

ChemScan®

PROCESS ANALYZERS

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Rev. 5/01

ChemScan® Method Summary #144 Silica in Water

Silica Analysis

Silica is the most abundant element after oxygen. It is commonly found in crystalline form such as in quartz or combined with other oxides and metals in a variety of silicates. Silica is only slightly soluble in water, resulting from the gradual degradation of silica-containing minerals. In solution, silica can exist as silicic acid or silicate ion, depending upon pH.

Silica concentration is of particular interest for steam power generation and for cooling water systems. The silica in these systems can form a silicate scale on turbine blades and heat exchange tubes. Thus, analysis of silica is important for safe and efficient operation of these systems. Silica removal, typically through ion exchange or precipitation, can be monitored to assure silica free water for steam production or recirculating cooling water.

ChemScan Analytical Method

The ChemScan analytical method is a variation of ASTM D859-94 and Standard Method 4500-Si.D, sometimes called the Molybdsilicate Method. The method is based on the reaction between ammonium molybdate and reactive forms of silica at low pH.

Forms of silica that react with ammonium molybdate include dissolved silicate ion, monomeric silica, silicic acid and some polymeric silica. Phosphate is also reactive, but the interference can be eliminated with the addition of oxalic acid. Because the ChemScan analysis is performed at multiple wavelengths in the ultraviolet and near visible wavelength ranges, the effects of phosphate reaction with ammonium molybdate at visible wavelengths may be able to be compensated without oxalic acid. However, if phosphate is to be detected in addition to silica, analysis by ChemScan is performed before and after the oxalic acid introduction to separate molybdate reactive phosphate from molybdate reactive silica.