

The Importance of Visible TOC Levels

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Introduction

Many chemical and petrochemical plants consume large amounts of water for processing product. An understanding of the organic loading in this water at all times is critical to avoiding upsets that can stop production, damage capital equipment, or create other costly issues. In recent years, total organic carbon (TOC) analysis has been accepted as an alternative to laboratory biochemical oxygen demand (BOD) and chemical oxygen demand (COD) analyses. TOC measurement has become the standard; it's the only reliable on-line method used to determine the contamination in waters to control processes and to minimize waste in the industry.

Overcoming TOC Measurement Challenges

On-line TOC analysis in the chemical and petrochemical industries is often extremely challenging due to the difficulties presented by liquid samples that typically contain high concentrations of organics and solids. Sampling issues can often lead to problems of clogging and analyzer downtime which result in high maintenance costs and low instrument reliability. If left unchecked, these issues can erode confidence in the measurement, which in turn can leave a process vulnerable to the costly problems the analyzer was originally intended to prevent.

Two-stage advanced oxidation (TSAO) was developed specifically by BioTector to overcome these limitations experienced by users. The key to the success of the TSAO process lies in the self-cleaning oxidation technique. This patented chemical oxidation process, using hydroxyl radicals, allows the complete oxidation of a large volume of sample fluid. This overcomes limitations experienced by other technologies, including salt buildup inside the reactor or inhibition of the oxidation process.

TSAO allows each analyzer to utilize up to six streams. This multi-measurement capability maintains high accuracy levels because the patented self-cleaning technology ensures there is no cross-contamination or carryover. The highly effective multi-stream option has been acknowledged by many companies to be a strong driver in their decision to purchase BioTector.

The Hach BioTector B7000 TOC Analyzer has built a worldwide reputation for its ability to excel in the toughest applications. This ability, along with the potential value extracted from reliable, real-time TOC information, is found in some of the world's largest chemical and petrochemical manufacturers.

Management Information Tool

Typical sites discharge at a rate of thousands of gallons per minute and each plant usually has a maximum carbon loading. Here, real-time and reliable TOC information is critical to decision making. A significant commercial advantage of the BioTector B7000 is that it gives confidence to management and operators in TOC measurements. The operations team can then use this information to drive operational decisions at the wastewater treatment plant (WWTP) including:

- Wastewater diversions to manage capacity and protect the WWTP from overload
- Selecting correct chemical volumes for wastewater treatment
- Managing energy usage levels for wastewater treatment.

Return on Investment with BioTector

Based on information patterns obtained from the BioTector analyzer, management can make long-term plans. For example, the data helps managers determine load sharing between different plants or production lines as well as toxic loadings through holding facilities. Clients have reported that, because the BioTector B7000 measures TOC reliably and accurately, they can build trends and averages and manage their operations based on what they know each area is putting into the stream.

BioTector clients have been emphatic about the operations savings to be made by using BioTector. The purchase price of the Hach BioTector B7000 is offset against a strong ROI and early payback period. In addition to this, BioTector also contributes to corporate sustainability goals.

Worst case scenario, a lack of accurate and real-time measurement could overload the WWTP and shut down the site. This would cause significant disruption to production volumes.

Real-Time Visibility and Early Detection

Hach BioTector analyzers monitor TOC continuously, giving the operations team real-time visibility of wastewater loading and enabling them to respond rapidly to incidents or upsets.

For many clients in the chemical and petrochemical industry, the BioTector B7000 is installed to monitor inbound river water, providing an early detection system. This water typically contains high volumes of silt and mud from local rivers. Clients implement analyzers at this point to:

- Ensure that there is no organic contamination from other plants in the area
- Assess treatment options before releasing this water into operations
- Ensure that overground and underground process lines have not ruptured.

The functionality featured above provides the respective sites with information to stay compliant in a situation where inaccurate data would be extremely costly to the company.

Accuracy and Filtration

Industry doesn't provide clean samples for measurement. Therefore, analyzers must work consistently with particles and dirty liquids. The BioTector B7000's self-cleaning technology and powerful oxidation process eliminates sample buildup and tube clogging. This means that the analyzer can use larger sample tubing. The tubing has an ID of 3.2 mm (the industry standard is 0.8 mm ID) which allows soft particulates of up to 2 mm. Filtration is not necessary and no additional equipment or maintenance is

Application Note: TSAO, TOC and BioTector B7000

required. Further, after each cycle of measurement, every part of the analyzer that comes in contact with the sample is automatically cleaned so that it does not suffer from drift or sample contamination. The end result is a more representative sample and therefore more accurate TOC results.

Reliability and Maintenance

The BioTector B7000 reduces TOC analyzer maintenance costs significantly by eliminating recurring issues that arise due to particulates in the liquid sample. The analyzer only requires a routine service every six months. Calibration is not required in-between these services and no drift occurs.

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