

Program ID #022

**Chlorine Free & Total Auto-Test™**

0.15 – 6.0 mg/L

For USEPA regulatory use, valid range is 0.15 - 5.0 mg/L

The Orion AQUAfast IV Auto-Test kit is intended for use with the Orion AQ4000 Advanced Colorimeter. For detailed setup and measurement procedures for the Orion AQ4000, consult your colorimeter manual.

**NOTE:** Before testing, zero the Orion AQ4000 using a sealed zero vial from the Orion AQUAfast IV Zero Auto-Test kit, AQ4ZER. If the sample is colored, use the sample cup provided to dilute the sample using the following steps: 1) Add 10 mL of sample and 5 mL of DI water to the sample cup for a total of 15 mL. 2) Transfer the diluted sample to a clean, dry screw top vial from the Orion Zero Auto-Test kit and use that vial to zero the meter. 3) See the colorimeter manual for details on the Zero Procedure for the Orion AQ4000. Discard the diluted sample after the zero procedure. Repeat for each colored sample. Re-zero with the sealed zero vial before testing any colorless samples.

**Safety Information**

Read MSDS before performing this test procedure. Wear safety glasses and gloves.

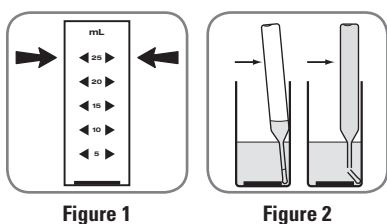
**Free Chlorine Procedure**

Figure 1

Figure 2

1. Fill the sample cup to the 25 mL mark with the sample. **See Fig 1.**
2. Place the Auto-Test cuvette in the sample cup. Snap the tip by pressing the cuvette against the side of the cup. The cuvette will fill, leaving a small bubble to facilitate mixing. **See Fig 2.**
3. Mix the contents of the cuvette by inverting it several times, allowing the bubble to travel from end to end each time. Tap the bottom of the cuvette on a hard surface to cause any tiny bubbles that have collected on the cuvette wall to rise to the top of the liquid in the cuvette. Wipe all liquid from the exterior of the cuvette.
4. Insert cuvette into Orion AQ4000. Align the ▼ on the Auto-Test cuvette with the ◆ on the adapter to obtain a continuous beeping and view \*\*\*\*\* across the display. If \*\*\*\*\* and beeping is not observed, rotate cuvette right or left to initiate the measurement.
5. Immediately cover the cuvette with the cuvette cover.
6. The Orion AQ4000 will begin a 1 minute countdown. After the countdown is completed, the Orion AQ4000 will automatically proceed to the measure mode.
7. Record the concentration reading from the Orion AQ4000 display as either mg/L or ppm Cl<sub>2</sub> or log measurement into the data logger by pressing the **log** key.

**Total Chlorine Procedure**

1. Fill the sample cup to the 25 mL mark with the sample.
2. Add 5 drops of Chlorine Activator solution. Stir briefly. Set timer for 1 minute.
3. Perform the Free Chlorine Procedure, starting with step 2, using this pre-treated sample.

## Test Method

The Chlorine Free & Total Auto-Test method employs the DPD chemistry.<sup>1,2</sup> Free chlorine oxidizes DPD (N,N-diethyl-p-phenylenediamine) to form a pink colored species in direct proportion to the chlorine concentration. Total chlorine, the sum of free and combined chlorine, is determined by adding an excess of potassium iodide to the sample. Chloramines (combined chlorine) oxidize the iodide to iodine. The iodine then oxidizes DPD to the pink colored species. Results are expressed in ppm (mg/Liter) Cl<sub>2</sub>. Halogens, ozone and halogenating agents will produce high test results. Chlorine, at >500 ppm may prevent color development.

1. APHA Standard Methods, 18th ed., p. 4-45, method 4500-Cl<sub>2</sub> G (1992)
2. EPA Methods for Chemical Analysis of Water and Wastes, method 330.5 (1983)

## Ordering Information

Cat. No.	Description
AC4070	Orion AQUAfast IV Chlorine Free & Total Auto-Test Kit
AQ4ZER	Orion AQUAfast IV Zero Vial Auto-Test Kit
AQ4CBL	Orion AQUAfast IV RS232 Cable
AQ4000	Orion AQUAfast IV Advanced Colorimeter

### Environmental Instruments Water Analysis Instruments

166 Cummings Center  
Beverly, MA 01915 USA

256445-001 Rev.A 0108

Toll Free: 1-800-225-1480  
Tel: 1-978-232-6000  
Dom. Fax: 1-978-232-6015  
Int'l Fax: 978-232-6031  
[www.thermo.com/water](http://www.thermo.com/water)

© 2008 Thermo Fisher Scientific Inc. All rights reserved.

