

John K. Wood
Vice President, Nuclear440-280-5224
Fax: 440-280-8029June 25, 2001
PY-CEI/OEPA-0355LOhio Environmental Protection Agency
Northeast District Office
Attention: Ms. Marie Underwood
2110 E. Aurora Rd.
Twinsburg, OH 44087-1969

Ladies and Gentlemen,

The Ohio Environmental Protection Agency (OEPA) Division of Surface Water Office was called at 13:05 on 6/05/01. Mr. Leo Harte of FirstEnergy (FE) Corporation spoke to Mr. Eric Nygaard of the OEPA. Mr. Harte explained that the validity of the current method used to analyze free available chlorine in accordance with the National Pollutant Discharge Elimination System Permit 3IB00016*ED was in question from a self-assessment. Mr. Harte discussed the regulations that were referenced, stated the permit requirement, details of the method in use, and cited a telephone memo dated 3-3-98. The memo documented a discussion on this subject between Donna Tizzano (FE) and Mr. Nygaard. However, the final decision was not clearly documented.

During the discussion, Mr. Nygaard stated that he believed we were in compliance, but wanted to look further into the issue. Mr. Nygaard returned my call and stated that after speaking with Ms. Marie Underwood of the OEPA district office, it was agreed that we were meeting the expectations of the permit. Mr. Harte was told to speak with Ms. Underwood in order to receive written acceptance of this method.

Mr. Harte then called Ms. Underwood. Ms. Underwood requested that Mr. Harte send the information discussed with Mr. Nygaard and that she would respond. This letter serves to document this discussion and request written confirmation that the attached method of analysis satisfies permit requirements.

A001

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If you have any questions or require additional information, please contact Mr. Leo Harte at (440)-280-5514.

Very Truly Yours,

A handwritten signature in black ink, appearing to read "John K. Hood". The signature is fluid and cursive, with the first name "John" and last name "Hood" clearly legible.

Enc: Hach Specifications and Methods of Analysis

cc: NRC Region III
NRC Resident Inspector
NRC Project Manager
NRC Document Control Desk (Docket No. 50-440)

46760-88

HACH COMPANY

POCKET COLORIMETER™
Analysis System
Chlorine (Cl₂)

MANUAL



SPECIFICATIONS

Lamp: Light emitting diode

Detector: Silicon cell

Wavelength: 528 nm

Accuracy: ± 0.02 mg/L at 25 °C

Repeatability: 0.01 mg/L

Filter bandwidth: 15 nm

Absorbance range: 0 to 1A

Dimensions: 3.2 x 6.1 x 15.2 cm (1.25 x 2.4 x 6 inches)

Weight: 0.2 Kg (0.43 lbs)

Operating conditions: 0 to 50 °C; 0 to 90% relative humidity (noncondensing)

Sample cell pathlength: 10 and 23 mm

Power supply: 4 AAA alkaline batteries; approximate life is 750 tests

OPERATION

DANGER

Handling chemical samples, standards, and reagents can be dangerous. Review the necessary Material Safety Data Sheets and become familiar with all safety procedures before handling any chemicals.

DANGER

La manipulation des échantillons chimiques, étalons et réactifs peut être dangereuse. Lire les Fiches de Données de Sécurité des Produits (FDSP) et se familiariser avec toutes les procédures de sécurité avant de manipuler tous les produits chimiques.

PELIGRO

La manipulación de muestras químicas, estándares y reactivos puede ser peligrosa. Revise las fichas de seguridad de materiales y familiarícese con los procedimientos de seguridad antes de manipular productos químicos.

GEFAHR

Das Arbeiten mit chemischen Proben, Standards und Reagenzien ist mit Gefahren verbunden. Es wird dem Benutzer dieser Produkte empfohlen, sich vor der Arbeit mit sicheren Verfahrensweisen und dem richtigen Gebrauch der Chemikalien vertraut zu machen und alle entsprechenden Materialsicherheitsdatenblätter aufmerksam zu lesen.

PERIGO

A manipulação de amostras, padrões e reagentes químicos pode ser perigosa. Reveja a folha dos dados de segurança do material e familiarize-se com todos os procedimentos de segurança antes de manipular quaisquer produtos químicos.



CHLORINE, FREE (0 to 2.00 mg/L Cl₂)

Method 8021

For water, wastewater and seawater

DPD Method* USEPA accepted for reporting**

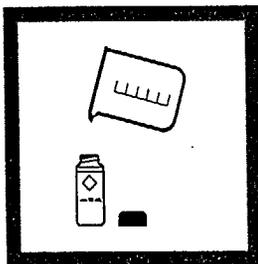
Measuring Hints

If the sample temporarily turns yellow after reagent addition, or the display shows overrange (flashing 2.20 in display), dilute a fresh sample and repeat the test. A slight loss of chlorine may occur because of the dilution. Multiply the result by the appropriate dilution factor.

* Adapted from *Standard Methods for the Examination of Water and Wastewater*.

** Procedure is equivalent to USEPA method 330.5 for wastewater and Standard Method 4500-Cl G for drinking water.

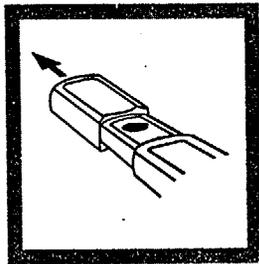
CHLORINE, FREE, continued



1. Fill a 10-mL cell to the 10-mL line with sample (the blank). Cap.

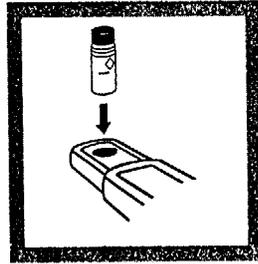
Note: Samples must be analyzed immediately and cannot be preserved for later analysis.

Note: Be sure the instrument is in the low range mode. See page 35.



2. Remove the instrument cap.

Note: For best results, zero the instrument and read the sample under the same lighting conditions.



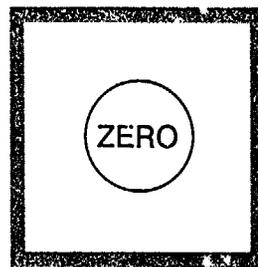
3. Place the blank in the cell holder with the diamond mark facing you. Tightly cover the cell with the instrument cap (flat side should face the back of the instrument).

Note: Wipe liquid off sample cells.

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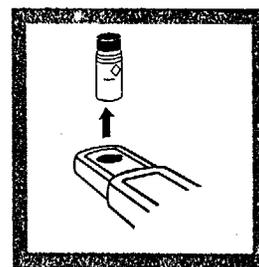
CHLORINE, FREE, continued



4. Press: ZERO

The instrument will turn on and the display will show - - - then 0.00.

Note: The instrument automatically shuts off after one minute and the last zero is stored in memory. Press READ to complete the analysis.



5. Remove the cell from the cell holder.



6. Fill a 10-mL cell to the 10-mL line with sample.

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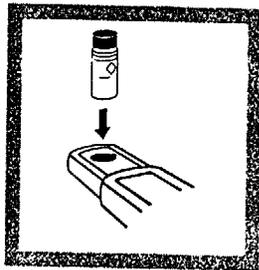
CHLORINE, FREE, continued



7. Add the contents of one DPD Free Chlorine Powder Pillow to the sample cell (the prepared sample). Cap and shake gently for 20 seconds.

Note: Accuracy is not affected by undissolved powder.

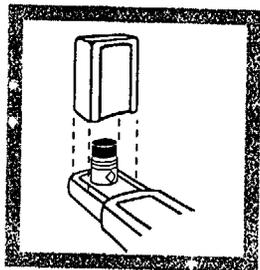
Note: Shaking dissipates bubbles that may form in samples with dissolved gases.



8. Within 1 minute after adding DPD to the sample, place the prepared sample in the cell holder.

Note: A pink color will develop if chlorine is present.

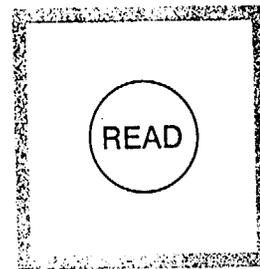
Note: Wipe liquid off sample cells or damage to the instrument may occur.



9. Tightly cover the cell with the instrument cap (flat side should face the back of the instrument).

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CHLORINE, FREE, continued



10. Press: READ

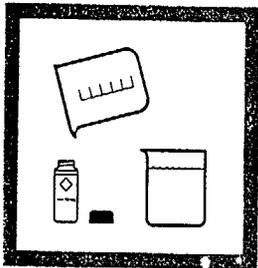
The instrument will show --- followed by the results in mg/L free chlorine.

Note: If the sample temporarily turns yellow after reagent addition, or shows overrange (flashing 2.20), dilute a fresh sample and repeat the test.

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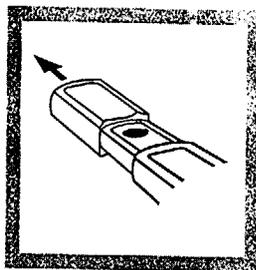
CHLORINE, FREE, continued

Using AccuVac® Ampuls



1. Fill a 10-mL sample cell to the 10-mL line with sample (the blank). Cap. Collect at least 40 mL of sample in a 50-mL beaker.

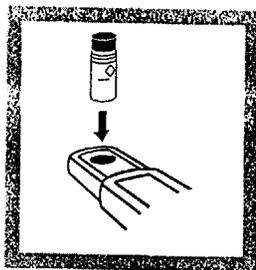
Note: Samples must be analyzed immediately and cannot be preserved for later analysis.



2. Remove the instrument cap.

Note: For best results, zero the instrument and read the sample under the same lighting conditions.

Note: Be sure the instrument is in the low range mode. See page 35.



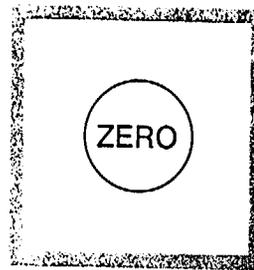
3. Place the blank in the cell holder, with the diamond mark facing you. Tightly cover the cell with the instrument cap (flat side should face the back of the instrument).

Note: Wipe liquid off sample cells.

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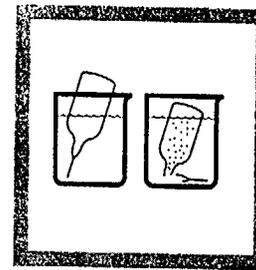
CHLORINE, FREE, continued



4. Press: ZERO

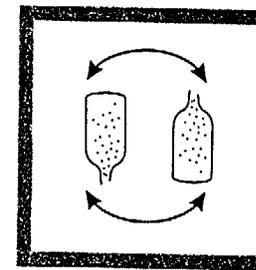
The instrument will turn on and the display will show --- then 0.00.

Note: The instrument automatically shuts off after 1 minute and stores the last zero in memory. Press READ to complete the analysis.



5. Fill a DPD Free Chlorine Reagent AccuVac Ampul with sample.

Note: Keep the tip immersed until the ampule fills completely.



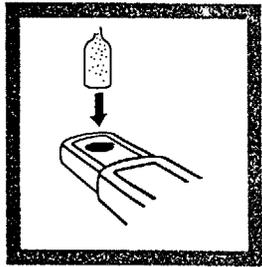
6. Quickly invert the ampule several times to mix. Wipe off any liquid or fingerprints.

Note: A pink color will form if chlorine is present.

Note: Accuracy is not affected by undissolved powder.

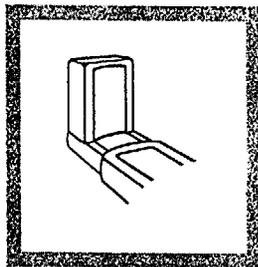
43

CHLORINE, FREE, continued

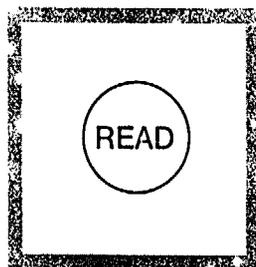


7. Within 1 minute after filling the AccuVac Ampul, place the prepared sample in the cell holder.

Note: Wipe liquid off the AccuVac Ampul.



8. Cover the ampule with the instrument cap.



9. Press **READ**. The instrument will show - - - followed by the results in mg/L free chlorine.

Note: If the sample temporarily turns yellow after reagent addition or shows overrange (flashing 2.20), dilute a fresh sample and repeat the test. A slight loss of chlorine may occur. Multiply the result by the dilution factor.

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CHLORINE, FREE, continued

Accuracy Check

Standard Additions Method

- Snap the neck off a Chlorine Standard Solution Voluette® Ampule.
- Use a TenSette® pipet to add 0.1, 0.2, and 0.3 mL of standard to three 25-mL samples. Swirl gently to mix. (For AccuVac Ampuls, use 50-mL beakers.)
- Analyze a 10-mL aliquot of each sample as described in the procedure. Each 0.1 mL of standard will cause an incremental increase in chlorine, the exact value depends on the concentration of the Voluette ampule standard. Check the certificate enclosed with the Voluette ampules for this value.
- If these increases do not occur, call Hach at 800-227-4224. Outside the United States, contact the Hach office or distributor serving you.

Interferences

Samples containing more than 250 mg/L alkalinity or 150 mg/L acidity as CaCO₃ may inhibit full color development, or the color may fade instantly. Neutralize these samples to pH 6–7 with 1 N Sulfuric Acid or 1 N Sodium Hydroxide. Determine the

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CHLORINE, FREE, continued

amount required on a separate 10-mL sample. Add the same amount to the sample to be tested. Correct for the additional volume.

Samples containing monochloramine will cause a gradual drift to higher chlorine readings. When read within one minute of reagent addition, 3.0 mg/L monochloramine will cause an increase of less than 0.1 mg/L in the free chlorine reading.

Bromine, iodine, ozone, and oxidized forms of manganese and chromium may also react and read as chlorine.

To compensate for the effects of manganese (Mn^{4+}) or chromium (Cr^{6+}), adjust the pH to 6-7 as described above. To a 25-mL sample, add 3 drops of 30 g/L Potassium Iodide Solution, mix, and wait one minute. Add 3 drops of 5 g/L Sodium Arsenite and mix. If chromium is present, allow exactly the same reaction period with DPD for both analyses. Subtract the result of this test from the original analysis to obtain the accurate chlorine concentration.

DPD Free Chlorine Reagent Powder Pillows and AccuVac Ampuls contain a buffer formulation that withstands high levels (at least 1000 mg/L) of hardness without interference.

CHLORINE, FREE, continued

REQUIRED REAGENTS

Description	Unit	Cat. No.
DPD Free Chlorine Reagent Powder Pillows	100/pkg	21055-69
or		
DPD Free Chlorine Reagent AccuVac® Ampuls	25/pkg	25020-25

REQUIRED APPARATUS (AccuVac® Ampuls)

Beaker, 50 mL	each	500-41
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OPTIONAL REAGENTS

Chlorine Standard Solution, Voluette® Ampules, 50-75 mg/L, 10 mL	16/pkg	14268-10
Chlorine Standard, secondary, Spec [†] M, 0.0, 0.2, 0.8 and 1.5 mg/L	4/pkg	26353-00
DPD Free Chlorine Reagent w/dispensing cap	250 tests	21055-29
Potassium Iodide Solution, 30 g/L	100 mL MDB*	343-32
Sodium Arsenite Solution, 5 g/L	100 mL MDB	1047-32
Sodium Hydroxide Standard Solution, 1 N	100 mL MDB	1045-32
Sulfuric Acid Standard Solution, 1 N	100 mL MDB	1270-32
Water, deionized	4 L	272-56

* Marked Dropper Bottle

CHLORINE, FREE, continued

OPTIONAL APPARATUS

Description	Unit	Cat. No.
AccuVac® Snapper Kit	each.....	24052-00
Batteries, AAA, alkaline.....	4/pkg.....	46743-00
Caps for 10-mL sample cells	12/pkg.....	24018-12
Cylinder, graduated, 25 mL, poly	each.....	1081-40
Cylinder, graduated, 100 mL, PMP	each.....	2172-42
sens <i>ion</i> ™ ¹ Basic Portable pH Meter, with electrode	each.....	51700-10
Pipet, TenSette®, 0.1 to 1.0 mL	each.....	19700-01
Pipet Tips, For 19700-01 TenSette® Pipet.....	50/pkg.....	21856-96
Sample Cells, 10-mL with screw caps.....	6/pkg.....	24276-06

REPLACEMENT PARTS

Instrument Cap/light shield.....	each.....	46704-00
Instrument Manual.....	each.....	46760-88



CHLORINE, TOTAL, Low Range (0 to 2.00 mg/L Cl₂)

For water, wastewater and seawater

DPD Method* USEPA accepted (powder pillows only)**

Measuring Hints

If the sample temporarily turns yellow after reagent addition or the display shows overrange (flashing 2.20 in display), dilute a fresh sample and repeat the test. A slight loss of chlorine may occur because of the dilution. Multiply the result by the appropriate dilution factor.

* Adapted from *Standard Methods for the Examination of Water and Wastewater*.

** Procedure is equivalent to USEPA method 330.5 for wastewater and Standard Method 4500-Cl G for drinking water.

CHLORINE, TOTAL, Low Range, continued



1. Fill a 10-mL cell to the 10-mL line with sample. Cap.

Note: Samples must be analyzed immediately and cannot be preserved for later analysis.

Note: Be sure the instrument is in the low range mode. See page 35.



2. Add the contents of one DPD Total Chlorine Powder Pillow to the sample cell (the prepared sample). Cap and gently shake for 20 seconds.

Note: Gently shaking dissipates bubbles which may form in samples containing dissolved gases.



3. Wait 3 minutes. During this period, proceed with steps 4–8.

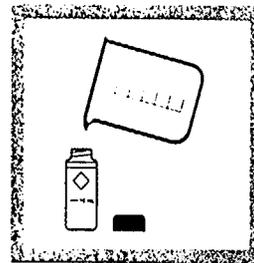
Note: A pink color will form if chlorine is present.

Note: Accuracy is not affected by undissolved powder.

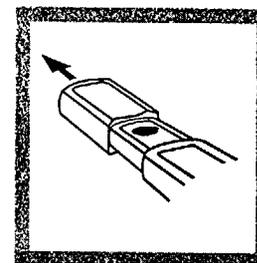
50



CHLORINE, TOTAL, Low Range, continued

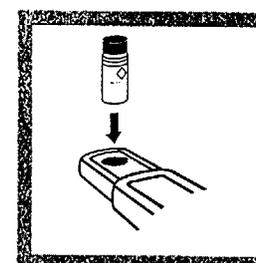


4. Fill a 10-mL sample cell to the 10-mL line with sample (the blank). Cap.



5. Remove the instrument cap.

Note: For best results, zero the instrument and read the sample under the same lighting conditions.

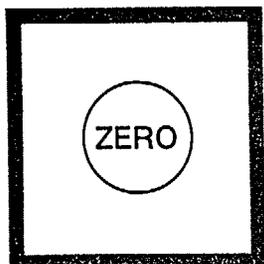


6. Place the blank in the cell holder, with the diamond mark facing you. Tightly cover the cell with the instrument cap (flat side should face the back of the instrument).

Note: Wipe liquid off sample cells.

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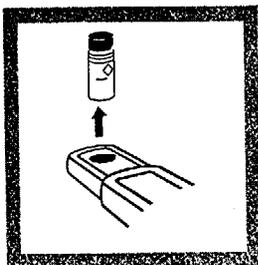
CHLORINE, TOTAL, Low Range, continued



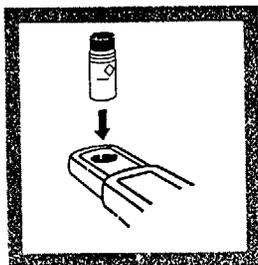
7. Press: ZERO

The instrument will turn on and the display will show --- followed by 0.00.

Note: The instrument automatically shuts off after 1 minute and stores the last zero in memory. Press READ to complete the analysis.



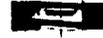
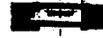
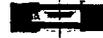
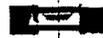
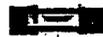
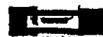
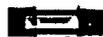
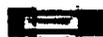
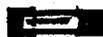
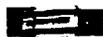
8. Remove the cell from the cell holder.



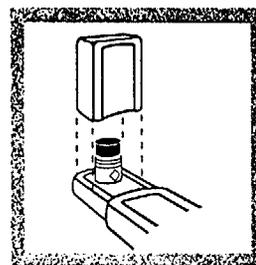
9. Within 3 minutes after the 3-minute reaction period, place the prepared sample in the cell holder.

Note: Wipe liquid off sample cells.

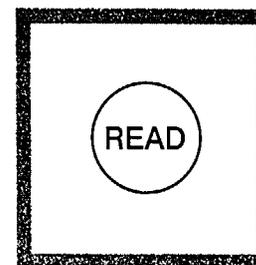
52



CHLORINE, TOTAL, Low Range, continued



10. Cover the cell with instrument cap.



11. Press: READ

The instrument will show --- followed by the result in mg/L total chlorine.

Note: If the sample temporarily turns yellow after reagent addition or shows overrange (flashing 2.20), dilute a fresh sample and repeat the test. Some loss of chlorine may occur. Multiply the result by the dilution factor.

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CHLORINE, TOTAL, Low Range, continued

Accuracy Check

Standard Additions Method

- Snap the neck off a Chlorine Standard Solution Voluette® Ampule.
- Use a TenSette® pipet to add 0.1, 0.2, and 0.3 mL of standard to three 25-mL samples. Swirl gently to mix. (For AccuVac Ampuls, use 50-mL beakers.)
- Analyze a 10-mL aliquot of each sample as described in the procedure. Each 0.1 mL of standard will cause an incremental increase in chlorine, the exact value depends on the concentration of the Voluette ampule standard. Check the certificate enclosed with the Voluette ampules for this value.
- If these increases do not occur, call Hach at 800-227-4224. Outside the United States, contact the Hach office or distributor serving you.

Interferences

Samples containing more than the 250 mg/L alkalinity or 150 mg/L acidity as CaCO₃ may inhibit full color development, or the color may fade instantly. Neutralize these samples to pH 6–7 with 1 N Sulfuric Acid or 1 N Sodium Hydroxide. Determine the



CHLORINE, TOTAL, Low Range, continued

amount required on a separate 10-mL sample. Add the same amount to the sample to be tested. Correct for the additional volume.

Bromine, iodine, ozone and oxidized forms of manganese and chromium may also react and read as chlorine.

To compensate for the effects of manganese (Mn⁴⁺) or chromium (Cr⁶⁺), adjust the pH to 6–7 as described above. To a 25-mL sample, add 3 drops of 30 g/L Potassium Iodide Solution, mix, and wait one minute. Add 3 drops of 5 g/L Sodium Arsenite and mix. If chromium is present, allow exactly the same reaction period with DPD for both analyses. Subtract the result of this test from the original analysis to obtain the accurate chlorine concentration.

DPD Total Chlorine Reagent Powder Pillows and AccuVac Ampuls contain a buffer formulation that withstands high levels (at least 1000 mg/L) of hardness without interference.

CHLORINE, TOTAL, Low Range, continued

REQUIRED REAGENTS

Description	Unit	Cat. No.
DPD Total Chlorine Reagent Powder Pillows	100/pkg.....	21056-69
or		
DPD Total Chlorine Reagent AccuVac® Ampuls.....	25/pkg.....	25030-25

REQUIRED APPARATUS (AccuVac® Ampuls)

Beaker, 50 mL.....	each.....	500-41
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OPTIONAL REAGENTS

Chlorine Standard Solution Voluette®		
Ampules, 50-75 mg/L, 10 mL.....	16/pkg.....	14268-10
Chlorine Standards, secondary, Spec ^v ™,		
0.0, 0.2, 0.8, and 1.5 mg/L	4/set.....	26353-00
DPD Total Chlorine Reagent w/dispensing cap	250 tests.....	21056-29
Potassium Iodide Solution, 30 g/L.....	100 mL MDB*.....	343-32
Sodium Arsenite Solution, 5 g/L	100 mL MDB.....	1047-32
Sodium Hydroxide Standard Solution, 1 N	100 mL MDB.....	1045-32
Sulfuric Acid Standard Solution, 1 N.....	100 mL MDB.....	1270-32
Water, deionized	4 L.....	272-56

* Marked Dropper Bottle

CHLORINE, TOTAL, Low Range, continued

OPTIONAL APPARATUS

Description	Unit	Cat. No.
AccuVac® Snapper Kit.....	each	24052-00
Batteries, AAA, alkaline.....	4/pkg	46743-00
Caps for 10-mL sample cells.....	12/pkg	24018-12
Cylinder, graduated, 25 mL, poly.....	each	1081-40
Cylinder, graduated, 100 mL, PMP.....	each	2172-42
sens ^{ion} ™/ Basic Portable pH Meter, with electrode	each	51700-10
Pipet, TenSette®, 0.1 to 1.0 mL.....	each	19700-01
Pipet Tips, For 19700-01 TenSette®.....	50/pkg	21856-96
Sample Cells, 10-mL with screw caps.....	6/pkg	24276-06

REPLACEMENT PARTS

Instrument Cap/light shield	each	46704-00
Instrument Manual.....	each	46760-88