

Photometer Method

CHLORINE DIOXIDE

TEST FOR CHLORINE DIOXIDE AND OTHER RESIDUALS IN WATER

AUTOMATIC WAVELENGTH SELECTION

0 – 25.0 mg/l as Cl
0 – 9.5 mg/l as ClO₂

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 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 two or three drops of Glycine treated sample into a second clean test tube. Add one DPD No 1 tablet and crush to disintegrate.
- 3 Add the remaining contents of the first test tube to the second test tube and mix.
- 4 Select Phot 7 on photometer.
- 5 Take photometer reading (Result G) immediately in usual manner (see photometer instructions).
- 6 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 ClO_2 , multiply **Result G** by 1.9.

Test Procedure - Free and Combined Chlorine, and Chlorite

- 1 Rinse a test tube with sample leaving two or three drops. Add one DPD No 1 tablet, crush and then fill the test tube with sample to the 10 ml mark. Mix to dissolve tablet.
- 2 Take the photometer reading on Phot 7 **immediately** (as result may drift on standing), in usual manner (**Result A**).
- 3 Continue the test by adding one DPD No 3 tablet. Crush tablet, mix to dissolve and then stand for two minutes.
- 4 Take photometer reading (**Result C**).
- 5 Continue the test by adding one DPD Acidifying tablet. Crush tablet, mix to dissolve and then stand for two minutes.
- 6 Add one DPD Neutralising tablet, crush and mix to dissolve.
- 7 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 :-

Chlorine Dioxide	= 5G
Free Chlorine	= A - G
Combined Chlorine	= C - A
Chlorite	= D - (C + 4G)
Total Oxidising Capacity	= D
