



# Sewage Treatment Plant Laboratory

STPL-WRT (188703)

DOC326.97.00088

## 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.*

- Put the color disc on the center pin in the color comparator box (numbers to the front).
- Rinse the tubes with sample before the test. Rinse the tubes with deionized water after the test.
- Use sunlight or a lamp as a light source to find the color match with the color comparator box.
- 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.

## Chlorine

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

## Dissolved oxygen

- If the sample is from an activated sludge tank, use the pretreatment procedure before the test procedure is started. Refer to [Pretreatment procedure for activated sludge samples](#) on page 2.
- Air bubbles cause incorrect results. To prevent air bubbles below the stopper, tilt the bottle and tap the stopper quickly on the bottle neck. Look below the stopper to make sure that there are no air bubbles.
- Hold the dropper vertically above the sample. Do not let the dropper touch the bottle during the titration.
- Keep the sodium thiosulfate away from direct sunlight.
- If the sample contains high concentrations of chloride (e.g., sea water) the floc that develops in the bottle does not fall. Wait 4 or 5 minutes after the floc develops, then continue the test.
- If the high-range procedure gives a low result, use the prepared sample for the titration in the low-range procedure.
- To increase the sensitivity of the test, use the starch indicator solution. Titrate the sample until the color is light yellow, then add 2 drops of the starch indicator solution. The solution becomes blue. Titrate the sample until the sample color changes from blue to colorless.

## pH

- Chlorine can interfere with the test for pH. To remove chlorine from the sample, add 1 drop of 0.1 N sodium thiosulfate solution to the 5-mL sample, mix, then add the pH indicator. The sodium thiosulfate removes a maximum of 50 mg/L chlorine from the sample.
- To verify the test accuracy, use a buffer solution as the sample.

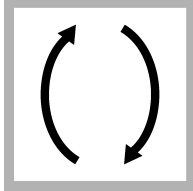
## Replacement items

Description	Unit	Item no.
Dissolved Oxygen 1 Reagent Powder Pillows, 60 mL	100/pkg	98199
Dissolved Oxygen 2 Reagent Powder Pillows, 60 mL	100/pkg	98299
Dissolved Oxygen 3 Reagent Powder Pillows	100/pkg	98799
Sodium Thiosulfate Standard Solution, stabilized, 0.0109 N	100 mL MDB	2408932
DPD Total Chlorine Reagent Powder Pillows, 5 mL	100/pkg	1407699
Wide range pH indicator solution	100 mL MDB	2329332
Copper Sulfate-Sulfamic Acid Inhibitor Solution	100 mL MDB	35732
Brush, cylinder, 2-in. diameter	each	68700
Copper tube for siphon	each	186441
Imhoff cone, 1 L, polycarbonate	each	206700
Imhoff cone support stand for 2 cones	each	206800
Thermometer, pocket, -10 to 110 °C (14 to 230 °F)	each	187701
Tubing, rubber latex, 6-in. segment	each	713400
Graduated cylinder, 500 mL, polycarbonate	each	2117949
Color disc, DPD chlorine, 0–3.4 mg/L	each	990200
Clippers	each	96800
Color disc, pH, wide range	each	990100
Bottle, BOD, 60 mL, with stopper	each	190902
Bottle, square, glass, 29 mL	6/pkg	43906
Measuring tube, plastic, 5.83 mL	each	43800
Color comparator box	each	173200
Glass viewing tubes, 18 mm	6/pkg	173006
Stoppers for 18-mm glass tubes and AccuVac Ampuls	6/pkg	173106

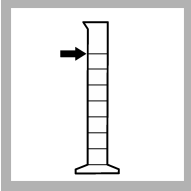
## Optional items

Description	Unit	Item no.
pH 7.0 buffer solution, colorless	500 mL	1222249
Sodium thiosulfate, 0.1 N	100 mL MDB	32332
Starch Indicator Solution	100 mL MDB	34932
Stopper, ground-glass for BOD bottles	each	190901
Water, deionized	500 mL	27249

## Test procedure—Sludge Settleability



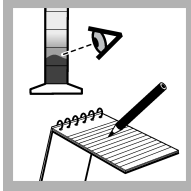
1. Slowly invert or stir the sample again and again to fully mix.



2. Fill a graduated cylinder to the 500-mL mark with the well-mixed sample.



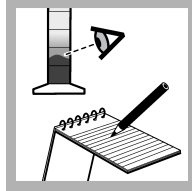
3. Wait 10 minutes.



4. Read and record the volume of the sludge.



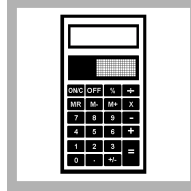
5. Wait 10 minutes.



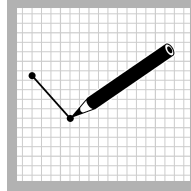
6. Read and record the volume of the sludge.



7. Continue to measure and record the volume at intervals of 10, 20, 30, 45 and 60 minutes.

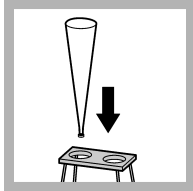


8. Multiply each volume by 0.2 to get the percent settleable solids at each time interval.

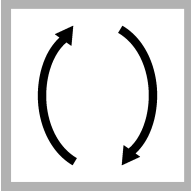


9. Make a plot of the percent settleable solids vs time to get the settling rate.

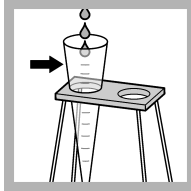
## Test procedure—Settleable Matter (mL/L)



1. Put an Imhoff cone in the rack.



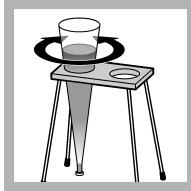
2. Slowly invert or stir the sample again and again to fully mix.



3. Fill the Imhoff cone to the 1-liter mark with the well-mixed sample.



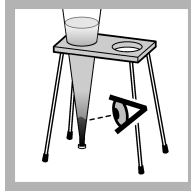
4. Wait 45 minutes for the solids to fall to the bottom of the cone.



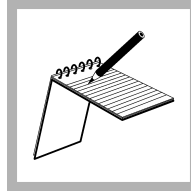
5. Twist the cone to the left and right to stir the sides of the cone.



6. Wait 15 minutes for the solids to fall to the bottom of the cone.



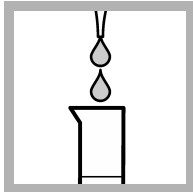
7. Read the volume of the solids in the cone.



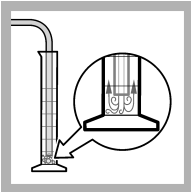
8. Record the result as mL/L settleable matter.

## Pretreatment procedure for activated sludge samples

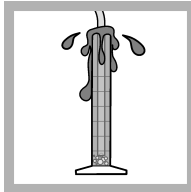
If the sample for dissolved oxygen measurement is from an activated sludge tank, use the steps that follow to pretreat the sample. Use the pretreated sample in the test procedure for dissolved oxygen.



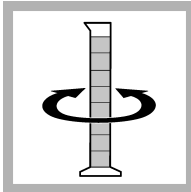
1. Add 10 full droppers of Copper Sulfate-Sulfamic Acid Inhibitor Solution to a clean 500-mL graduated cylinder.



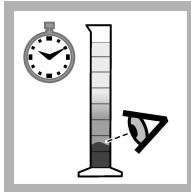
2. Use a tube to collect the sample so that the sample flows into the cylinder near the bottom.



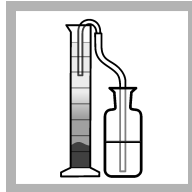
3. Fill the cylinder with the activated sludge sample. Let approximately 100 to 200 mL of the sample overflow the cylinder.



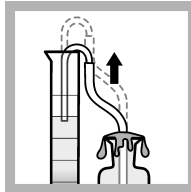
4. Swirl the cylinder to the left and right to mix.



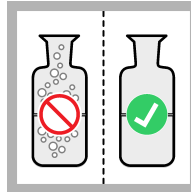
5. Let the suspended solids fall to the bottom of the cylinder.



6. Use the copper and latex tubes to siphon the relatively clear top layer into the bottle. Push the tube end to the bottom of the bottle.



7. Fill the bottle with the clear sample and let the sample overflow. Remove the tube from the bottle while the water is flowing.

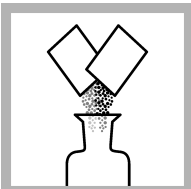


8. Make sure that there are no air bubbles in the bottle.

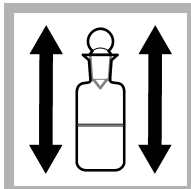
### Test procedure—Dissolved oxygen (0–10 mg/L O<sub>2</sub>)



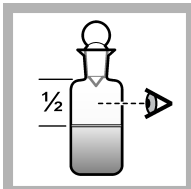
1. Fill the dissolved oxygen bottle with sample. Let the water overflow for 2 to 3 minutes.



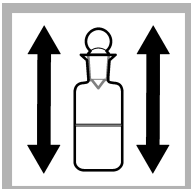
2. Add the contents of one Dissolved Oxygen 1 Powder Pillow and one Dissolved Oxygen 2 Powder Pillow.



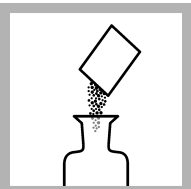
3. Immediately put the stopper on the bottle. Make sure that no air bubbles are below the stopper. Shake the bottle vigorously.



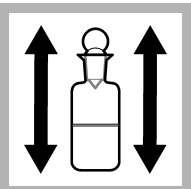
4. A brown-orange floc develops. The floc slowly falls. Wait until the top half of the bottle is clear.



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



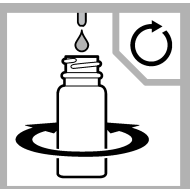
6. Remove the stopper. Add the contents of one Dissolved Oxygen 3 Powder Pillow.



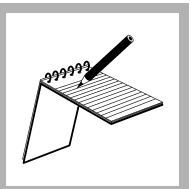
7. Immediately put the stopper on the bottle. Shake the bottle. The floc dissolves and a yellow color develops.



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



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

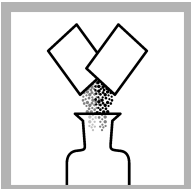


10. Record the number of drops. The number of drops of the titrant solution is equal to the result in mg/L.

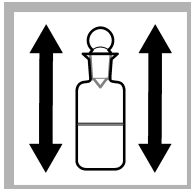
### Test procedure—Dissolved oxygen (0–1 mg/L O<sub>2</sub>)



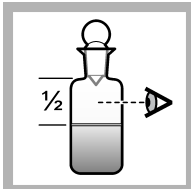
1. Fill the dissolved oxygen bottle with sample. Let the water overflow for 2 to 3 minutes.



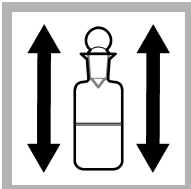
2. Add the contents of one Dissolved Oxygen 1 Powder Pillow and one Dissolved Oxygen 2 Powder Pillow.



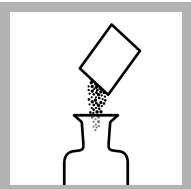
3. Immediately put the stopper on the bottle. Make sure that no air bubbles are below the stopper. Shake the bottle vigorously.



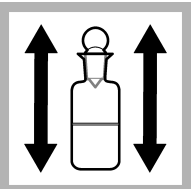
4. A brown-orange floc develops. The floc slowly falls. Wait until the top half of the bottle is clear.



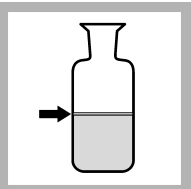
5. Shake the bottle again. Wait until the top half of the bottle is clear.



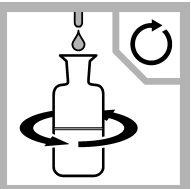
6. Remove the stopper. Add the contents of one Dissolved Oxygen 3 Powder Pillow.



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



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

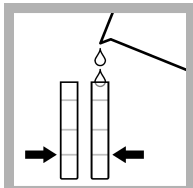


9. Add the Sodium Thiosulfate solution by drops. Swirl to mix after each drop. Count the drops until the color changes to colorless.

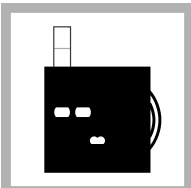


10. Multiply the number of drops of the titrant solution by 0.2 to get the result in mg/L.

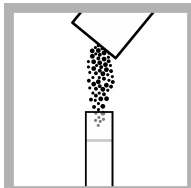
### Test procedure—Total chlorine (0–3.4 mg/L Cl<sub>2</sub>)



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



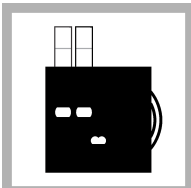
2. Put one tube into the left opening of the color comparator box.



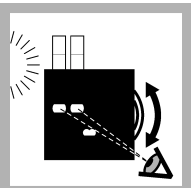
3. Add one DPD Total Chlorine Powder Pillow to the second tube.



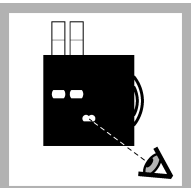
4. Wait 3 minutes. Read the result within 6 minutes.



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

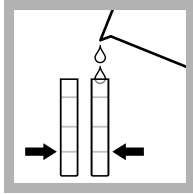


6. Hold the color comparator box in front of a light source. Turn the color disc to find the color match.

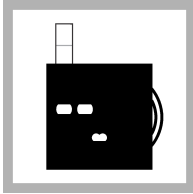


7. Read the result in mg/L in the scale window.

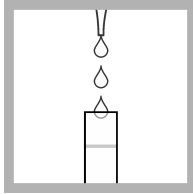
## Test procedure—pH (4–10 pH units)



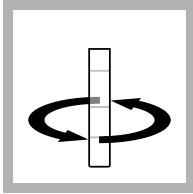
1. Fill two tubes to the first line (5 mL) with sample.



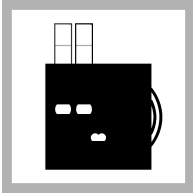
2. Put one tube into the left opening of the color comparator box.



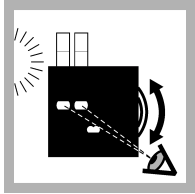
3. Add 6 drops of wide range pH indicator solution to the second tube.



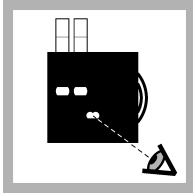
4. Swirl to mix.



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



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



7. Read the result in pH units in the scale window.

