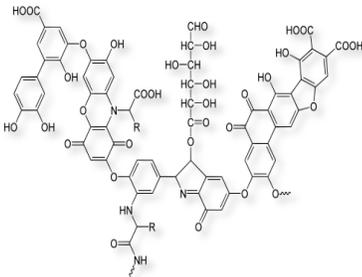


Total Organic Carbon Monitoring with the LiquID™ Station

Measuring Total Organic Carbon

The LiquID Station represents a revolutionary new tool for online organic carbon monitoring, in both clean and waste water systems. The system combines ZAPS own patent-pending spectral methodology with a ruggedized form factor and a low-noise optical platform to produce total organic carbon (TOC) readings that are both selective and sensitive.

The term “total organic carbon” encompasses a diverse range of organic carbon compounds found in a typical natural water stream or wastewater stream (such as humic acid, pictured below). As these compounds affect a number of water related processes, TOC is a foundational measurement in a number of applications; including water treatment, desalination, and other water reuse and industrial applications.



Skilled analysts have traditionally measured TOC in a lab using combustion- or chemical-oxidation procedures. Both of these techniques rely on converting 100% of all organic molecules to carbon dioxide, which is then measured by absorption in the infrared.

Somewhat recently, instrument supply companies have produced automated systems to perform these processes, including cabinet based online analyzers.

These online instruments produce precise and reliable measurements, but require a high level of “care and feeding” to keep them clean, calibrated and supplied with reagents. Maintenance is even more difficult when they are used to monitor saline brackish water or seawater.

Optical monitoring systems, which monitor continuously and use no reagents, have emerged to bypass these problems. These optical systems utilize **ultraviolet-visible light spectroscopy**, where absorption measurements of light at specific wavelengths are used to measure specific compounds in the water matrix. A number of newer online, multi-parameter instruments use this spectral method combined with algorithmic correction to monitor key water quality parameters such as

About LiquID™

The **LiquID Station** from **ZAPS Technologies** (pictured below) is an innovative, optical instrument for continuous water quality monitoring. The automated online instrument analyzes a continuous flow-through stream from a pressurized water sample line using multi-spectral light and software algorithms, and uses no reagents nor produces any waste other than the original sample (which is returned or wasted as appropriate). With this method LiquID is capable of monitoring a wide range of water quality parameters in a number of different industry applications, including those relevant to municipal water and wastewater treatment, water reuse systems and industrial process control.



Deeper UV TOC

- More Power
- Better Signal-to-Noise Ratio
- Better Matrix Correction
- Sensitivity & Selectivity

nitrate-nitrogen, UV absorption/transmittance @ 254 nanometers, and to estimate organic carbon concentration.

The challenge for all of these instruments is in applying good correction factors. The absorption curves of the various compounds in a typical natural or wastewater system tend to overlap significantly, especially in the near-UV range where organic carbon is measured. To solve this, instruments gather multi-spectral measurements and use mathematical algorithms to isolate individual compounds and attempt to use

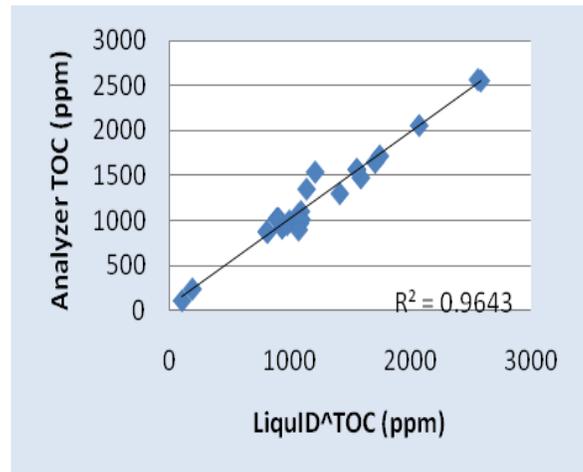
mathematical algorithms to correct for interferences from coexisting compounds, which is effective inasmuch as the instrument's signal strength is sufficient to sort through it all. But whatever corrections are made, TOC from these devices is never better than an estimate because they do not use high enough energy to detect the carbon bonds that form the lattice of organic molecules.

The innovative ZAPS approach provides a further advancement in TOC monitoring, by going deeper into the UV spectrum (patent pending). Using advanced optical components, the LiquID Station monitors at a higher-energy than other devices. This innovation provides LiquID with greater signal strength and an enhanced ability to measure carbon-oxygen bonds which ultimately leads to more robust and accurate TOC measurements. More powerful light means that LiquID can provide TOC readings that are reliable, selective, and highly sensitive, in matrixes ranging from ultrapure water to seawater to wastewater.

Effective in Different Matrixes

The LiquID Station is a robust, ruggedized instrument, designed for monitoring in indoor or outdoor environments and matrixes ranging from ultrapure waters to wastewater. **For TOC monitoring, LiquID provides a detection range from below 10 parts per billion to 5000 parts per million.** Further, this capability extends into challenging water systems, including turbid or saline waters where other systems fail. In fact, LiquID was originally invented by an oceanographer for monitoring compounds in seawater.

The graph to the right shows LiquID data from a trial at Seattle Tacoma International Airport. In that environment, the TOC pool is primarily airplane de-icing fluids and mechanical greases and oils. TOC loads and water turbidity varies widely in that application, depending on weather and temperature, but LiquID TOC readings remain true.



Real-time LiquID TOC readings from Sea-Tac International Airport compared to conventional lab analysis results

Value of Real-Time TOC Monitoring

The monitoring needs of each industry and each plant vary, but organic carbon chemistry is at the heart of a wide range of water quality challenges, and so it is a core measurement provided by the multi-parameter LiquID Station platform for a number of different industries. To learn more about how TOC and other LiquID measurements can benefit your operations, please contact ZAPS for further information.

Contact ZAPS For More Information

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