24813-88

STORM WATER TEST KIT MANUAL

CONTENTS

WARNING

The chemicals in this kit may be hazardous to the health and safety of the user if inappropriately handled. Read all warnings carefully before performing the test and use appropriate safety equipment.

MATERIAL SAFETY DATA SHEETS AND LABELS

As part of good laboratory practice, please familiarize yourself with reagents used in these procedures. Read all product labels and material safety data sheets for all chemicals before using them. Please use appropriate safety equipment.

INTRODUCTION

Environmental Protection Agency (EPA) studies indicate storm water runoff carries pollutants to nearby lakes, rivers and streams. In an effort to protect receiving waters, the EPA issued regulations* in November 1990 which apply to both municipalities and industrial storm water discharges.

Part 1 of the NPDES** application requires municipalities to do field screening using grab samples collected from dry weather flows. These samples will be analyzed for pH, total chlorine, total phenols, total copper, and detergents.

This kit combines the direct-reading, battery operated Pocket Pal pH Tester and four, easy-to-read color discs. The Storm Water Field Screening test kit includes the instruments, reagents and apparatus for monitoring all 5 of the necessary tests complete in a durable carrying case.

Parameter	Range	# of Tests	Type of Test	Incremental Accuracy
pH	0-14	†	Ion-selective electrode	0.1 pH
Chlorine, Total	0-3.5 mg/L	100	DPD	0.1 mg/L
Copper, Total	0-5 mg/L	100	Bicinchoninate Hydrosulfite Reduction	0.1 mg/L
Phenol	0-5, 0-1	100	4-aminoantipyrine	0.1 mg/L 0.05 mg/L
Detergents	0-1.3 mg/L	32	Toluidine Blue-O	0.05 mg/L

With this kit, the analyst can obtain information for efficient management and control of storm water discharges.

**Federal Register*, November 16, 1990.
**National Pollutant Discharge Elimination System
†approximately 5000 tests with each battery set

TOTAL CHLORINE

Range: O-3.5 mg/L Total Chlorine (Cl_2)

To ensure accurate results please read carefully before proceeding.

Rinse viewing tubes thoroughly before conducting the test. The powder does not have to dissolve completely to obtain correct results.

PROCEDURE

1. Fill a color viewing tube to the lower edge of frosted area (5 mL) with clear water and place it in the left top opening of the comparator (untreated sample, Figure 1).

2. Fill the other viewing tube to the lower edge of frosted area (5 mL) with the water sample to be tested.

3. Open one DPD Total Chlorine Reagent Powder Pillow. Add the contents of the pillow to the test sample. Let stand for three minutes, but not more than six minutes, to let the color develop. Place the sample in the right top opening of the comparator (prepared sample, Figure 1).

4. Hold the comparator up to a light source such as a window the sky or a lamp and view through the openings in front. Rotate the disc until a color match is obtained. Read the mg/L total chlorine (Cl_2) through the scale window.

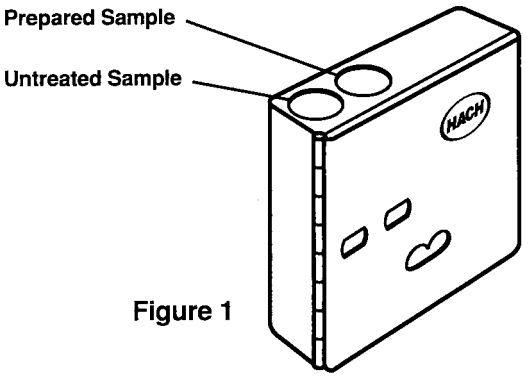

Figure 1

REPLACEMENTS

Cat. No.	Description	Unit
14076-99	DPD Total Chlorine Reagent Powder Pillows	pk/100
936-00	Clippers	each
1732-00	Color Comparator	each
46600-04	Color Viewing Tube & Cap	pk/4
21988-00	DPD Chlorine Disc, 0-3.5 mg/L	each
46600-14	Stopper for Color Viewing Tube	pk/4

TOTAL COPPER

Range: 0-5 mg/L Total Copper (Cu)

To ensure accurate results please read carefully before proceeding.

This procedure tests for free or complexed copper. Free copper refers to any free or weakly chelated copper ion in solution. Complexed (chelated) copper is tightly bound, as in Cu (EDTA). Free copper plus complexed copper gives the total dissolved copper.

High concentrations of cyanide will inhibit color development. If the cyanide concentration is greater than 2 mg/L, add three drops of Formaldehyde Solution, Cat. 2059-36, to the prepared sample after completing Step 3. Wait three minutes before reading the mg/L free copper in Step 6. The Formaldehyde Solution is not part of this kit but may be ordered from Hach Company. See Replacements.

PROCEDURE

1. Rinse both color viewing tubes several times with the water to be tested. Fill both tubes to the 5-mL mark with the water sample.

2. Open one Free Copper Reagent Powder Pillow (red pillow). Add the contents of the pillow to one of the tubes.

3. Stopper the tube and invert several times to mix. If free copper is present, a purple color will develop. Allow at least two minutes before completing Steps 4 through 6.

4. Insert the prepared sample tube from Step 3 into the right top opening of the color comparator (prepared sample, Figure 1).

5. Insert the tube of untreated water sample into the left top opening of the color comparator (untreated sample, Figure 1).

6. Hold the comparator up to a light source such as the sky, a window or lamp and view through openings in front. Rotate disc to obtain a color match. Read the mg/L free copper through the scale window. Record the value obtained.

7. To determine the amount of total dissolved copper present in the sample add the contents of one Hydrosulfite Reagent Powder Pillow (clear pillow) to the sample tube prepared in Step 3. This is the sample tube in the right opening of the color comparator.

8. Stopper the tube and invert several times to mix. Allow at least two additional minutes before completing Step 9.

9. Replace the tube in the right top opening of the color comparator. Hold the comparator up to a light source and rotate the color disc to obtain a match. Read the mg/L total dissolved copper (free plus complexed copper) through the scale window.

10. The amount of complexed copper can be determined by subtracting the amount of free copper present in the sample (results from Step 6) from the amount of total copper present in the sample (results from Step 9).

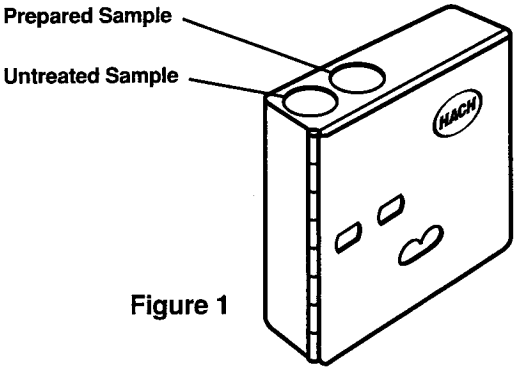

Figure 1

REPLACEMENTS

Cat. No.	Description	Unit
21824-66	Reagents for Total Copper	pk/50
936-00	Clippers	each
1730-06	Color Viewing Tube	pk/6
1731-06	Stopper for viewing tube	pk/6
1732-00	Color Comparator	each
14212-00	Copper Color Disc	each
129-37	Copper Standard Solution 10 mg/L (not included in kit)	118 mL(4 oz) MDB*
272-28	Demineralized Water (not included in kit)	118 mL(4 oz)
2059-36	Formaldehyde (not included in kit)	15 mL(1/2 oz) SCDB**

It is suggested that reagent accuracy be checked periodically using a reliable standard such as Copper Standard Solution 10 mg/L, Cat. 129-37. Prepare a 2 mg/L copper solution by adding 1 mL of the Copper Standard Solution to a sample tube and dilute to the 5-mL mark with Demineralized Water, Cat. 2872-28. Follow the test kit instructions Steps 1-6 to determine the free copper value of the standard. Copper Standard Solution and Demineralized Water are not included in this kit but may be ordered from Hach Company. *See Replacements.*

*Marked Dropping Bottle
**Self-contained Dropping Bottle

DETERGENTS

Range: 0-1.3 mg/L Detergents

To ensure accurate results please read carefully before proceeding.

PROCEDURE

1. Fill one of the test tubes to the upper mark (20 mL) with the water to be tested.

2. Add 12 drops of Detergent Test Solution and shake to mix.

3. Add chloroform to the lowest mark (5 mL) on the test tube. (Chloroform is heavier than water and will sink.) Stopper, shake vigorously for 30 seconds and let stand for one minute to allow the chloroform to separate.

4. Using the draw-off pipet, remove the water from the tube and discard.

5. Refill the test tube to the upper mark with the Wash Water Buffer and, using the draw-off pipet, remove the Wash Water Buffer and discard. This step washes away the remaining water sample.

6. Refill the test tube to the upper mark with the Wash Water Buffer, stopper and shake vigorously for 30 seconds. See Notes for turbid samples.

Let stand for one minute to allow the chloroform to separate.

7. Insert the test tube containing the prepared sample in the right opening of the color comparator.

8. Fill the other test tube with demineralized water and place it in the left opening of the comparator.

9. Hold the comparator up to a light, such as the sky, a window or a lamp, and view through the two openings in the front. Rotate the Detergents Color Disc until a color match is obtained. Read the ppm Detergents (LAS and/or ABS) from the scale window.

10. If the color is darker than the highest reading on the color disc, dilute the original sample 20-to-1 by adding 1 mL of sample to the test tube (using the plastic dropper filled to the top, or 1-mL mark) and filling the test tube to the upper mark (20 mL) with demineralized water. Repeat Steps 2 through 9 and multiply the results by 20.

NOTES

If the water sample is turbid, the chloroform layer must be filtered after Step 6, using the procedure given below.

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

b. Using the draw-off pipet to remove the chloroform, filter the chloroform through the glass wool and into the extra test tube.

c. Proceed with Step 7.

The kit includes a sufficient amount of Wash Water Buffer for 32 tests. Also included are Detergent Test Solution and Chloroform for approximately 90 tests.

REPLACEMENTS

Cat. No.	Description	Unit
14299-00	Demineralizer Bottle	each
1059-37	Detergents Test Solution	118 mL (4 oz) MDB*
999-11	Wash Water Buffer Solution	473 mL (pt)
14458-49	Chloroform, ACS grade	500 mL
1732-00	Color Comparator	each
2221-00	Detergents Color Disc, 0-1 mg/L	each
1736-06	Color Viewing Tube, with 5- & 20-mL marks	pk/6
14480-01	Stopper, for color viewing tube	pk/6
1786-00	Bulb, for pipet	each
2218-00	Glass Tube, for draw-off pipet	each
14197-05	Dropper, glass, 0.5 & 1.0 marks	pk/5
512-00	Filtering Thimble	each
565-10	Test Tube	pk/10
2520-74	Glass Wool	5 g

*Marked dropping bottle

pH

USING POCKET PAL™ pH TESTER

Range: 0-14 pH units

To ensure accurate results please read carefully before proceeding.

PROCEDURE

1. Slide the on/off switch to on. The switch is located on top of the Pocket Pal.

2. Remove protective cap from the bottom.

3. Immerse the bottom of the Pocket Pal 1.0 to 1.5 inches (2.5-3.8 cm) into the sample. See Note A on how to calibrate and verify the accuracy of the Pocket Pal.

4. Using the Pocket Pal, gently stir the sample for several seconds. After stirring and when the digital display stabilizes, read the pH value. See Note B.

5. Rinse the bottom of the Pocket Pal and replace the protective cap. Follow Note C for longer life.

NOTES

A. Before using the Pocket Pal and for periodic calibration, prepare a pH 7.00 buffer solution. Use the Pocket Pal to read pH. If necessary adjust with a small screwdriver through the hole in the back to a 7.0 reading. The Pocket Pal is now calibrated (See Figure 1).

B. Large differences in pH readings may be caused by a dry electrode or run-down batteries. To improve performance, dip to immersion level in tap water for a few minutes at least once a week.

C. Place several drops of water in the protective cap to prevent the glass bulb from drying out. This will provide a faster response time and a longer Pocket Pal life.

BATTERY REPLACEMENT:

1. Remove the case top from the Pocket Pal. **Caution: Do not over extend the attached wires (See Figure 2).**

2. Replace the four batteries (positive terminals up) with Eveready E675E, Duracell RM 675 or equivalent. A package of 4 batteries is available from Hach Company (order catalog number 23678-00).

SPECIFICATIONS

Range: 0.0 - 14.0 pH
Resolution: 0.1 pH
Accuracy: ±0.2 pH
Operating Temperature: 0-50 °C
Battery Life: 1000 hours continuous use

WARRANTY

Hach Company warrants this product against defective materials or workmanship for six months from date of shipment. Warranty does not apply to batteries nor degradation of electrode due to normal use. Not recommended for use in presence of heavy metals or in liquids over 50 °C.

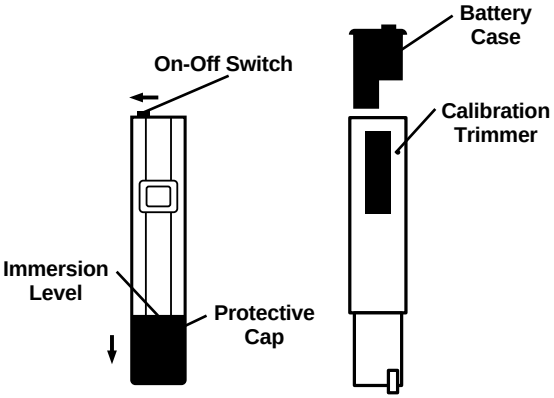

Figure 1

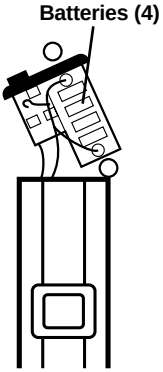

Figure 2

Pocket Pal is a trademark of Hach Company.

PHENOLS

Range: 0-1 mg/L Phenols

To ensure accurate results please read carefully before proceeding.

PROCEDURE

1. Assemble the color comparator. If the anticipated concentration is between 0 and 1 mg/L, assemble with both the Long Path Viewing Adapter and the phenols color disc installed. See Figure 1. If the concentration is expected to require the 0-5 mg/L range, omit the adapter.

Note: *If the sample is turbid, it may be necessary to filter the sample as described in Steps a and b to accurately determine a color match in the comparator. Figure 2 illustrates how to assemble the filter assembly components. If filtering is not needed, proceed to Step 2.*

a. Install a 0.45 micron filter disc in the filter holder. Be sure the holder is well tightened after installation. Filter discs are packaged with blue papers separating them.

b. Fill the 30-cc syringe with the turbid sample and attach the filter holder to the syringe with a twisting motion. Use the filtered sample in Step 4.

2. Fill two plastic color viewing tubes to the line nearest the top with sample.

3. Add the contents of one EDTA Reagent Powder Pillow to each viewing tube. Cap each tube and mix until the powder is dissolved.

4. Add 15 drops of Hardness 1 Buffer Solution to each viewing tube. Cap the tubes and mix.

5. Place one of the tubes into the left opening in the top of the color comparator.

6. To the other tube, add the contents of one Phenol Reagent Powder Pillow (Nonextraction). Cap the tube and mix until powder is dissolved. Then add the contents of one Potassium Persulfate Powder Pillow for Phosphonate. Cap and mix until the powder is dissolved.

7. Place the sample tube treated in Step 6 into the right opening in the top of the comparator. Remove the caps from both tubes.

8. Hold the comparator so that light shines down through the tubes from the top if the adapter is installed or from the back if the adapter is not installed. See Figure 3. Rotate the disc to match the colors in the color matching windows. Read the mg/L phenols from the scale window. If measuring without the Long Path Viewing Adapter, multiply the reading by five.

Note: *If the color of the sample is too red to make a color match with the Long Path Viewing Adapter installed, repeat the procedure without the adapter.*

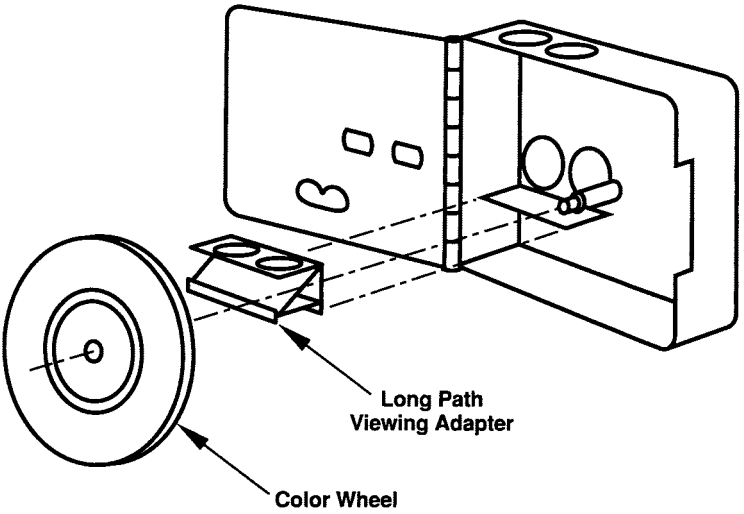

Figure 1

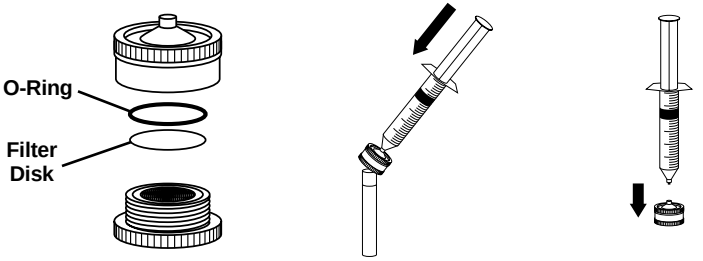

Figure 2 Optional Apparatus

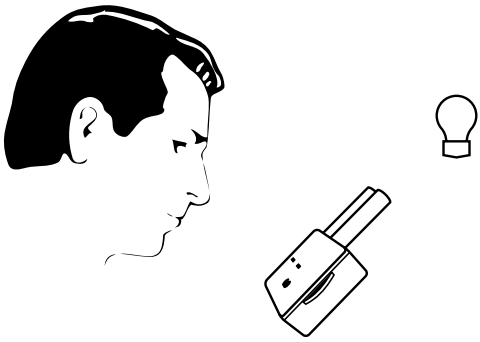

Figure 3

REPLACEMENTS

Reagents

Cat. No.	Description	Unit
7005-66	EDTA Reagent Powder Pillows	pk/50
424-26	Hardness 1 Buffer Solution	59 mL
24815-69	Phenol Reagent Powder Pillows (nonextraction)	pk/100
20847-69	Potassium Persulfate Powder Pillows for Phosphonate	pk/100

Apparatus

Cat. No.	Description	Unit
936-00	Clippers	each
1732-00	Color Comparator	each
24122-00	Long Path Viewing Adapter	each
24834-00	Phenols Color Disc, 0-1 mg/L	each
46600-04	Viewing Tubes, plastic	pk/4

Optional Apparatus

Cat. No.	Description	Unit
22095-25	Filter Discs, 25 mm, 45 micron	pk/25
2468-00	Filter Holder, for Luer-Lok	each
22258-00	Syringe, 30 cc, Luer-Lok tip	each

HOW TO ORDER

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Loveland, Colorado 80539
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Telephone: (970) 669-3050
FAX: (970) 669-3050
E-mail: orders@hach.com

In the United States call toll-free 1-800-227-4224 for current prices.

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