CHLORINE–BROMINE–IODINE

DPD METHOD • CODE 3643-SC

QUANTITY	CONTENTS	CODE
100	*Chlorine #1 Instrument Grade Tablets	*6903-J
100	*Chlorine #3 Instrument Grade Tablets	*6197-J
15 mL	Glycine Solution	6811-E
1	Tablet Crusher	0175

***WARNING:** Reagents marked with * are considered hazardous substances. Material Data Safety Sheets (MSDS) are supplied for these reagents. For your safety, read label and accompanying MSDS before using.

All water for cities and communities must be sanitized; even waters that come from clean sources, protected watersheds, reservoirs, and deep wells, are commonly sanitized to assure safety. Chlorine is the most commonly used sanitizer for several reasons: it is effective against a wide range of microorganisms, the cost is low, and the methods of applying it have been well developed. If an adequate concentration of chlorine is present in the water for a few minutes, disease producing bacteria will be destroyed. A number of conditions affect the sanitizing action of chlorine. In municipal systems these can be controlled so that if chlorine is detectable, it can be assumed that bacteria have been killed. The factors that influence the rate of sanitization are temperature, pH, presence of other materials that react with chlorine, time, and the concentrations of the various chlorine combinations that are formed in the water with ammonia and other substances that react with chlorine.

The fact that chlorine can be easily detected and measured makes chlorine a favorite water sanitizer of those concerned with the public safety of water supplies. Chlorine concentrations in the range of 0.1 to 0.4 parts per million are usually maintained in municipal supplies.

Chlorine can be added in the form of chlorine gas, liquid sodium hypochlorite (bleach), granular calcium hypochlorite or as organic chlorine compounds. Chlorine is not present in natural water supplies; if it is present it is the result of chlorination of a water supply or of chlorinated compounds being discharged as waste from industrial operations. The presence of chlorine in concentrations above 0.5 parts per million should be considered evidence of pollution from chlorine treated effluents or from a process in which high concentrations of chlorine are used.

APPLICATION: Drinking, surface, and saline waters; swimming pool water; domestic and industrial wastes.

RANGE: 0.00–4.00 Chlorine

METHOD: In the absence of iodide, free available chlorine reacts instantly with DPD to produce a red color. Subsequent addition of potassium iodide evokes a rapid color response from the combined forms of chlorine (chloramines).

SAMPLE HANDLING & PRESERVATION: Chlorine in aqueous solutions is not stable, and the chlorine content of samples or solutions, particularly weak solutions, will rapidly decrease. Exposure to sunlight or agitation will accelerate the reduction of chlorine present in such solutions. For best results, start analysis immediately after sampling. Samples to be analyzed for chlorine cannot be preserved or stored.

INTERFERENCE: The only interfering substance likely to be encountered in water is oxidized manganese. The extent of this interference can be determined by treating a sample with sodium arsenite to destroy the chlorine present so that the degree of interference can be measured.

Iodine and bromine can give a positive interference, but these are not normally present unless they have been added as sanitizers.

PROCEDURE–FREE CHLORINE

1. Press and hold **ON** button until colorimeter turns on.
2. Press **ENTER** to start.
3. Press **ENTER** to select TESTING MENU.
4. Select ALL TESTS (or another sequence containing 15 Chlorine) from TESTING MENU.
5. Scroll to and select 15 Chlorine from menu.
6. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample.
7. Insert tube into chamber, close lid and select SCAN BLANK.
8. Remove tube from colorimeter and pour off all but a sufficient amount of sample water to cover a tablet. Add one *Chlorine DPD #1 Instrument Grade Tablet (6903). Crush tablet with a tablet crusher (0175), then add sample water until tube is filled to 10 mL line. Cap tube and shake until tablet has dissolved. Solution will turn pink if free chlorine is present. Wait 15 seconds, but no longer than 30 seconds. Mix.
9. Insert tube into chamber, close lid and select SCAN SAMPLE.

PROCEDURE–COMBINED CHLORINE

10. Add one *Chlorine DPD #3 Instrument Grade Tablet (6197) to sample from Step 8 above. Crush tablet with tablet crusher (0175). Cap tube and shake until tablet dissolves. An increase in color represents combined chlorine.
    - ☑ NOTE: For wastewater samples, *Standard Methods for the Examination of Water and Wastewater* recommends waiting 2 minutes for full color development.
11. Insert sample into chamber, close lid and select SCAN SAMPLE. Record result as Total Chlorine.
12. Subtract free chlorine reading from total chlorine reading to obtain concentration of combined chlorine.
13. Press the **OFF** button to turn off the colorimeter or press the **EXIT** button to exit to a previous menu or make another menu selection.

BROMINE

Like chlorine, bromine is an effective germicidal agent employed in drinking water treatment, pool and spa water sanitization, food service sanitation, and other public health applications.

APPLICATION: Drinking, surface, and saline waters; swimming pool water; domestic and industrial waters and wastes.

RANGE: 0.00–9.00 Bromine

METHOD: In buffered sample bromine reacts with diethyl-p-phenylene diamine (DPD) to produce a pink-red color in proportion to the concentration of bromine present.

SAMPLE HANDLING & PRESERVATION: Bromine in aqueous solutions is not stable, and the bromine content of samples or solutions, particularly weak solutions, will rapidly decrease. Exposure to sunlight or agitation will accelerate the reduction of bromine present in such solutions. For best results start analysis immediately after sampling. Samples to be analyzed for bromine cannot be preserved or stored.

INTERFERENCE: The only interfering substance likely to be encountered in water is oxidized manganese. The extent of this interference can be determined by treating a sample with sodium arsenite to destroy the bromine present so that the degree of interference can be estimated.

Iodine and chlorine can also interfere, but these are not normally present unless they have been added as sanitizers.

PROCEDURE A: BROMINE (NO CHLORINE)

1. Press and hold **ON** button until colorimeter turns on.
2. Press **ENTER** to start.
3. Press **ENTER** to select TESTING MENU.
4. Select ALL TESTS (or another sequence containing 9 Bromine-LR) from TESTING MENU.
5. Scroll to and select 9 Bromine-LR from menu.
6. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample.
7. Insert tube into chamber, close lid and select SCAN BLANK.
8. Remove tube from colorimeter. Pour out all but a sufficient amount of sample water to cover a tablet. Add one *Chlorine DPD #1 Instrument Grade Tablet (6903). Crush tablet with crusher (0175), then add sample water until tube is filled to 10 mL line. Cap tube and shake until tablet is dissolved. Solution will turn pink if bromine is present. Wait 15 seconds. Mix.
9. Insert tube into chamber, close lid and select SCAN SAMPLE.
10. Press **OFF** button to turn colorimeter off or press the **EXIT** button to exit to a previous menu or make another menu selection.

PROCEDURE B:
BROMINE IN THE PRESENCE OF CHLORINE

1. Press and hold **ON** button until colorimeter turns on.
2. Press **ENTER** to start.
3. Press **ENTER** to select `TESTING MENU`.
4. Select `ALL TESTS` (or another sequence containing `9 Bromine-LR`) from `TESTING MENU`.
5. Scroll to and select `9 Bromine-LR` from menu.
6. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample.
7. Insert tube into chamber close lid and select `SCAN BLANK`.
8. Rinse a second clean tube (0290) with sample water. Fill to the 10 mL line with sample. Add 5 drops of Glycine Solution (6811). Cap and mix.
9. Remove blank from colorimeter. Pour out all of the sample water. To this tube add just enough of Glycine treated sample (Step 8) to cover a tablet. Add one *Chlorine DPD#1 Instrument Grade Tablet (6903). Crush tablet with a tablet crusher (0175). Add all remaining Glycine-treated sample. Cap tube and shake until tablet dissolves. Solution will turn pink if bromine is present. Wait 15 seconds. Mix.
10. Insert tube into chamber, close lid and select `SCAN SAMPLE`.
11. Press **OFF** button to exit to previous menu or make another menu selection.

PROCEDURE C: FREE AVAILABLE, TOTAL AVAILABLE & COMBINED CHLORINE IN THE PRESENCE OF BROMINE

1. Perform the test for free and combined chlorine as previously described.
2. Perform the test for bromine in the presence of chlorine.
3. Calculations:

Residual Bromine (ppm) = Reading BR

Free Chlorine in the Presence of Bromine =
Free Chlorine – 0.45 (Reading BR)

Total Chlorine in the Presence of Bromine =
Total Chlorine – 0.45 (Reading BR)

Combined Chlorine in the Presence of Bromine =
Total Chlorine – Free Chlorine

☑ NOTE: Combined chlorine is not affected by the presence of bromine, so the calculation is the same as when only chlorine is present.

IODINE

Like chlorine and bromine, iodine is an effective germicidal agent employed in drinking water treatment, pool and spa water sanitization, food service sanitation, and other public health applications.

APPLICATION: Drinking, surface, and saline waters; swimming pool water; domestic and industrial wastes.

RANGE: 0.00–14.00 ppm Iodine

METHOD: In a buffered sample iodine reacts with diethyl-p-phenylene-diamine (DPD) to produce a pink-red color in proportion to the concentration of iodine present.

SAMPLE HANDLING & PRESERVATION: Iodine in aqueous solutions is not stable, and the iodine content of samples or solutions, particularly weak solutions, will rapidly decrease. Exposure to sunlight or agitation will accelerate the reduction of iodine present in such solutions. For best results start analysis immediately after sampling. Samples to be analyzed for iodine cannot be preserved or stored.

INTERFERENCE: The only interfering substance likely to be encountered in water is oxidized manganese. The extent of this interference can be determined by treating a sample with sodium arsenite to destroy the iodine present so that the degree of interference can be measured.

Chlorine and bromine can give a positive interference, but these are not normally present unless they have been added as sanitizers.

PROCEDURE

1. Press and hold **ON** button until colorimeter turns on.
2. Press **ENTER** to start.
3. Press **ENTER** to select `TESTING MENU`.
4. Select `ALL TESTS` (or another sequence containing `50 Iodine`) from `TESTING MENU`.
5. Scroll to and select `50 Iodine` from menu.
6. Rinse a clean tube (0290) with sample water. Fill tube to the 10 mL line with sample.
7. Insert tube into chamber, close lid and select `SCAN BLANK`.
8. Remove tube from colorimeter. Pour off all but a sufficient amount of sample water to cover a tablet. Add one *DPD #1 Tablet Instrument Grade (6903). Crush tablet with tablet crusher (0175). Add sample water until tube is filled to 10 mL line. Cap and shake until tablet dissolves. Solution will turn pink if iodine is present. Wait 15 seconds. Mix.
9. Insert tube into chamber, close lid and select `SCAN SAMPLE`. Record result.
10. Press **OFF** button to turn colorimeter off or press **EXIT** button to exit to a previous menu or make another menu selection.