

ChemScan®

PROCESS ANALYZERS

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ChemScan® Application Summary #105 Color Removal in Water

Statement of the Problem

Color in surface or ground water may result from the presence of metal ions, natural organic matter, algae or plankton, plants and/or industrial wastes.

A variety of techniques are used to remove color. These include oxidation of ions and organics using diffused air or a chemical oxidant, ion exchange techniques, coagulation or precipitation followed by solids separation, biological treatment and other methods.

Control Strategy

Measurement of color is frequently a surrogate for direct measurement of the compounds which cause the sample to possess true color. (True color is the color of water after turbidity has been removed.)

Thus, color removal processes may benefit from an analysis of the water prior to color removal compared to an analysis after color removal. The analysis can measure the color inducing matter itself, the resulting color or both.

If color is principally the result of colloidal or suspended material present, there may be a substantial difference between the "apparent color" which includes the colloidal or suspended matter and the "true color", which remains after filtration of the sample.

Color Analysis

Visual color analysis techniques depend upon the human ability to discriminate light, generally over the range of 380 nm (violet) to 700 nm (red), based on wavelength composition resulting from the responses from three classes of photo receptors in the human eye. Visual methods are very subjective, since each person sees color differently. A set of platinum-cobalt standards are typically used for comparison. Spectrophotometric methods for analysis of color are generally more reliable than visual methods.

ChemScan Instruments

ChemScan Process Analyzers are array detector spectrophotometers designed to measure the relative absorbance of individual wavelengths of light transmitted through a fixed path length liquid sample connected to a flow cell within the analyzer. The light absorbance signatures are generally used as an input for a chemical analysis software algorithm but may also be used as a direct indicator of overall optical properties.

Any of several recognized color scales (Pt-Co, APHA, ADMI) may be used, with ChemScan performing calculations to convert wavelength intensity values to the appropriate color scale value.

Sample filtration can be performed prior to analysis using a ChemScan cross flow ultrafilter or samples can be automatically normalized to subtract the effects of turbidity by making a measurement at a reference wavelength that is not affected by dissolved color or by color inducing matter but is affected by turbidity.

If desired, a measurement of color inducing matter such as metals (iron, manganese, copper, chromium, nickel or others), natural organic matter (humic acid, tannic acid, fulvic acid) or other components can be made by ChemScan.