

ChemScan[®]

PROCESS ANALYZERS

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ChemScan[®] Method Summary #68 Natural Organic Matter (NOM) in Water

Natural Organic Matter (NOM) is the organic material present in surface or ground water. NOM includes both humic and non-humic fractions. The humic fraction includes high molecular weight organic molecules such as humic and fulvic acids. These substances plus tannic acid are the major fraction of Dissolved Organic Matter (DOM) in water. These substances are oxidized very slowly and their solubility in water may vary with pH. The dissolved fraction of NOM may not be fully removed using conventional water treatment practices and have been shown to produce by-products such as trihalomethane during disinfection. On-line analysis of dissolved NOM is important for proper monitoring and control of enhanced or special treatment processes designed to remove NOM prior to disinfection.

Standard Analysis Methods

Natural Organic Matter is typically classified by solubility, as measured by particle size. Particles under 0.45 micron are classified as dissolved, while particles over 0.45 micron are classified as colloidal or particulate. The usual detection method is to separate the size fractions using membrane filtration, then analyze each fraction for organic carbon using TOC analysis procedures. In typical raw water from surface or ground water sources, the dissolved fraction is the major source of the Natural Organic Matter. This is also the fraction that tends to form disinfection by-products. This standard TOC analysis approach is difficult and expensive to automate for on-line monitoring at multiple sample points in a water treatment plant, and is not necessary if the objective is process control within the plant.

ChemScan Analytical Method

Dissolved Organic matter can be economically monitored using UV light absorbance as described in Standard Method 5910.B. Many organic acids have a unique light absorbance signature in the ultraviolet wavelength range. Individual components such as tannic acid, humic acid or fulvic acid can be detected as individual parameters through their individual absorbance signatures or as a combined value through the use of shared wavelengths such as 254 nm. The ChemScan UV-0254 can be used to detect Dissolved Organic Matter, independent of turbidity. Other ChemScan analyzers can perform a full spectrum analyses across the entire ultraviolet wavelength range for individual or combined analysis of NOM components. The full spectrum analysis using pattern

recognition techniques can detect NOM and can also compensate for the effects of other organic and inorganic matter and turbidity present in the sample.

Monitoring System Requirements

The Information Collection Rule (ICR) defined certain sample collection points for monthly analysis. Data gathered under the ICR confirms the use of UV light absorbance as a dependable surrogate for analysis of dissolved organic matter. The same sample points used for ICR analysis are excellent candidate sample points for on-line NOM monitoring using the ChemScan Process Analyzers. These points include:

- A. Treatment plant raw influent
- B. Before and after coagulation/flocculation
- C. Before and after sedimentation, filtration or softening
- D. Prior to disinfection
- E. At the distribution system entry point

Monitoring System Requirements - Water or Wastewater

ChemScan Process Analyzers can accommodate samples with up to 150 mg/l of total suspended solids and turbidity of up to 60 NTU. Samples that contain debris capable of plugging sample lines or that contain high solids and turbidity may require screening, settling or filtration prior to analysis. Most ground water plants and many surface water plants will not require any filtration prior to analysis. Plants with high influent solids and turbidity may require filtration for samples extracted from points in the treatment process prior to initial settling.