

# Nitrate Vacu-vials® Kit

**K-6913:** 0 - 1.50 ppm N (Prog. # 122)

## Instrument Set-up

For CHEMetrics photometers, follow the **Setup and Measurement Procedures** in the operator's manual. For spectrophotometers, follow the manufacturer's specifications to set the wavelength to 520 nm and to zero the instrument using the ZERO ampoule supplied.

## Safety Information

Read SDS (available at [www.chemetrics.com](http://www.chemetrics.com)) before performing this test procedure. Wear safety glasses and protective gloves.

## Test Procedure

1. Fill the **reaction tube** (green screw cap tube) to the 15 mL mark with the sample to be tested.
2. Empty the contents of one Zinc Foil Pack into the reaction tube (fig. 1). Cap the reaction tube and shake it vigorously for exactly **2 minutes**.
3. Add 10 drops of A-6901 Acidifier Solution to the empty **25 mL sample cup** (fig. 2).
4. Pour the treated sample from the reaction tube into the sample cup, being careful not to transfer any solid material to the sample cup.

**NOTE:** Getting a small amount of solid material into the sample cup will not affect test results.

5. 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).
6. To mix the ampoule, invert it several times, allowing the bubble to travel from end to end.

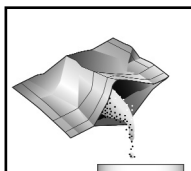


Figure 1

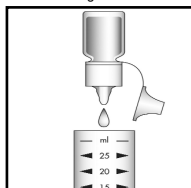


Figure 2

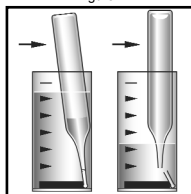


Figure 3

7. Dry the ampoule and wait **10 minutes** for color development.
8. Insert the Vacu-vial ampoule into the photometer, flat end first, and obtain a reading in ppm (mg/Liter) nitrate-nitrogen ( $\text{NO}_3\text{-N}$ ).

**NOTE:** If using a spectrophotometer that is not pre-calibrated for CHEMetrics products, then use the **equation below** or the **Concentration Calculator** found under the Support tab at [www.chemetrics.com](http://www.chemetrics.com). If instrument response is > 2 absorbance (abs), dilute sample and retest.

$$\text{ppm N} = 0.21 (\text{abs})^3 - 0.68 (\text{abs})^2 + 1.42 (\text{abs})$$

**NOTE:** To convert to ppm nitrate ( $\text{NO}_3$ ), multiply test result by 4.4.

## Test Method

The Nitrate Vacu-vials<sup>®</sup> test kit employs the zinc reduction method.<sup>2,3,4,5</sup> Nitrate is reduced to nitrite in the presence of zinc. In an acidic solution, nitrite diazotizes with a primary aromatic amine and then couples with another organic molecule to produce a highly colored azo dye. The resulting pink-orange color is proportional to the nitrate concentration.

This method is applicable to industrial wastewater, drinking water, surface water and seawater. It can be used to measure nitrate in the presence of up to 0.5 ppm nitrite-nitrogen by difference using the following procedure:

- A. Fill the 25 mL sample cup to the 15 mL mark with sample.
- B. Follow steps 5 - 8 of the test procedure to obtain a test result for nitrite-nitrogen in the sample.
- C. If the test result obtained for nitrite-nitrogen is less than or equal to 0.5 ppm, this test result can be subtracted from a nitrate-nitrogen test result (obtained on a separate aliquot of sample by following the full test procedure, Steps 1 - 8) to obtain accurate results for nitrate-nitrogen in the presence of low levels of nitrite-nitrogen.

1. Vacu-vials is a registered trademark of CHEMetrics, Inc. U.S. Patent No. 3,634,038
2. APHA Standard Methods, 22<sup>nd</sup> ed., Method 4500- $\text{NO}_3\text{-E}$  - 2000
3. ASTM D 3867 - 09, Nitrite-Nitrate in Water, Test Method B
4. EPA Methods for Chemical Analysis of Water and Wastes, Method 353.3 (1983)
5. Nelson J. L., Kurtz, L. T., and R. H. Bray Rapid Determination of Nitrates and Nitrites. Analytical Chem., V26, p 1081-2 (1954)

Visit [www.chemetrics.com](http://www.chemetrics.com) to view product demonstration videos.  
Always follow the test procedure above to perform a test.