

# Cyanide Vacu-vials® Kit

K-3803: 0 - 0.400 ppm (Prog. # 60)

## Instrument Set-up

For CHEMetrics photometers, follow the **Setup and Measurement Procedures** in the operator's manual. For spectrophotometers, follow the manufacturer's instructions to set the wavelength to **600 nm** and to zero the instrument using the reagent blank generated below.

## Sample Temperature

Sample temperatures that deviate significantly from 20°C (68°F) may introduce test result bias.

## Sample Pretreatment

Sample pH **must be** between 7.5 and 11 before performing this test. Use a solution of sodium hydroxide or hydrochloric acid to adjust sample pH as needed. A sample pH of <7.0 could result in the evolution of cyanide gas.

## Generating Reagent Blank

A fresh reagent blank must be generated for each series of tests and for each new lot of Cyanide Vacu-vials. Use a reagent blank ampoule from the same lot as the test Cyanide Vacu-vials. To generate the reagent blank ampoule, perform **Steps # 1-6** of the test procedure using **distilled water** in place of sample in **Step # 1**.

## Test Procedure

1. Fill the sample cup to the 10 mL mark with the sample to be tested (fig. 1).
2. Using the syringe, add 1.5 mL of S-3804 Neutralizer Solution to the contents of the sample cup. Stir to mix the contents of the cup.
3. Shake the S-3801 Activator Solution, then add 5 drops to the sample cup (fig. 2). Stir to mix the contents of the cup.

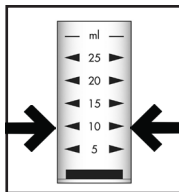


Figure 1

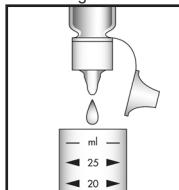


Figure 2

4. Place the Vacu-vial ampoule, tip first, into the sample cup. Snap the tip. The ampoule will fill leaving a bubble for mixing (fig. 3).
5. To mix the ampoule, invert it several times, allowing the bubble to travel from end to end.

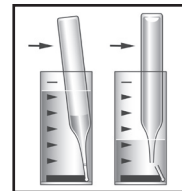


Figure 3

6. Dry the ampoule. Obtain a test result **15 minutes** after snapping tip.
7. Insert the Vacu-vial ampoule into the photometer, flat end first, and obtain a reading in ppm (mg/Liter) cyanide (CN).

**NOTE: If using a spectrophotometer** that is not pre-calibrated for CHEMetrics products, then use the **equation below** or the **Concentration Calculator** on the website.

$$\text{ppm} = 0.37 (\text{abs})$$

## Test Method

The Cyanide Vacu-vials®<sup>1</sup> test kit employs the isonicotinic/barbituric acid chemistry.<sup>2</sup> Cyanide reacts with chlorine to form cyanogen chloride (CNCI), which in turn reacts with a stabilized isonicotinic-barbituric acid reagent to form a blue colored complex in direct proportion to the cyanide concentration.

Sulfides, aldehydes and heavy metals will cause low test results. Thiocyanate will cause high test results. To determine total cyanide and to remove most interfering substances a preliminary distillation step is required.

1. *Vacu-vials is a registered trademark of AquaPhoenix Scientific, LLC U.S. Patent No. 3,634,038.*
2. *S. Nagashima, Spectrophotometric Determination of Cyanide with Isonicotinic Acid and Barbituric Acid, Int'l Journal of Environ. Anal. Chem., 1981, Vol. 10, p 99-106.*

## Safety Information

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