to the first line (5 mL) with sample.



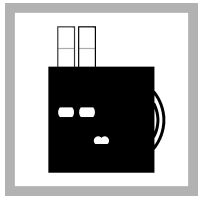
2. Put one tube into the left opening of the color comparator box.



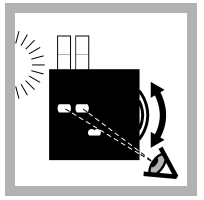
3. Add 6 drops of wide range pH indicator solution to the second tube.



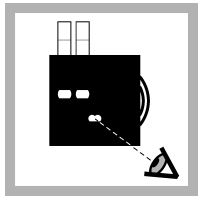
4. Swirl to mix.



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.

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