



Phosphate (reactive, ortho) - Stannous Chloride Method

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Applications and Industries

Domestic and industrial wastewater, industrial process waters, boiler water, cooling water, surface and ground water, potable water

Power generation, pulp and paper, food and beverage

Not applicable for seawater analysis

References

APHA Standard Methods, 22nd ed., Method 4500-P D - 1999

Chemistry

In an acidic solution, ortho-phosphate reacts with ammonium molybdate to form molybdophosphoric acid, which is then reduced by stannous chloride to the intensely colored molybdenum blue. The resulting blue color is directly proportional to the phosphate concentration. Results are expressed in ppm (mg/L) phosphate as PO₄ or P. To convert results from ppm PO₄ to ppm P, divide by 3.06.

Available Analysis Systems

Visual colorimetric: CHEMets® and VACUettes®

Instrumental colorimetric: Vacu-vials®

Shelf Life

When stored in the dark and at room temperature:

Visual colorimetric:

CHEMets and VACUettes refills: 4 years

Color comparators: 2 years

Accessory solution: 20 months

Instrumental colorimetric:

Vacu-vials kit: 20 months

Safety Information

Safety Data Sheets (SDS) are available upon request and at www.chemetrics.com. Read SDS before using these products. Breaking the tip of an ampoule in air rather than water may cause the glass ampoule to shatter. Wear safety glasses and protective gloves.

Interference Information

Silica at up to at least 50 ppm does not interfere, although silica may interfere positively if the sample is heated.

Chlorine is an increasing negative interference; an approximate -4% error is expected per 1 ppm chlorine. Addition of sodium thiosulfate to the sample to destroy chlorine helps to minimize the interference.

Cyanuric acid at concentrations up to at least 100 ppm does not interfere.

Low test results will be obtained if sample is not mixed thoroughly with the stannous chloride reducing agent (A-8500 Activator Solution).

Unexpectedly high results may reflect sample contamination from labware. If contamination is suspected, labware can be rinsed with dilute sulfuric acid followed by deionized or distilled water.

Hydrogen peroxide prevents the blue color formation in the presence of phosphate. Peroxide also causes the formation of a yellow color whether phosphate is present or not.

Molybdate at >1000 ppm, thiosulfate, sulfide, thiocyanate, bismuth, thorium, fluoride, or arsenate may cause a false negative result. If the sample is heated, arsenate can instead become a positive interference.

Sample pHs should be adjusted to between 3 and 7. A sample with a pH below 3 may develop a green color, and a sample with a pH above 7 may precipitate upon addition of stannous chloride solution (A-8500).

Low test results are obtained with seawater.

Condensed phosphates (pyro-, meta-, and other polyphosphates) and organically bound phosphates do not respond to this test.

NOTE: The color development time specified in the kit instructions must be followed **exactly**, and sample temperatures should be at or near room temperature at the time of analysis. Otherwise, accuracy will be compromised.

Accuracy Statement

CHEMets and VACUettes kits:

± 1 color standard increment

Vacu-vials kit:

With a spectrophotometer:

≤ 0.08 ppm at 0 ppm, ± 0.09 ppm at 0.30 ppm, ± 0.25 ppm at 1.25 ppm, ± 0.56 ppm at 3.75 ppm PO₄

With CHEMetrics® V-2000:

≤ 0.15 ppm at 0 ppm, ± 0.09 ppm at 0.30 ppm, ± 0.40 ppm at 2.00 ppm, ± 0.90 ppm at 6.00 ppm PO₄

With CHEMetrics® V-3000:

≤ 0.15 ppm at 0 ppm, ± 0.09 ppm at 0.30 ppm, ± 0.25 ppm at 1.25 ppm, ± 0.56 ppm at 3.75 ppm PO₄

Storage Requirements

Product should be stored in the dark and at room temperature.