

## Photometer Method

# CHLORINE DIOXIDE

## TEST FOR CHLORINE DIOXIDE AND OTHER RESIDUALS IN WATER

AUTOMATIC  
WAVELENGTH  
SELECTION

0 – 10 mg/L as ClO<sub>2</sub>  
0 – 25 mg/L as Cl

Chlorine dioxide is used for the disinfection of water in a variety of different applications. Chlorine dioxide is normally generated by reacting chlorine with sodium chlorite solution in specially designed plant and equipment. Water treated with chlorine dioxide may therefore also contain amounts of chlorine and chlorite. For the control of such water treatment systems it is necessary to determine and differentiate between these different residual species.

The Palintest Chlorine Dioxide method provides a precise method of determining chlorine dioxide in treated water. Supplementary procedures provide for the determination of free and combined chlorine and chlorite.

### Method

Chlorine dioxide reacts with diethyl-p-phenylene diamine (DPD) in buffered solution to produce a pink coloration. Chlorine reacts in a similar manner. Glycine is used to prevent the reaction with chlorine so as to give specific determination of chlorine dioxide.

In the supplementary part of the test the glycine is omitted and it is then possible, by differences, to measure the free chlorine content. Subsequent addition of potassium iodide induces a further reaction with any combined chlorine present. Continuation of the test using an acidification and neutralisation procedure produces a further reaction and in this way the chlorite concentration can be determined.

The colour intensities at each stage of the test are measured using a Palintest Photometer and the concentration of each individual component are obtained by a simple calculation. It is normal practice to express the concentration of each component in terms of the equivalent chlorine concentration.

### Reagents and Equipment

Palintest DPD No 1 Tablets

Palintest DPD Glycine Tablets

Palintest Automatic Wavelength Selection Photometer

Palintest Round Test Tubes, 10 mL glass (PT 595)

## **Test Procedure**

- 1 Rinse a clean test tube with sample, then fill with sample to the 10 mL mark. Add one Glycine tablet, crush and mix to dissolve.
  - 2 Decant two or three drops of Glycine treated sample into a second clean test tube. Add one DPD No 1 tablet then crush to disintegrate.
  - 3 Add the remaining contents of the first test tube to the second test tube and mix.
  - 4 Gently invert the tube to remove any bubbles from the inner walls of the tube
  - 4 Select Phot 115 on the photometer.
  - 5 Take photometer reading.
  - 6 The result displayed on screen represents the chlorine dioxide concentration as mg/L of ClO<sub>2</sub>.
  - 7 Divide your result by 1.9 and then multiply by 5 to obtain the chlorine dioxide residual in terms of mg/L Chlorine.
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## Photometer Method

# CHLORINE DIOXIDE

### TEST FOR CHLORINE DIOXIDE AND OTHER RESIDUALS IN WATER

(see also Phot.115)

#### AUTOMATIC WAVELENGTH SELECTION

0 – 25.0 mg/l as Cl  
0 – 10.0 mg/l as ClO<sub>2</sub>

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The colour intensities at each stage of the test are measured using a Palintest Photometer and the concentration of each individual component are obtained by a simple calculation. It is normal practice to express the concentration of each component in terms of the equivalent chlorine concentration.

#### Reagents and Equipment

- Palintest DPD No 1 Tablets
- Palintest DPD No 3 Tablets
- Palintest DPD Glycine Tablets
- Palintest DPD Acidifying Tablets
- Palintest DPD Neutralising Tablets
- Palintest Automatic Wavelength Selection Photometer
- Palintest Round Test Tubes, 10 ml glass (PT 595)

### **Test Procedure - Chlorine Dioxide**

- 1 Rinse a clean test tube with sample, then fill with sample to the 10 ml mark. Add one Glycine tablet, crush and mix to dissolve.
- 2 Decant a few drops of Glycine treated sample into a second clean test tube.
- 3 Add and then crush the DPD #1 tablet in the few drops of the water sample until the tablet is thoroughly crushed.
- 4 Add the remaining treated sample of the first test tube to the second test tube, mix and seal the tube with the cap.
- 5 Gently invert the tube to remove any bubbles from the inner walls of the tube
- 6 Select Phot 7 on photometer.
- 7 Take photometer reading [**Result G**]
- 8 Multiply **Result G** by 5 to obtain the chlorine dioxide residual in terms of mg/l Chlorine.

To obtain the chlorine dioxide residual as mg/l  $\text{ClO}_2$ , multiply **Result G** by 1.9.

### **Test Procedure - Free and Combined Chlorine, and Chlorite**

- 1 Rinse a test tube with sample leaving a few drops.
- 2 Add and then crush the DPD #1 tablet in the few drops of the water sample until the tablet is thoroughly crushed.
- 3 Add the 10ml test solution, mix and seal the tube with the cap.
- 4 Gently invert the tube to remove any bubbles from the inner walls of the tube
- 5 Take the photometer reading on Phot 7 in usual manner (**Result A**).
- 6 Continue the test by adding one DPD No 3 tablet. Crush tablet, mix to dissolve and then stand for two minutes.
- 7 Take photometer reading (**Result C**).
- 8 Continue the test by adding one DPD Acidifying tablet. Crush tablet, mix to dissolve and then stand for two minutes.
- 9 Add one DPD Neutralising tablet, crush and mix to dissolve.
- 10 Take the photometer reading (**Result D**).

The results of the tests, in terms of mg/l chlorine, are calculated from the observed results as follows :-

$$\begin{aligned}\text{Chlorine Dioxide} &= 5G \\ \text{Free Chlorine} &= A - G \\ \text{Combined Chlorine} &= C - A \\ \text{Chlorite} &= D - (C + 4G) \\ \text{Total Oxidising Capacity} &= D\end{aligned}$$

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