

Silica - Heteropoly Blue Method

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Applications and Industries

Boiler water, cooling water, natural waters, wastewater, high purity water. Not recommended for seawater.

References

APHA Standard Methods, 23rd ed., Method 4500-SiO₂ D - 1997

USEPA Methods for Chemical Analysis of Water and Wastes, Method 370.1 (1983)

ASTM D859-05, Silica in Water

Chemistry

Silica reacts with ammonium molybdate under acidic conditions to produce yellow molybdosilicic acid, which is reduced by aminonaphtholsulfonic acid to form heteropoly blue. The resulting blue color is directly proportional to the silica concentration of the sample. Results are expressed as ppm (mg/L) SiO₂. To convert test results to ppm Si, multiply by 0.467.

Available Analysis Systems

Visual colorimetric: CHEMetrics® and ULR CHEMetrics®

Instrumental colorimetric: Vacu-vials®

Accuracy Statement

Statements of accuracy are based on laboratory tests performed under ideal testing conditions using standards of known concentration prepared in deionized water.

CHEMetrics and ULR CHEMetrics kits:

± 1 color standard increment

Vacu-vials kit:

With spectrophotometers:

< 0.07 ppm at 0 ppm
± 0.08 ppm at 0.25 ppm
± 0.20 ppm at 1.00 ppm
± 0.30 ppm at 3.00 ppm

With V-2000 and V-3000 photometers:

≤ 0.25 ppm at 0 ppm (V-2000)
< 0.13 ppm at 0 ppm (V-3000)
± 0.15 ppm at 0.50 ppm
± 0.60 ppm at 3.00 ppm
± 0.75 ppm at 7.50 ppm

Storage Requirements

Products should be stored in the dark and at room temperature. The CHEMetrics refill (R-9010) can be refrigerated to extend the shelf life.

Interference Information

- This chemistry measures “molybdate reactive silica” which includes dissolved simple silicates, monomeric silica, silicic acid, and an undetermined fraction of polymeric silica.
- Citric acid has been added to the reagent to eliminate interference from up to 60 ppm phosphate.
- Color development is affected by high salt concentrations. With seawater, the color intensity may be increased by approximately 10-15%.
- Sample temperatures should be at or near 20°C. Low sample temperatures may cause false low results.
- Strong oxidizing agents may interfere in the reduction step, preventing the blue color formation.
- Sulfide and high concentrations of iron may interfere.
- Glassware may contribute silica.
- Ethylene and propylene glycol do not interfere at concentrations up to at least 1%.
- Sample color or turbidity may make a color match difficult during visual colorimetric testing and may cause a false positive result with instrumental colorimetric tests. To minimize this interference during instrumental analysis, results can be adjusted for a “chemical zero” which is prepared by omitting the addition of ammonium molybdate (A-9001 Activator Solution) to the sample during the test procedure. Alternatively, CHEMetrics’ Sample Zeroing Accessory Pack can be used in conjunction with the Vacu-vials kit to correct for potential errors.

Shelf Life

When stored in the dark and at room temperature:

Visual colorimetric:

CHEMetrics refill (R-9010): 11 months*

*shelf life can be extended by 18 months if refrigerated ULR CHEMetrics refill (R-9011), color comparators, Activator and Neutralizer Solutions: at least 1 year

Instrumental colorimetric:

Vacu-vials kit: at least 1 year

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.