

ChemScan®

PROCESS ANALYZERS

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ChemScan® Application Summary #106 Hardness Control

Statement of the Problem

Water supplies obtained from natural sources are often contaminated with the salts of calcium, magnesium, sodium, potassium, iron, manganese, barium and other metals. The concentration of calcium and magnesium salts are usually much higher than other compounds and are therefore the major cause of water hardness.

Water utilities control hardness through ion exchange or chemical precipitation processes to remove calcium and magnesium. These processes may also remove other metal ions that contribute to water hardness.

Control Strategy

On-line hardness analysis can be used to determine the need to regenerate ion exchange tanks. Analysis of hardness into and from lime soda softening processes can be used to adjust chemical feed or sludge recirculation rates.

ChemScan Analytical Method

The ChemScan method for low hardness concentrations (under 5.0ppm) is an improvement of the standard EDTA method. The EDTA titration is eliminated and precise pH control is not required as long as sample pH is 12 or more. The ChemScan Process Analyzer detects the intensity of the reaction between Calmagite indicator and hardness anions at multiple wavelengths, following addition of a pH buffer.

Results for both methods are shown in ppm CaCO₃ units.

The method for high hardness concentrations (typically 5-500ppm or more) is based on the measurement of residual NTA after a fraction has been complexed with total hardness

Apparatus

ChemScan Process Analyzers can detect hardness alone or in combination with major anions that may be present such as sulfate and nitrate.