



Ecology Test Kit

AL-36B (180202)

DOC326.97.00086

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.

Acidity and Alkalinity:

- To record the test result as mg/L CaCO₃, multiply the test result in gpg by 17.1.

Dissolved oxygen:

- Air bubbles cause incorrect results. To prevent air bubbles below the stopper, tilt the bottle and tap the stopper quickly on the bottle neck. Look below the stopper to make sure that there are no air bubbles.
- Keep the sodium thiosulfate away from direct sunlight.
- If the sample contains high concentrations of chloride (e.g., sea water) the floc that develops in the bottle does not fall. Wait 4 or 5 minutes after the floc develops, then continue the test.
- If the high-range procedure gives a low result, use the prepared sample for the titration in the low-range procedure.

Hardness:

- To record the test result as mg/L CaCO₃, multiply the test result in gpg by 17.1.

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.

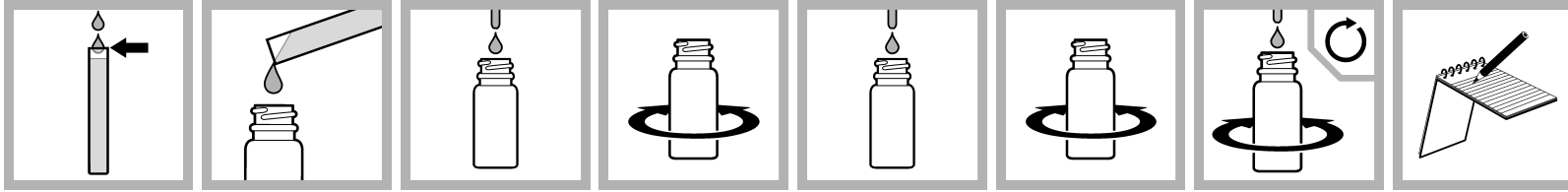
Replacement items

Description	Unit	Item no.
Bromcresol Green-Methyl Red Indicator Powder Pillows	100/pkg	94399
Dissolved Oxygen 1 Reagent Powder Pillows, 60 mL	100/pkg	98199
Dissolved Oxygen 2 Reagent Powder Pillows, 60 mL	100/pkg	98299
Dissolved Oxygen 3 Reagent Powder Pillows	25/pkg	98768
Hardness 1 Buffer Solution	100 mL MDB	42432
Hardness 2 Indicator Solution	100 mL MDB	42532
Hardness 3 Titrant Solution	100 mL MDB	42632
Phenolphthalein Indicator Solution, 1 g/L	15 mL SCDB	189736
Sodium hydroxide standard solution, 0.01 N	100 mL MDB	67132
Sodium Thiosulfate Standard Solution, stabilized, 0.0109 N	100 mL MDB	2408932
Sulfuric acid standard solution, 0.030 N	100 mL MDB	2620532
Wide range pH indicator solution	100 mL MDB	2329332
Clippers	each	96800
Color disc, pH, wide range	each	990100
Bottle, BOD, 60 mL, with stopper	each	190902
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

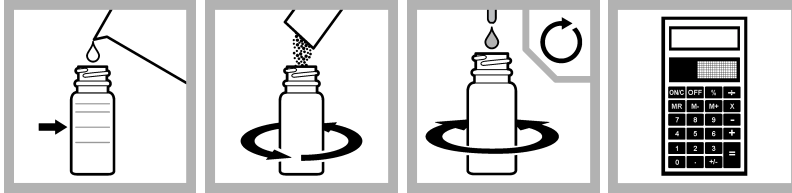
Description	Unit	Item no.
pH 7.0 buffer solution, colorless	500 mL	1222249
Plastic viewing tubes, 18 mm, with caps	4/pkg	4660004
Sodium thiosulfate, 0.1 N	100 mL MDB	32332
Water, deionized	500 mL	27249

Test procedure—Hardness (0–20 gpg CaCO₃)



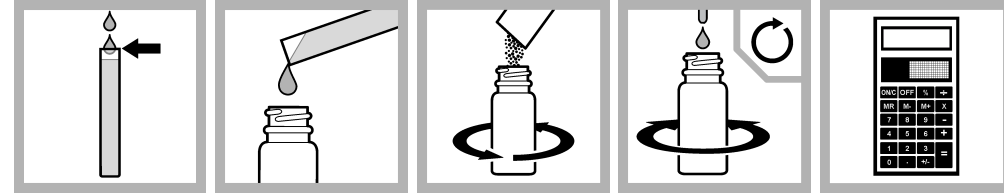
1. Fill the measuring tube with sample.
2. Pour the sample into the mixing bottle.
3. Add three drops of the Hardness 1 Buffer Solution.
4. Turn the bottle left and right to mix.
5. Add one drop of the Hardness 2 Indicator Solution. A pink color develops.
6. Turn the bottle left and right to mix.
7. 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—Free Acidity, LR (gpg CaCO₃)



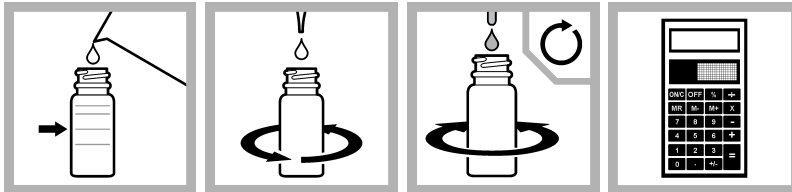
1. Fill the bottle to the 15-mL mark with sample.
2. Add one Bromocresol Green-Methyl Red Powder Pillow. Swirl to mix. If the color is grey-blue, blue or green, the free acidity is zero.
3. If the color is pink, add the Sodium Hydroxide Solution by drops. Mix after each drop. Count the drops until the color changes from pink to grey-blue.
4. Divide the number of drops by 7.5 to get the free acidity result as gpg CaCO₃.

Test procedure—Free Acidity, HR (gpg CaCO₃)



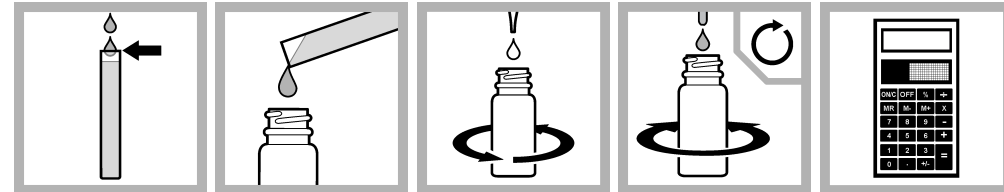
1. Fill the measuring tube with sample.
2. Pour the sample into the mixing bottle.
3. Add one Bromocresol Green-Methyl Red Powder Pillow. Swirl to mix. If the color is grey-blue, blue or green, the free acidity is zero.
4. If the color is pink, add the Sodium Hydroxide Solution by drops. Mix after each drop. Count the drops until the color changes from pink to grey-blue.
5. Divide the number of drops by 3 to get the free acidity result as gpg CaCO₃.

Test procedure—Total Acidity, LR (gpg CaCO₃)



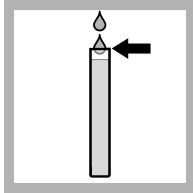
1. Fill the bottle to the 15-mL mark with sample.
2. Add 1 drop Phenolphthalein Indicator Solution. Swirl to mix. If the color is pink, the total acidity is zero.
3. If there is no color change, add the Sodium Hydroxide Solution by drops. Mix after each drop. Count the drops until the color changes to light pink.
4. Divide the number of drops by 7.5 to get the total acidity result as gpg CaCO₃.

Test procedure—Total Acidity, HR (gpg CaCO₃)



1. Fill the measuring tube with sample.
2. Pour the sample into the mixing bottle.
3. Add 1 drop Phenolphthalein Indicator Solution. Swirl to mix. If the color is pink, the total acidity is zero.
4. If there is no color change, add the Sodium Hydroxide Solution by drops. Mix after each drop. Count the drops until the color changes to light pink.
5. Divide the number of drops by 3 to get the total acidity result as gpg CaCO₃.

Test procedure—Alkalinity, HR (gpg CaCO₃)



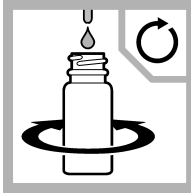
1. Fill the measuring tube with sample.



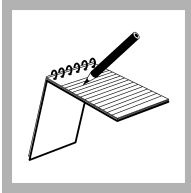
2. Pour the sample into the mixing bottle.



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



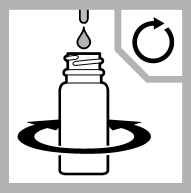
4. Add the Sulfuric Acid Standard Solution by drops. Mix after each drop. Count the drops until the color changes from pink to colorless.



5. Record the number of drops. The number of drops is the phenolphthalein alkalinity result as gpg CaCO₃.



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

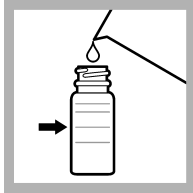


7. Add the Sulfuric Acid Standard Solution by drops. Mix after each drop. Count the drops until the color changes from green to pink.



8. Add the number of drops from step 5 and step 7 to get the total (methyl orange) alkalinity result as gpg CaCO₃.

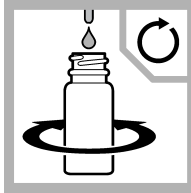
Test procedure—Alkalinity, LR (gpg CaCO₃)



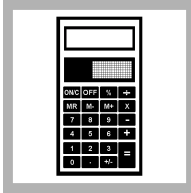
1. Fill the bottle to the 15-mL mark with sample.



2. Add one drop of Phenolphthalein Indicator Solution. 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. Divide the number of drops by 2.5 to get the phenolphthalein alkalinity result as gpg CaCO₃.



5. Add one Bromocresol 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.

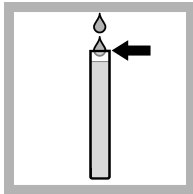


7. Add the number of drops from step 3 and step 6.



8. Divide the total number of drops by 2.5 to get the total (methyl orange) alkalinity result as gpg CaCO₃.

Test procedure—Carbon dioxide (0–100 mg/L CO₂)



1. Fill the measuring tube with sample.



2. Pour the sample into the mixing bottle.



3. Add one drop of the Phenolphthalein Indicator Solution.



4. Turn the bottle left and right to mix.



5. Add the Sodium Hydroxide Solution by drops. Mix after each drop. Count the drops until a pink color stays for 30 seconds.

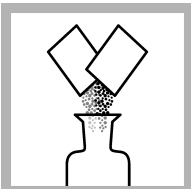


6. Multiply the number of drops of the sodium hydroxide solution by 5 to get the result in mg/L.

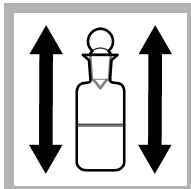
Test procedure—Dissolved oxygen (0–10 mg/L O₂)



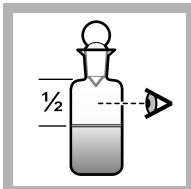
1. Fill the dissolved oxygen bottle with sample. Let the water overflow for 2 to 3 minutes.



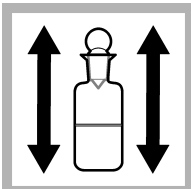
2. Add the contents of one Dissolved Oxygen 1 Powder Pillow and one Dissolved Oxygen 2 Powder Pillow.



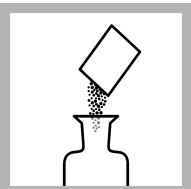
3. Immediately put the stopper on the bottle. Make sure that no air bubbles are below the stopper. Shake the bottle vigorously.



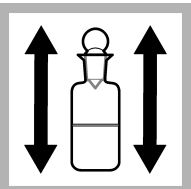
4. A brown-orange floc develops. The floc slowly falls. Wait until the top half of the bottle is clear.



5. Shake the bottle again. Wait until the top half of the bottle is clear.



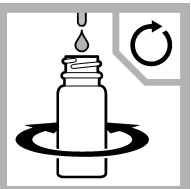
6. Remove the stopper. Add the contents of one Dissolved Oxygen 3 Powder Pillow.



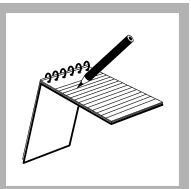
7. Immediately put the stopper on the bottle. Shake the bottle. The floc dissolves and a yellow color develops.



8. Fill the measuring tube with the prepared sample. Pour the prepared sample into the mixing bottle.



9. Add the Sodium Thiosulfate solution by drops. Mix after each drop. Count the drops until the solution is colorless.

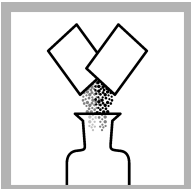


10. Record the number of drops. The number of drops of the titrant solution is equal to the result in mg/L.

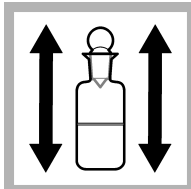
Test procedure—Dissolved oxygen (0–1 mg/L O₂)



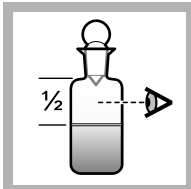
1. Fill the dissolved oxygen bottle with sample. Let the water overflow for 2 to 3 minutes.



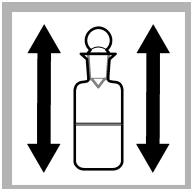
2. Add the contents of one Dissolved Oxygen 1 Powder Pillow and one Dissolved Oxygen 2 Powder Pillow.



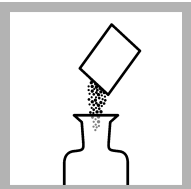
3. Immediately put the stopper on the bottle. Make sure that no air bubbles are below the stopper. Shake the bottle vigorously.



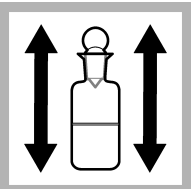
4. A brown-orange floc develops. The floc slowly falls. Wait until the top half of the bottle is clear.



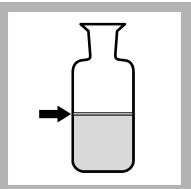
5. Shake the bottle again. Wait until the top half of the bottle is clear.



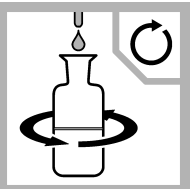
6. Remove the stopper. Add the contents of one Dissolved Oxygen 3 Powder Pillow.



7. Immediately put the stopper on the bottle. Shake the bottle. The floc dissolves and a yellow color develops.



8. Pour the prepared sample from the bottle until the volume in the bottle is 30 mL.

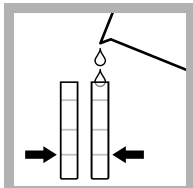


9. Add the Sodium Thiosulfate solution by drops. Swirl to mix after each drop. Count the drops until the color changes to colorless.

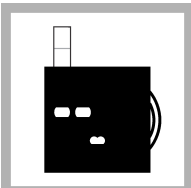


10. Multiply the number of drops of the titrant solution by 0.2 to get the result in mg/L.

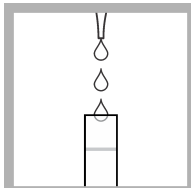
Test procedure—pH (4–10 pH units)



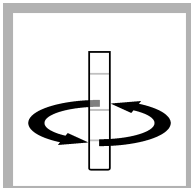
1. Fill two tubes to the first line (5 mL) with sample.



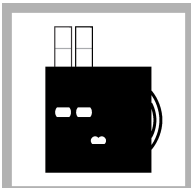
2. Put one tube into the left opening of the color comparator box.



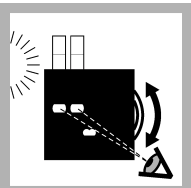
3. Add 6 drops of wide range pH indicator solution to the second tube.



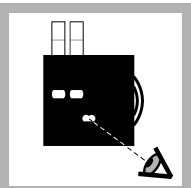
4. Swirl to mix.



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.

