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Storm Water Test Kit

SW-1 (2481300)

02/2017, Edition 2

User Manual

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General information

In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

Use of hazard information

▲ DANGER

Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

▲ WARNING

Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

▲ CAUTION

Indicates a potentially hazardous situation that may result in minor or moderate injury.

NOTICE

Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

Product overview

▲ WARNING



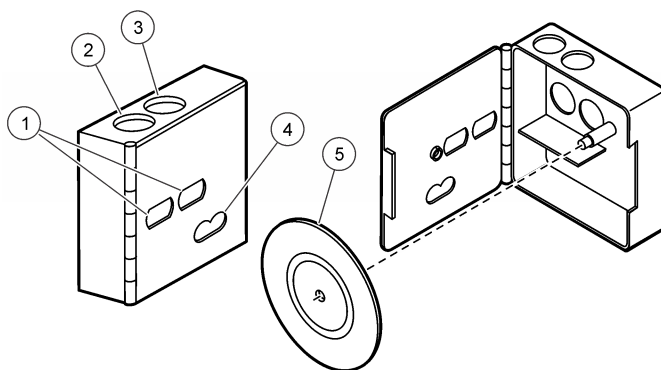
Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

The storm water test kit includes the necessary items to measure five parameters in storm sewer outflow and industrial discharge samples. Refer to [Table 1](#). The test kit includes a pH tester to measure the pH value of the samples. The test kit includes reagents and color discs to measure the concentration of chlorine, phenols, copper and detergents. Refer to [Figure 1](#).

Table 1 Test kit parameters

Parameter	Range	Number of tests	Method	Sensitivity
pH	0–14	Refer to packaging	Ion selective electrode	Refer to packaging
Chlorine, total	0–3.4 mg/L	100	DPD	0.1 mg/L
Copper, free and total	0–4 mg/L	100	Bicinchoninate	0.1 mg/L
Phenols	0–5 mg/L	100	4-Aminoantipyrine	0.1 mg/L
Detergents	0–1.2 mg/L	32	Toluidine Blue-O	0.05 mg/L

Figure 1 Color comparator box



1 Windows for color matching	4 Scale window
2 Left opening for viewing tube	5 Color disc
3 Right opening for viewing tube	

Product components

Make sure that all components have been received. Refer to the list that follows. If any items are missing or damaged, contact the manufacturer or a sales representative immediately.

- Carrying case
- Color discs (4x)
- Color comparator box
- Color viewing tubes, plastic (2x)
- Color viewing tubes, glass (2x), for detergents test
- Stopper for color viewing tubes (2x)
- Filtering thimble
- Test tube, 10 mL (2x), for detergents test
- Draw-off pipet
- Rubber bulb
- Glass wool for detergents test
- Dropper
- Demineralizer bottle
- Beaker, 100 mL
- Pocket Pro™ pH tester
- Buffer Powder Pillows, pH 7.00
- Clippers for pH powder pillows
- DPD Total Chlorine Reagent Powder Pillows
- Free Copper Reagent Powder Pillows
- Hydrosulfite Reagent Powder Pillows
- Detergents Test Solution
- Chloroform, ACS grade
- Wash Water Buffer Solution (2x)
- Phenol Reagent Powder Pillows
- EDTA Reagent Powder Pillows
- Hardness 1 Buffer Solution
- Potassium Persulfate Powder Pillows

Use of the demineralizer bottle

To use the included demineralizer bottle, fill the bottle with tap water and shake to mix. Use the water from the demineralizer bottle as deionized water in the test procedure. Fill the bottle again when empty. Replace the resin after the bottle is filled approximately 100 times.

pH

Refer to the pH tester documentation to measure the pH value of samples and to calibrate the pH tester. To prepare a pH 7.00 calibration solution, dissolve the contents of one pH 7.00 buffer pillow in 50 mL of deionized water.

Total Chlorine

Test preparation

⚠ CAUTION

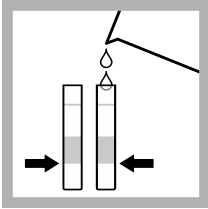
Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.

NOTICE

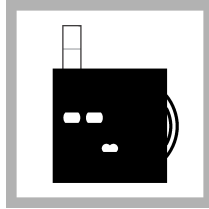
This product has not been evaluated to test for chlorine and chloramines in medical applications in the United States.

- Analyze samples immediately after collection.
- 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.
- Undissolved reagent does not have an effect on test accuracy.

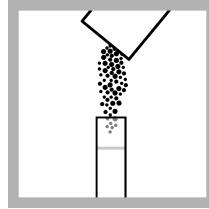
Test procedure—Total chlorine (0–3.4 mg/L Cl₂)



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



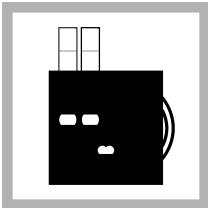
2. Put one tube into the left opening of the color comparator box.



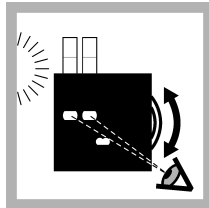
3. Add one DPD Total Chlorine Powder Pillow to the second tube.



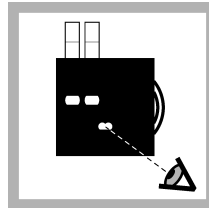
4. Wait 3 minutes. Read the result within 6 minutes.



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.

Replacement items

Description	Unit	Item no.
DPD Total Chlorine Reagent Powder Pillows, 5 mL	100/pkg	1407699
Color disc, DPD chlorine, 0–3.4 mg/L	each	990200
Color comparator box	each	173200
Plastic viewing tubes, 18 mm, with caps	4/pkg	4660004

Optional items

Description	Unit	Item no.
Caps for plastic viewing tubes (4660004)	4/pkg	4660014
Glass viewing tubes, 18 mm	6/pkg	173006
Stoppers for 18-mm glass tubes and AccuVac Ampuls	6/pkg	173106
Water, deionized	500 mL	27249

Copper

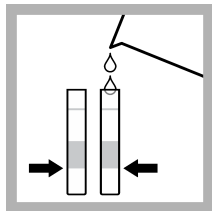
Test preparation

⚠ CAUTION

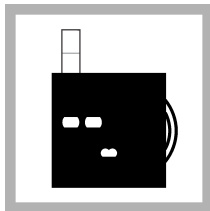
Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.

- 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.
- Undissolved reagent does not have an effect on test accuracy.
- To verify the test accuracy, use a standard solution as the sample.
- High concentrations of cyanide prevent color development. If the cyanide concentration is more than 2 mg/L, add 3 drops of formaldehyde solution to the prepared sample after the free copper reagent is added. Wait 3 minutes, then read the mg/L free copper.
- The test procedure measures free copper and total dissolved copper. Free copper is the free copper ion or weakly chelated copper ion in solution. Total dissolved copper is the sum of free copper and complexed copper. Complexed (chelated) copper is copper that is tightly bound to another compound, as in the copper EDTA complex.
- Free copper is measured to determine if the concentration is toxic to fish and other aquatic species. Free copper is also measured for other types of applications to determine if the quantity of chelant is sufficient.
- Free copper in the sample reacts with bicinchoninic acid in the Free Copper Reagent Powder Pillow and a purple color develops. Complexed (chelated) copper in the sample reacts with the Hydrosulfite Reagent and additional purple color develops. The result after both reagents are added is total dissolved copper. To determine the mg/L of complexed copper, subtract the mg/L free copper from the mg/L total dissolved copper.

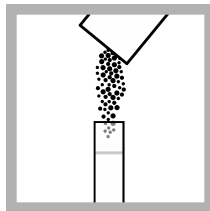
Test procedure—Copper, free and total (0–4 mg/L Cu)



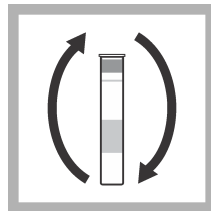
1. Fill two tubes to the first line (5 mL) with sample.



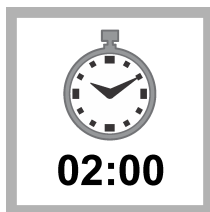
2. Put one tube into the left opening of the color comparator box.



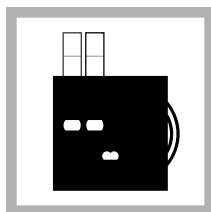
3. Add one Free Copper Reagent Powder Pillow to the second tube.



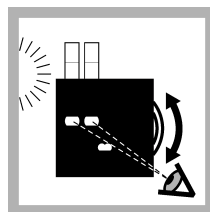
4. Put a stopper on the tube. Invert to mix.



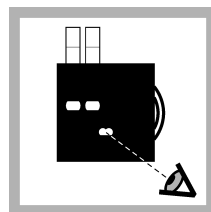
5. Wait 2 minutes. A purple color develops if free copper is in the sample.



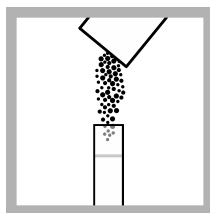
6. Put the second tube into the color comparator box.



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



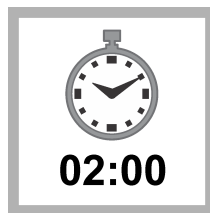
8. Read the mg/L free copper in the scale window. Record the value.



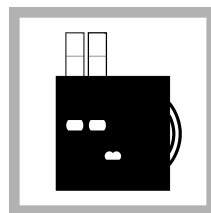
9. To determine total dissolved copper, add one Hydrosulfite Reagent Powder Pillow to the second tube.



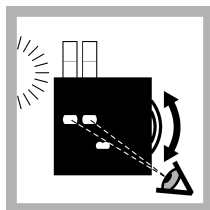
10. Put a stopper on the tube. Invert to mix.



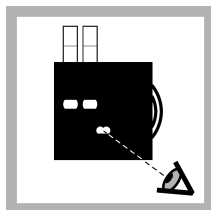
11. Wait 2 minutes.



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



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



14. Read the mg/L total dissolved copper in the scale window.

Replacement items

Description	Unit	Item no.
Free Copper Reagent Powder Pillows	100/pkg	2182369
Hydrosulfite Reagent Powder Pillows	100/pkg	2118869
Color disc, copper, 0–4 mg/L	each	9263300
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.
Metals standard solution for drinking water (2.5 mg/L Cu, 1.5 mg/L Fe, 5.0 mg/L Mn)	500 mL	2833649
Formaldehyde, ACS	100 mL MDB	205932

Detergents

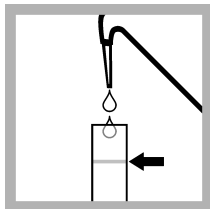
Test preparation

⚠ CAUTION

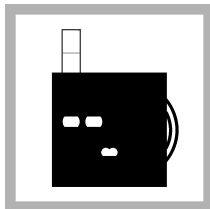
Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.

- 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.
- Use the filtration procedure for samples that contain turbidity.
- If the test result is more than the maximum limit, dilute the sample as follows. Use the dropper to add 1 mL of sample to a tube. Dilute the sample to the 20-mL line with deionized water. Use the diluted sample in the test procedure. Multiply the value in the scale window by 20 to get the test result in mg/L.
- To use the included demineralizer bottle, fill the bottle with tap water and shake to mix. Use the water from the demineralizer bottle as deionized water in the test procedure. Fill the bottle again when empty. Replace the resin after the bottle is filled approximately 100 times.
- Dispose of reacted solutions according to local, state and federal regulations. Refer to the Safety Data Sheets for disposal information for unused reagents. Refer to the environmental, health and safety staff for your facility and/or local regulatory agencies for further disposal information.

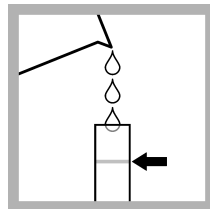
Test procedure—Detergents (0–1.2 mg/L as LAS (linear alkylate sulfonate) and/or ABS (alkyl benzene sulfonate))



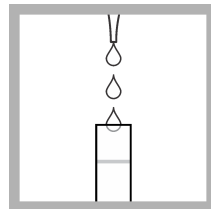
1. Fill a glass tube to the top line (20 mL) with deionized water.



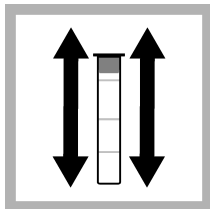
2. Put the tube into the left opening of the color comparator box.



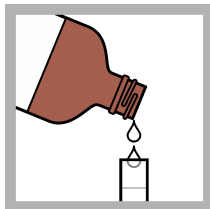
3. Fill a second glass tube to the top line (20 mL) with sample.



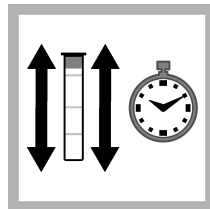
4. Add 12 drops of Detergents Reagent.



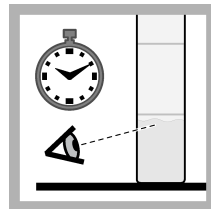
5. Put the stopper on the second tube. Shake to mix.



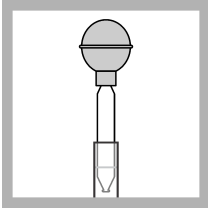
6. Add chloroform to the first line (5 mL). Chloroform is heavier than water and goes to the bottom of the tube.



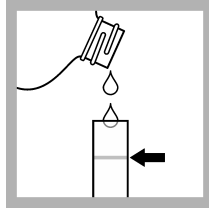
7. Put the stopper on the tube. Shake vigorously for 30 seconds.



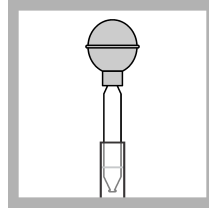
8. Do not touch the tube for 1 minute to let the chloroform separate from the sample.



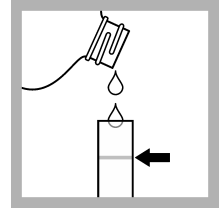
9. Use the transfer pipet to remove the top water layer from the tube. Discard the water.



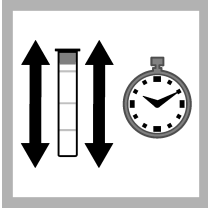
10. Add Wash Water Buffer Solution to the top mark (20 mL).



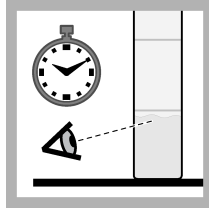
11. Use the transfer pipet to remove the Wash Water Buffer. Discard the buffer. This step removes the remaining water sample.



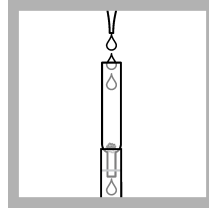
12. Add Wash Water Buffer to the top mark (20 mL).



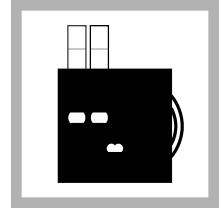
13. Put the stopper on the tube. Shake vigorously for 30 seconds.



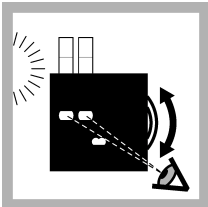
14. Do not touch the tube for 1 minute to let the chloroform separate.



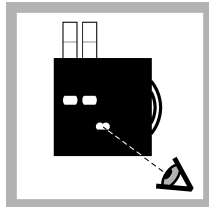
15. If the sample contains turbidity, complete the [Filtration procedure for turbid samples](#) on page 12.



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



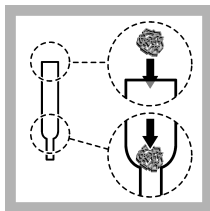
17. Hold the color comparator box in front of a light source. Turn the color disc to find the color match.



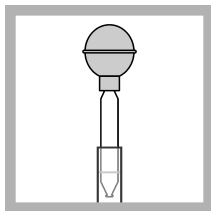
18. Read the result in mg/L in the scale window.

Filtration procedure for turbid samples

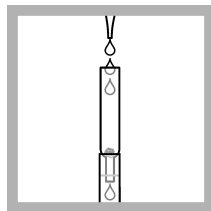
If the sample contains turbidity, pour the chloroform layer through a filter during the test procedure after step 15.



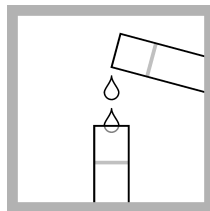
1. Put a small ball (the size of a large pea) of glass wool in the filter thimble.



2. Use the transfer pipet to remove the chloroform layer from the viewing tube.



3. Put the filter thimble on a clean test tube. Add the chloroform to the filter thimble.



4. Use the filtered chloroform to continue the test procedure after step 15.

Replacement items

Description	Quantity	Item no.
Chloroform, ACS grade	500 mL	1445849
Detergents Reagent	100 mL MDB	105932
Wash Water Buffer Solution	500 mL	99949
Color comparator box	each	173200
Color disc, detergents, 0–1.2 mg/L	each	9265700
Deminerlizer bottle, 177-mL capacity	each	1429900
Dropper, glass, 0.5- and 1.0-mL marks	5/pkg	1419705
Filter thimble	1	51200
Glass viewing tubes, 5-mL and 20-mL marks	6/pkg	173606
Glass wool	5 g	252074
Pipet bulb	1	178600
Stoppers for viewing tubes, No. 2 plastic	6/pkg	1448001
Test tube, 13 x 100 mm	10/pkg	56510
Transfer pipet	1	221800

Phenols

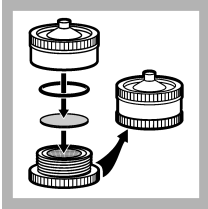
Test preparation

⚠ CAUTION

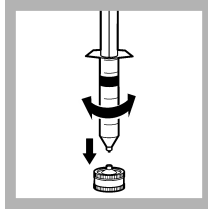
Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.

- 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.
- Use the filtration procedure for samples that contain turbidity.

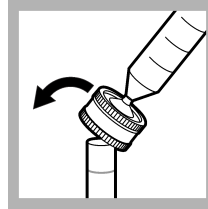
Filtration procedure for turbid samples



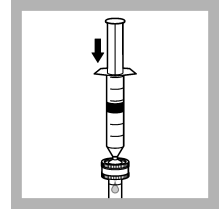
1. Put a 0.45- μm filter disc in the 25-mm filter holder. Tighten the filter holder.



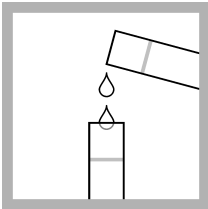
2. Fill a 30-cc syringe with sample. Attach the syringe to the filter holder.



3. Put the filter holder on the tube.

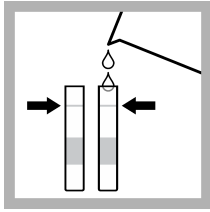


4. Push the sample through the filter.

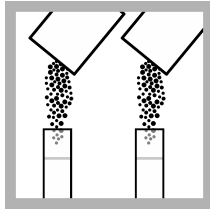


5. Use the filtered sample in the test procedure.

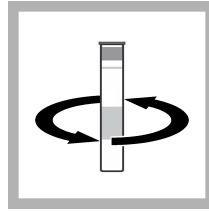
Test procedure—Phenols (0–5 mg/L)



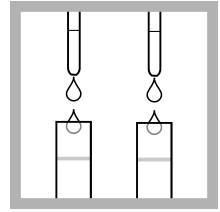
1. Fill two tubes to the top line with sample.



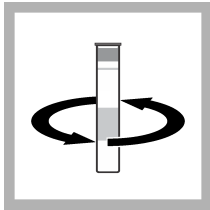
2. Add one EDTA Reagent Powder Pillow to each tube.



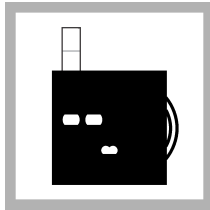
3. Put a cap on each tube. Swirl to mix until the reagent is dissolved.



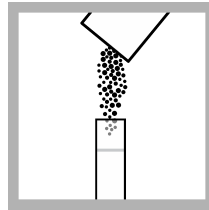
4. Add 15 drops of Hardness 1 Buffer Solution to each tube.



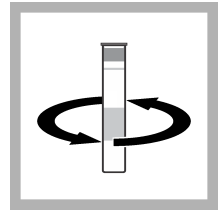
5. Put a cap on each tube. Swirl to mix.



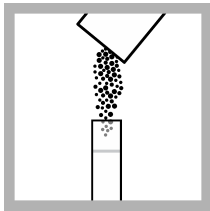
6. Put one tube into the left opening of the color comparator box.



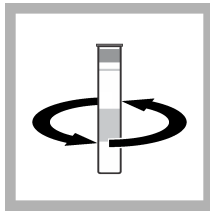
7. Add one Phenol Reagent Powder Pillow for non-extraction method to the second tube.



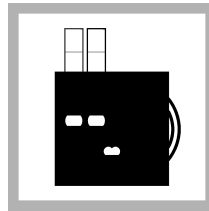
8. Put a cap on the tube. Swirl to mix until the reagent is dissolved.



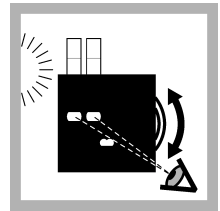
9. Add one Potassium Persulfate Powder Pillow for phosphonate to the second tube.



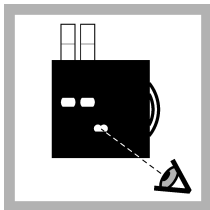
10. Put a cap on the tube. Swirl to mix until the reagent is dissolved.



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



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



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

Replacement items

Description	Unit	Item no.
EDTA Reagent Powder Pillows	100/pkg	700599
Hardness 1 Buffer Solution	50 mL SCDB	42426
Phenol Reagent Powder Pillows, non-extraction method	100/pkg	2481569
Potassium Persulfate Powder Pillows, phosphonate	100/pkg	2084769
Color disc, phenols, 0–5 mg/L	each	9263100
Color comparator box	each	173200
Plastic viewing tubes, 18 mm, with caps	4/pkg	4660004

Optional items

Description	Unit	Item no.
Filter holder, 25 mm, syringe with Luer-Lok® Tip	each	246800
Filter disc, 0.45 micron, 25 mm	25/pkg	2209525
Syringe, Luer-Lok® Tip, 30 cc	each	2225800
Caps for plastic viewing tubes (4660004)	4/pkg	4660014
Water, deionized	100 mL	27242



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