Electro-Chemical Devices

White Paper

Two Ways to Measure TOC Levels in Water: UV Persulfate NDIR Vs UV Correlation

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Introduction

Plant engineers responsible for water and wastewater treatment in municipal and industrial plants will find that there are two different, highly accurate and reliable sensor technology solutions to measuring total organic carbon (TOC) levels to protect water quality.

Organic compounds are found in almost all types of water – from natural and treated drinking water to process water, cooling water, and water used in pharmaceuticals and food production. Too much organic contamination in the water interferes with many municipal and industrial processes. For example, when disinfecting drinking water an excess of organic matter can foster microbiological growth or indicate the presence of other undesirable byproducts.

Measuring TOC levels continuously with online analyzers is a highly effective, dependable way to monitor water and wastewater for hazardous contaminants. Depending on the plant, the process and the water quality requirements, plant engineers typically select one of the industry's two most popular sensing techniques to measure TOC.

Two Ways To Measure

The reliable ECD **Model 3S TOC Analyzer** measures TOC using the UV persulfate oxidation method with carbon dioxide detection by nondispersive infrared absorption (NDIR). In comparison, the ECD **Model UV-6 TOC Analyzer** measures TOC levels with a UV absorption correlation technique. Both ECD analyzer models provide excellent TOC measurement accuracy and repeatability to ensure compliance with water quality standards.

#1 **UV Persulfate Oxidation**

ECD's Model 3S TOC Analyzer measures TOC in liquid samples ranging from 0–5 mg/L to 20,000 mg/L. The UV persulfate oxidation method conforms to EPA, DIN, CE, ASTM, and NAMUR regulations as well as meeting the requirements of ISO and EN directives.

The very dependable Model 3S TOC Analyzer features a fast-loop reservoir with a floating level sensor. If no sample reaches the reservoir for more than a pre-set time, the analyzer switches automatically to standby mode. As soon as the sample flow re-starts, the analyzer switches back to the analysis cycle automatically. Air bubbles are removed in the reservoir before the sample enters the analyzer.

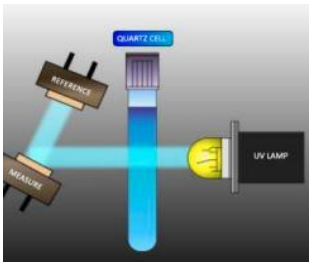
The sample first is acidified and then sparged to remove inorganic carbon. The remaining liquid is mixed with sodium persulfate and digested by two high-performance reactors. The resulting CO_2 is then stripped from the liquid and, after drying, its concentration is measured by a NDIR analyzer to determine TOC levels.

#2 UV Correlation

An alternative TOC analytical method is the UV correlation technique performed by the ECD UV-6 Analyzer.

The analyzer is factory configured by ECD to measure TOC as correlated with the 254 nm wave lengths and the final correlated calibration is done by matching the TOC measured to the on-site grab sample TOC value.

The Model UV-6 Analyzers are a family of on-line sampling analyzers that use UV absorption to perform an analysis. The analyzers are configured to perform analysis over a wide range of values for each parameter measured, nitrate, color, or the correlation at 254 nm wavelength for TOC, COD or BOD.



This technique measures TOC based on the measurement of UV absorption in the sample. The absorbance of the solution or gas is measured though a quartz flow cell at the chosen parameter's specific wavelength using a long life Xenon light source and photo-detectors. The absorbance level is related to the sample concentration according to the 'Beer-Lambert Law'.

The UV6 Analyzer features an easy-to-use reagent-less design. The UV spectroscopy measuring principle requires no chemical reagent resulting in very low operating and maintenance costs. There are no reagent chemicals to order, store, track and dispose at the end of their useful life, simplifying the entire process.

Conclusions

Depending on the application, measurement requirements, equipment, plant layout, operating environment, etc., either TOC measurement method could be the best choice. ECD's application engineering team is available help you pick the best TOC measurement analyzer that will fully meet your needs. If you have a problem or question, they've probably seen it before and have the answers ready to help.