

Total Iron Analysis in the Presence of Nitrite CHEMetrics® Iron Vacu-vials® or CHEMetrics Test Kit, Cat. No. K-6003 / K-6203 / K-6010 / K-6210

Version 2 / Apr 2025

Overview

In boiling and cooling tower applications, the amount of iron in the water is monitored due to its potential to cause some issues, namely corrosion, scale-formation and bacterial growth. In closed-looped systems, sodium nitrite is usually employed as a corrosion inhibitor and is maintained at a relatively high level (> 500 ppm). Unfortunately, this compound directly interferes with the Total Iron analysis by reacting with S-6000 Activator Solution, yielding low spectrophotometric test results as well as color interference that may elicit a positive bias for the visual test result depending on the observer. A laboratory trial (Vacu-vials), involving 10 - 1000 ppm sodium nitrite contamination in an iron-containing sample was shown to cause up to about (-)10 to (-) 60% test results bias.

The reaction of sodium nitrite and sulfamic acid (Cat. No. **S-9600**) in acidic environment can effectively remove this interference. The interaction of sulfamic acid and nitrites will rapidly generate nitrogen gas that manifest as microbubbles in the sample during pretreatment, after which normal test procedure can be performed on the sample.

Required Equipment

- Iron Vacu-vials Kit, Cat. No. K-6003 / 6203
- Iron CHEMetrics Kits, Cat. No. K-6010 / 6210
- CHEMetrics photometer (V-2000, V-3000) or a spectrophotometer that accepts 13-mm round cells.
- Sulfite Neutralizer Solution, Cat. No. S-9600 *

** This is a component of the Sulfite Titret test kits but can be purchased separately.*

Modified Total Iron Test Procedure

1. Fill the sample cup to the 25 mL mark with the sample to be tested (fig 1).
2. Add **5 drops** of the S-9600 Neutralizer solution (fig 2). Place the Vacu-vial or CHEMet ampoule, tip first, into the cup.
3. Stir vigorously for **at least 10 seconds**, preferably longer (fig 3).
4. Add the **5 drops** of S-6000 Activator solution, stir briefly wait 4 minutes.
5. Complete the remaining steps in the **Total Iron Procedure** directed in the kit instructions.

Note: A dose of 5 drops can treat a 1000 ppm NaNO_2 interference. However, rigorous stirring and allowing the reaction to sit for longer period contributes to a more thorough nitrite removal. Heavy presence of nitrites will cause the sample to fizz initially upon adding S-9600 and stirring.

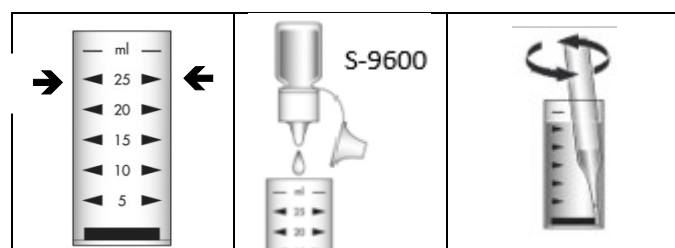


Fig. 1

Fig. 2

Fig. 3