Effluent Organic Load Control Using Continuous TOC Monitoring

Problem

In order to effectively manage organic load elimination in wastewater treatment, it is necessary to have continuous organic monitoring, so that the process can be adjusted according to the actual organic load. This information is critical in determining when to end treatment.

Solution

The BioTector B7000 TOC (total organic carbon) analyser provides precise TOC results in the different phases of the purification process, giving accurate information on the treatment status and making it possible to make decisions in real time.

Benefits

The availability of continuous TOC values makes it possible to automatically control the process by modulating the operating variables according to the results obtained, enabling smart decisions to be made instantly.

Background

Destilerías Muñoz Gálvez is a company in Spain specialising in the manufacture of aromatic chemical products, essential oils, fragrances, and flavours. Its growth strategy includes the launch of a new industrial wastewater treatment plant (see Figure 1) that will enable treated water to be reused. The company participates in the European WaterReuse project (see Figure 2), which aims to reuse wastewater after the reduction of its organic load. To do this, it applies several of what are considered to be the best available technologies (BAT) for effluent treatment.

The company's new facility is fitted with four treatment lines, ultra- and nano-filtration, photochemical, and electro-oxidation for organic load reduction, which enables water reuse. A PLC and SCADA system carry out process control, providing automatic control of each treatment line and continuously recording process data to aid in decision-making. In all cases, it is necessary to find out the initial level of organic load before each treatment; the destruction profile of the organic load during each assay, and the final value reached.

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Figure 1: Destilerías Muñoz Gálvez's new facility

Figure 2: The European WaterReuse project is a European Commission (EC) funded project.

Solution and Improvements

The company installed a BioTector TOC analyser, fitted with four sample channels, to continuously monitor the four treatment lines mentioned earlier. The analyser connects to an internal PROFIBUS DP network, so that the SCADA system can receive and make decisions based on the information provided, enabling efficient control of the treatment processes.

The TOC analyser accurately monitors the development in organic load of each treatment line, which can vary from high to very low TOC concentration levels. The analyser's unique Two-Stage Advanced Oxidation (TSAO) technology guarantees the oxidation of the complex organic compounds present in the sample. Furthermore, the analyser has a self-cleaning feature that enables it to measure a wide range of samples in a single instrument without the risk of contamination from one sample stream to another.

The TOC measurements were used to record the elimination kinetics of organic matter during an electro-oxidation treatment for water previously treated with membranes. The values shown in Figure 4 demonstrates these organic matter elimination kinetics and enable the SCADA to adapt electro-oxidation operating parameters, such as the electrical charge supplied, to the instantaneous concentration of organic matter.

Figure 3: BioTector B7000 installed at the plant

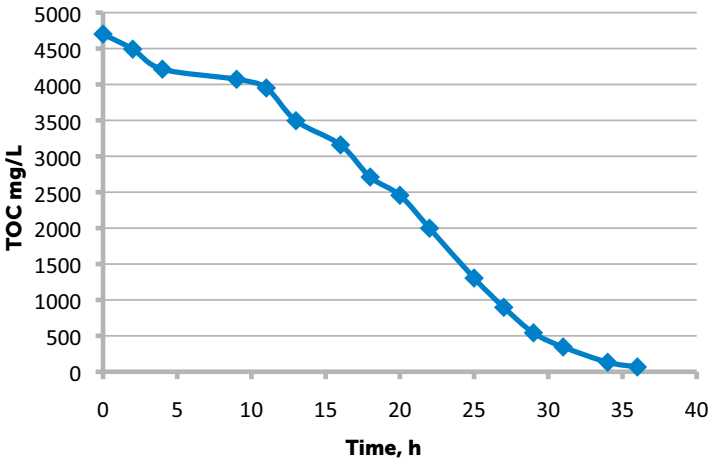

Figure 4: Reduction of TOC over time in the electro-oxidation treatment phase

Conclusion

The analyser provides a reliable value directly related to the total content of the effluent organic load during the treatment process. The availability of TOC values versus real time permits action to be taken automatically by modulating the operating variables based on the results obtained, making it possible to make smart decisions in real time.

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