CHEMSTREAM

WATER TREATMENT SPECIALISTS

511 Railroad Ave.
Homer City, PA 15748
(724) 915-8388
www.chemstream.com

Safety Data Sheet

Chemstream CWT-323

1. IDENTIFICATION

Product name	Chemstream CWT-323
Description	Phosphonic Acid Solution
Product class	Specialty
Supplier address	511 Railroad Ave Homer City, PA 15748
Telephone numbers	
Company Phone Number	(724) 915-8388
Emergency Telephone	CHEMTREC 800-424-9300

2. HAZARDS IDENTIFICATION

Hazard classification

Corrosive to Metals, Category 1
Skin Corrosion, Category 1
Serious Eye Damage, Category 1

Signal word

Danger

Hazard statements

May be corrosive to metals.
Causes severe skin burns and eye damage.
Causes serious eye damage.

Pictograms of related hazards

Precautionary statements

Prevention

Keep only in original packaging.
Wash skin thoroughly after handling.
Wear protective gloves, protective clothing, eye protection, and face protection.

Response

Absorb spillage to prevent material damage.
Wash contaminated clothing before reuse.
IF SWALLOWED: Rinse mouth. DO NOT induce vomiting. Immediately contact a POISON CENTER or health care provider.
IF ON SKIN (or hair): Remove immediately all contaminated clothing. Rinse skin with water or emergency shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if

present and easy to do. Continue rinsing. Immediately contact a POISON CENTER or health care provider.

Storage

Store in a corrosive-resistant container or container with a resistant inner liner. Store locked up.

Disposal

Dispose of contents and container in accordance with local, state, and federal regulations.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS #	Weight %
1-Hydroxyethylidene-1,1-diphosphonic acid (HEDP)	2809-21-4	20–30
2-Phosphono-1,2,4-butanetricarboxylic acid (PBTC)	37971-36-1	20–30
Non-hazardous substances	Proprietary	>40

4. FIRST-AID MEASURES

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally to ensure complete rinsing. Remove contact lenses if present and easy to do, then resume rinsing. Get medical attention immediately.

Skin contact Immediately remove all contaminated clothing. Rinse with copious amounts of water; use an emergency shower if available. Wash contaminated clothing before reuse.

Ingestion If swallowed, DO NOT induce vomiting. Rinse mouth and get emergency medical attention. Do not give anything by mouth unless instructed to do so by a poison center or health care provider.

Inhalation If inhaled, move victim to fresh air. Seek emergency medical attention if breathing is difficult; perform artificial respiration if breathing stops.

Note to health care provider No specific information—treat symptomatically

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media Use extinguishing media appropriate for the surrounding fire.

Unsuitable extinguishing media No information available

Protective equipment and precautions for firefighters Exercise caution when fighting any chemical fire. A self-contained breathing apparatus and protective clothing are essential.

Specific hazards Combustion may produce toxic gases.

Hazardous combustion products Carbon oxides, phosphorous oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions Evacuate the area of all non-essential personnel. Do not touch spilled material without proper protective equipment. Ventilate the area and mitigate further release if it is safe to do so. Avoid contact with eyes.

Methods for clean-up

Small spills — Contain spill and soak up with an inert absorbent material and place residues in a properly labeled container for disposal. Avoid discharge into sewer or surface water.

Large spills — Contain spill using trenches, diking, or absorption with an inert material (i.e. sand or earth). Reclaim spilled material into recovery or salvage drums or tank truck for proper disposal.

7. HANDLING AND STORAGE

Advice on safe handling — Avoid contact with eyes, skin, and clothing. Avoid breathing vapor or mist. Wash hands thoroughly after handling.

Storage conditions — Store in a cool, dry, well-ventilated area away from incompatible materials. Keep containers closed when not in use.

Suitable materials of construction — No information available

Unsuitable materials of construction — No information available

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye/face protection — Chemical splash goggles

Skin protection — Chemical-resistant gloves and body-covering clothing

Respiratory protection — Observe published airborne exposure limits. NIOSH approved respirator should be used in accordance with OSHA respiratory protection requirements (29 CFR 1910.134).

Engineering controls — Adequate ventilation, eye-wash station, and emergency shower

General hygiene considerations — Do not eat, drink, or smoke while handling this product.

Chemical Name	OSHA PEL	ACGIH TLV
1-Hydroxyethylidene-1,1-diphosphonic acid (HEDP)	None established	None established
2-Phosphono-1,2,4-butanetricarboxylic acid (PBTC)	None established	None established
Non-hazardous substances	None established	None established

9. PHYSICAL AND CHEMICAL PROPERTIES

pH	<0.5
Appearance	Clear colorless liquid
Odor	Mild
Odor Threshold	No information available
Melting/freezing point	No information available
Initial boiling point/boiling range	No information available
Flash point	No information available
Evaporation rate	No information available

Flammability (solid, gas)	No information available
Upper/lower flammability or explosive limits	No information available
Vapor pressure	No information available
Vapor density	No information available
VOC content	No information available
Specific gravity	1.325-1.405
Solubility	Complete
Partition coefficient n-octanol/water	No information available
Auto-ignition temperature	No information available
Decomposition temperature	No information available
Viscosity	No information available

10. STABILITY AND REACTIVITY

Chemical stability Stable under normal conditions of storage and handling.

Hazardous polymerization Polymerization will not occur.

Conditions to avoid Extreme temperatures, incompatibilities

Incompatibilities Strong bases, oxidizers

Hazardous decomposition products No known non-thermal decomposition hazards.

11. TOXICOLOGICAL INFORMATION

Likely routes of exposure Skin, eyes, ingestion

Acute toxicity

1-Hydroxyethylidene-1,1-diphosphonic acid (HEDP)

Parameter	Result
LD_{50}, Oral (rat)	1,536-2,003 mg/kg
LD_{50}, Oral (mouse)	1,100 mg/kg
LD_{50}, Dermal (rabbit)	>6,000 mg/kg
Draize, Eye (rabbit)	Severe corrosion

2-Phosphono-1,2,4-butanetricarboxylic acid (PBTC)

Parameter	Result
LD_{50}, Oral (rat)	>4,000 mg/kg
LC_{50}, Inhalation (rat)	1,979 mg/m³/4hr
Draize, Skin (rabbit)	Not irritating
Draize, Eye (rabbit)	Moderately irritating

Acute symptoms and effects

Eye Eye irritation with or without pain, burning, itching, redness, discharge, and serious eye damage.

Skin Skin irritation with or without pain, burning, itching, redness, and swelling. Symptoms may be exacerbated by open wounds, excoriations, rashes, or other skin breaches.

Ingestion	Gastrointestinal distress with or without nausea, vomiting, and diarrhea.
Inhalation	Upper respiratory irritation with or without cough, watering of the eyes, and postnasal drip.
Reproductive effects	No information available
Teratogenicity	No information available
Mutagenicity	No information available
Embryotoxicity	No information available
Sensitization to product	No information available
Synergistic products	No information available
Carcinogenicity	No components have been identified as carcinogenic by OSHA, NTP, or IARC.
Chronic	Repeat, long-term, or high-dose exposure to HEDP has been implicated in dysregulation of blood calcium levels and shown adverse effects on bone mineralization.

12. ECOLOGICAL INFORMATION

Aquatic toxicity

1-Hydroxyethylidene-1,1-diphosphonic acid (HEDP)

Parameter	Result
96 hr LC_{50}, Bluegill sunfish	868 mg/L
96 hr LC_{50}, Rainbow trout	195 mg/L
96 hr LC_{50}, Cyprinodon varigatus	2,180 mg/L
48 hr EC_{50}, Daphnia magna	527 mg/L
14 day chronic NOEC, Rainbow trout	180 mg/L
28 day chronic NOEC, Daphnia magna	6.75 mg/L

2-Phosphono-1,2,4-butanetricarboxylic acid (PBTC)

Parameter	Result
48 hr LC_{50}, Leuciscus idis	>500 mg/L
24 hr EC_{50}, Daphnia magna	747 mg/L
48 hr LC0, Rainbow trout	3,440 mg/L
72 hr LC0, Leuciscus idus	>2,000 mg/L
14 day NOEC, Zebra fish	>1,042 mg/L
21 day LC_{50}, Daphnia magna	>1,071 mg/L

Persistence	No information available
Bioaccumulative potential	No information available
Mobility	No information available

13. DISPOSAL CONSIDERATIONS

Disposal	Dispose of in accordance with federal, state, and local regulations.
RCRA status	As sold, discarded product would be considered a RCRA hazardous waste based on the corrosive characteristics. The EPA hazardous waste number is D002.

14. TRANSPORT INFORMATION

US Department of Transportation (DOT)

UN Number	UN3265
Proper shipping name	Corrosive liquid, acidic, organic, n.o.s. (contains 1-Hydroxyethylidene-1,1-diphosphonic acid (HEDP), 2-Phosphono-1,2,4-butanetricarboxylic acid (PBTC))
Primary hazard class/division	8
Secondary hazard	None
Packing group	III
Label	Corrosive

15. REGULATORY INFORMATION

OSHA Hazard Communication Status	Corrosive to Metals, Category 1 Skin Corrosion, Category 1 Serious Eye Damage, Category 1
EPA Registration Number	Not applicable
TSCA	The ingredients of this product are listed on the Toxic Substances Control Act (TSCA) Chemical Substances Inventory.

CERCLA

EPA Hazardous Substances (40 CFR 302)

Chemical Name	Reportable Quantity (RQ)
1-Hydroxyethylidene-1,1-diphosphonic acid (HEDP)	None
2-Phosphono-1,2,4-butanetricarboxylic acid (PBTC)	None
Non-hazardous substances	None

SARA Title III (Sections 302, 311, 312, and 313)

Section 302 Extremely Hazardous Substances (40 CFR 355)

Chemical Name	CAS#	RQ	TPQ
None			

Section 311 and 312 Health and Physical Hazards

Immediate	Delayed	Fire	Pressure	Reactivity
Yes	No	No	No	No

Section 313 Toxic Chemicals (40 CFR 372)

Chemical Name	CAS Number	Percent by Weight
None		

16. OTHER INFORMATION

HMIS Ratings	Health—2; Flammability—0; Reactivity—0
NFPA Ratings	Health—2; Flammability—0; Reactivity—0
HMIS/NFPA Rating Scale	Minimal—0; Slight—1; Moderate—2; Serious—3; Severe—4
SDS Issue Date	3/19/2019
Version	1

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal, and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Phosphonates

Method 8007

Powder Pillows

Persulfate UV Oxidation Method[1]

(0.02 to 2.50 and 1.0 to 125.0 mg/L)

Scope and Application: For boiler and cooling water, wastewater, and seawater

[1] Adapted from Blystone, P., Larson, P., *A Rapid Method for Analysis of Phosphate Compounds*, International Water Conference, Pittsburgh, PA. (Oct 26-28, 1981)

Test Preparation

Before starting the test:

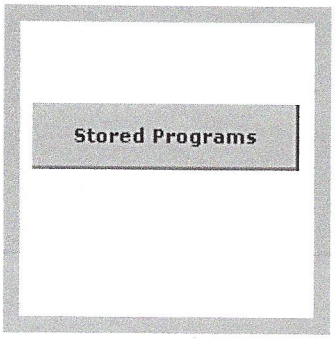
Clean glassware with 1:1 Hydrochloric Acid Solution[1], followed by a distilled water rinse. Do not clean glassware with commercial detergent.
Wear UV safety goggles while the UV lamp is on.
Do not handle the UV lamp surface. Fingerprints will etch the glass. Wipe the lamp with a soft, clean tissue between samples
The digestion in step 8 is normally completed in less than 10 minutes. However, contaminated samples or a weak lamp can cause incomplete phosphate conversion. Check conversion efficiency by running a longer digestion and seeing if the readings increase.

[1] See Optional Reagents and Apparatus on page 6.

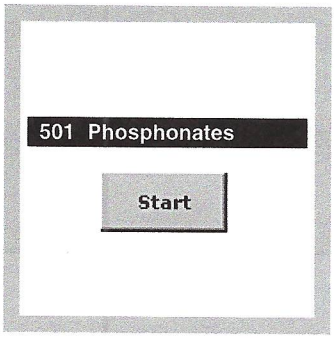
Collect the following items:	**Quantity**
Bottle, square, with 25-mL mark	1
Cylinder, mixing, graduated, 50-mL	1
Goggles, UV safety	
Pipet, serological, 10-mL	1
PhosVer® 3 Phosphate Reagent Powder Pillows	2
Potassium Persulfate Powder Pillow for Phosphonate	1
Safety bulb	1
Sample Cells, 1-square, 10-mL	2
Water, deionized	varies
UV Lamp with Power Supply	1

Note: *Reorder information for consumables and replacement items is on page 6.*

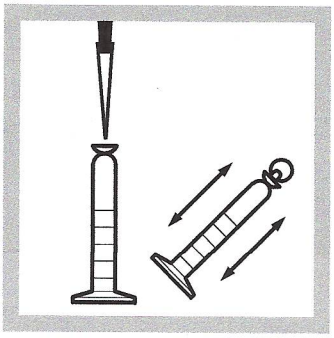
Powder Pillows — Method 8007



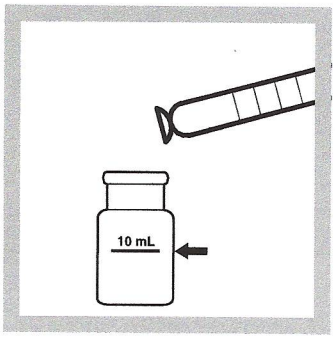
1. Press **STORED PROGRAMS**.



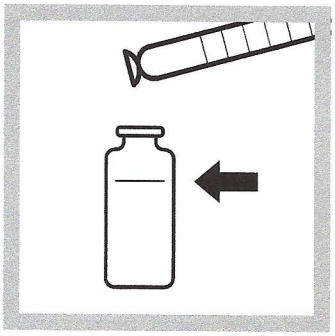
2. Select the test.



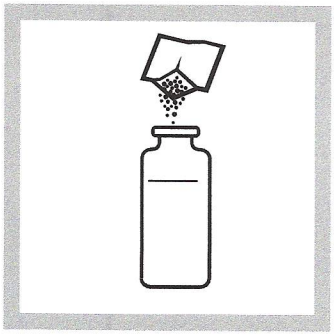
3. Choose the appropriate sample size from Table 1 on page 4. Pipet the chosen volume into a 50-mL graduated cylinder. If necessary, dilute the sample to 50-mL with deionized water and mix well.



4. Blank Preparation: Fill a square sample cell to the 10-mL mark with diluted sample from step 3.

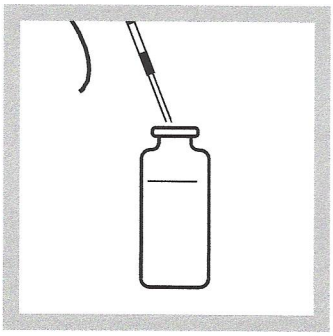


5. Digested Sample: Fill a square sample bottle to the 25-mL mark with diluted sample from step 3.



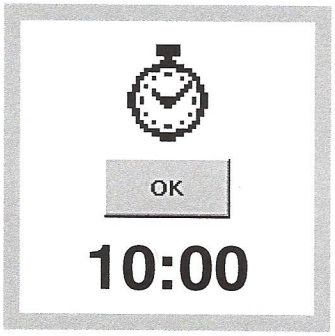
6. Add the contents of one Potassium Persulfate for Phosphonate Powder Pillow to the bottle containing 25 mL of sample.

Swirl to dissolve the powder.



7. Insert the ultraviolet (UV) lamp into the sample bottle.

CAUTION
Wear UV safety goggles while the lamp is on.

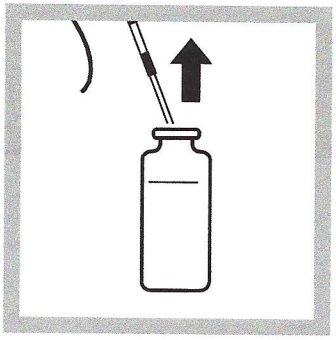


8. Turn on the UV lamp.

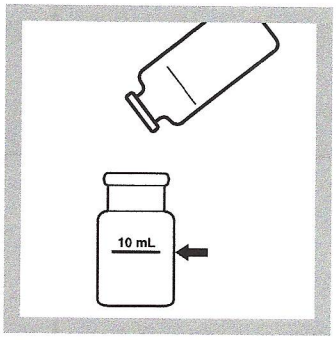
Press **TIMER>OK**.

A ten-minute reaction period will begin.

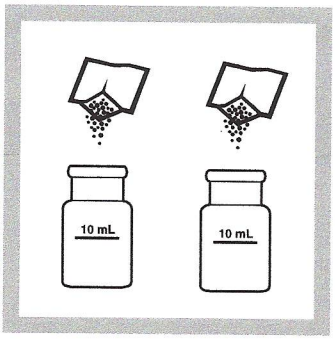
Phosphonates are converted to orthophosphate in this step.



9. When the timer expires, turn off the UV lamp and remove it from the sample.

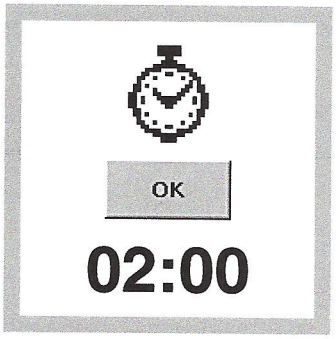


10. Prepared Sample: Fill a second square sample cell to the 10-mL mark with the digested sample.



11. Add the contents of one PhosVer 3 Phosphate Reagent Powder Pillow to the blank and prepared sample. Immediately swirl vigorously 20–30 seconds to mix. Some powder may not dissolve.

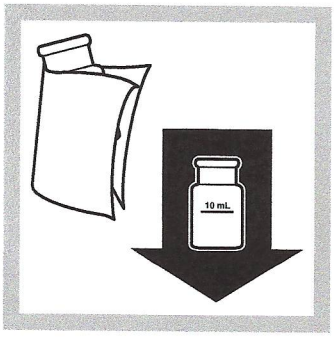
A blue color will develop if phosphate is present. Both sample and blank cells may develop color. The increase in sample color is proportional to the phosphonate concentration.



12. Press **TIMER>OK**.

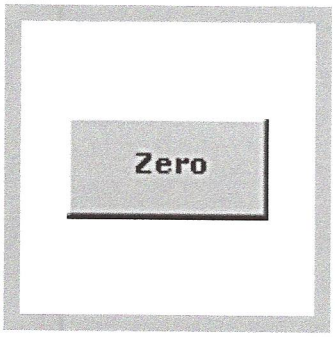
A two-minute reaction period will begin.

If the sample is colder than 15 °C, allow four minutes for color development.



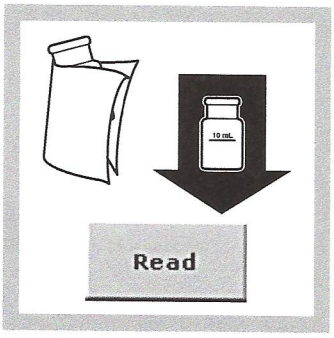
13. When the timer expires, insert the blank into the cell holder with the fill line facing right.

Complete steps 14–16 within three minutes after the timer expires.



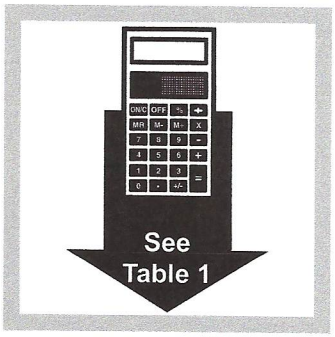
14. Press **ZERO**.

The display will show: 0.00 mg/L PO_4^{3-}



15. Wipe the prepared sample and insert it into the cell holder with the fill line facing right.

Press **READ**. Results are in mg/L PO_4^{3-}.



16. Multiply the value in step 15 by the appropriate multiplier in Table 1 on page 4 to obtain the actual phosphonate concentration.

Table 1 Expected Ranges with Multipliers

Expected Range (mg/L phosphonate)	Sample Volume (mL)	Multiplier
0–2.5	50	0.1
0–5	25	0.2
0–12.5	10	0.5
0–25	5	1.0
0–125	1	5.0

To express results in terms of active phosphonate, multiply the final value in step 16 by the appropriate conversion factor in Table 2.

Table 2 Conversion Factors by Phosphonate Type

Phosphonate Type	Conversion Factor
PBTC	2.84
NTP	1.050
HEDPA	1.085
EDTMPA	1.148
HMDTMPA	1.295
DETPMPA	1.207
HPA	1.49
active phosphonate (mg/L) = phosphonate concentration from step 16 ↔ conversion factor	

Interferences

Table 3 Interfering Substances and Levels

Interfering Substance	Interference Levels and Treatments
Aluminum	100 mg/L
Arsenate	Interferes at all levels
Benzotriazole	10 mg/L
Bicarbonate	1000 mg/L
Bromide	100 mg/L
Calcium	5000 mg/L
CDTA	100 mg/L
Chloride	5000 mg/L
Chromate	100 mg/L
Copper	100 mg/L
Cyanide	100 mg/L (Increase the UV digestion to 30 minutes.)
Diethanoldithiocarbamate	50 mg/L
EDTA	100 mg/L
Iron	200 mg/L
Nitrate	200 mg/L
NTA	250 mg/L
Orthophosphate	15 mg/L
Phosphites and organophosphorus compounds	Reacts quantitatively. Meta- and polyphosphates do not interfere.

Table 3 Interfering Substances and Levels (continued)

Interfering Substance	Interference Levels and Treatments
Silica	500 mg/L
Silicate	100 mg/L
Sulfate	2000 mg/L
Sulfide	Interferes at all levels
Sulfite	100 mg/L
Thiourea	10 mg/L
Highly buffered samples or extreme sample pH	May exceed the buffering capacity of the reagents and require sample pretreatment.

The interference levels will decrease as the sample size increases. For example, copper does not interfere at or below 100 mg/L for a 5.00 mL sample. If the sample volume is increased to 10 mL, copper will begin to interfere above 50 mg/L.

Sample Collection, Storage, and Preservation

Collect samples in acid-cleaned (1:1 HCl*) plastic or glass bottles that have been rinsed with distilled water. Do not use a commercial detergent. If prompt analysis is impossible, preserve the sample by adjusting to pH 2 or less with Sulfuric Acid* (about 2 mL per liter). Store at 4 °C (39 °F). Preserved samples may be stored up to 24 hours. Correct the test result for volume additions.

Accuracy Check

Ideally, a solution containing the phosphonate product being used should be prepared. This will check the UV conversion of phosphonate to orthophosphate. Alternatively, a phosphate standard can be used to check the accuracy of the colorimetric part of the method.

Standard Solution

A 1-mg/L Phosphate Standard Solution can be used to check accuracy. Use 10 mL of this standard in place of the prepared sample in step 10 on page 3. Use deionized water for the blank. A multiplier value from Table 1 on page 4 is not needed. The result should be 10.0 mg/L phosphate, due to a factor of 10 in calibration.

Summary of Method

This method is directly applicable to boiler and cooling tower samples. The procedure is based on a UV-catalyzed oxidation of phosphonate to orthophosphate. The orthophosphate reacts with the molybdate in the PhosVer 3 reagent to form a mixed phosphate/molybdate complex. This complex is reduced by the ascorbic acid in the PhosVer 3, yielding a blue color that is proportional to the phosphonate present in the original sample. Test results are measured at 880 nm.

* See Optional Reagents and Apparatus on page 6.

Consumables and Replacement Items

Required Reagents

Description	Quantity/Test	Unit	Cat. No.
Phosphonate Reagent Set for 10-mL sample (100 tests), includes:	—	—	24297-00
PhosVer® 3 Phosphate Reagent Powder Pillows, 10-mL	2	100/pkg	21060-69
Potassium Persulfate Powder Pillow for Phosphonate	1	100/pkg	20847-69
Water, deionized	varies	4 L	272-56

Required Apparatus

Description	Quantity/Test	Unit	Cat. No.
Bottle, square, with 25-mL mark	1	each	17042-00
Polypropylene Beaker, 50-mL, low form, with pour spout	1	each	1080-41
Cylinder, mixing, graduated, 50-mL	1	each	1896-41
Goggles, UV safety	1	each	21134-00
Pipet, serological, graduated, 10-mL	1	each	532-38
Safety Bulb	1	each	14651-00
Sample Cells, 1-inch square, 10 mL, matched pair	2	2/pkg	24954-02
UV Lamp with Power Supply, 115 VAC	1	each	20828-00
OR			
UV Lamp with Power Supply, 230 VAC	1	each	20828-02

Recommended Standards

Description	Unit	Cat. No.
Phosphate Standard Solution, 1-mg/L	500 mL	2569-49

Optional Reagents and Apparatus

Description	Cat. No.
Hydrochloric Acid Solution, 1:1, 500 mL	884-49
Sulfuric Acid, 500 mL	979-49

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