

ChemScan®

PROCESS ANALYZERS

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ChemScan® Method Summary #42 Percent Transmittance in Treated Wastewater

Transmittance Monitoring

Numerous chemical substances absorb light in ultraviolet or visible portions of the light spectrum. Measurement of the amount of light transmitted through a fixed path length of sample can be used as a surrogate measurement of concentration for a specific chemical or group of chemicals or for a physical condition such as turbidity or suspended solids concentration. Specific chemical measurements will depend on the purity of the sample and the specific wavelength used for analysis. One of the most popular applications of this principal is the measurement of percent transmittance prior to UV Disinfection. (See ChemScan Application Summary #103, Ultraviolet Disinfection Control.)

Standard Techniques

Percent transmittance is typically measured by comparison of light intensity before and after the light passes through the sample. Light transmittance is the inverse of light absorbance. (See ChemScan Method Summary #127, Specific UV Absorbance.) Transmittance measurements of the same sample will have different percent transmittance values on different analyzers based on differences in path length, cell fouling, light source intensity, and detector efficiency. Standard methods have not defined an absolute reference or a standard path length for transmittance analysis, so care should be exercised in comparing results from different measurement instruments.

Also, at least two adjustments may be required to obtain a true percent transmittance result. If the sample is contained within a transparent cell, the measurement must compensate for losses of light at the cell walls and from any film or deposits on the cell surfaces. A blank or zero standard is used to characterize any light intensity losses attributable to the sample cell itself. Other losses can be attributable to light scattering within the sample from suspended particles. If percent transmittance is to be used for analysis of dissolved chemicals, the possible effects from suspended particles should be considered. The suspended particles must either be removed prior to analysis or their effects must be independently measured at a second wavelength and removed mathematically from the analysis.

ChemScan Analytical Method

Continuous on-line analysis of percent transmittance can be most economically performed on the ChemScan UV-0254. This analyzer is designed to continuously detect light intensity in one sample line at 254 nm with or without compensation for turbidity. The UV-0254 has several features designed to provide stable, accurate results. These features include independent measurement of lamp intensity prior to light transmittance through the cell to correct for lamp drift and intensity losses, thermopane type flow cell windows to eliminate errors from condensation, automatic zeroing to correct for fouling within the flow cell, automatic cleaning to remove mineral deposits and slimes within the cell, and dual wavelength measurements to allow for optional turbidity correction from suspended particles. The ChemScan UV-0254 measures transmittance at 254 nm and performs optional turbidity correction at 404 nm.

Other full spectrum ChemScan analyzers can perform percent transmittance analysis at any desired ultraviolet or visible wavelength or at several independent wavelengths and can monitor multiple sample points.

All ChemScan Process Analyzers are designed to perform periodic zeroing using deionized water standards and periodic chemical cleaning of optical surfaces using a site specific cleaning solution. Best results for percent transmittance applications will be obtained with frequent zeroing and cleaning, accomplished with an automatic system.