

Biochemical Oxygen Demand Monitoring with the LiquID™ Station

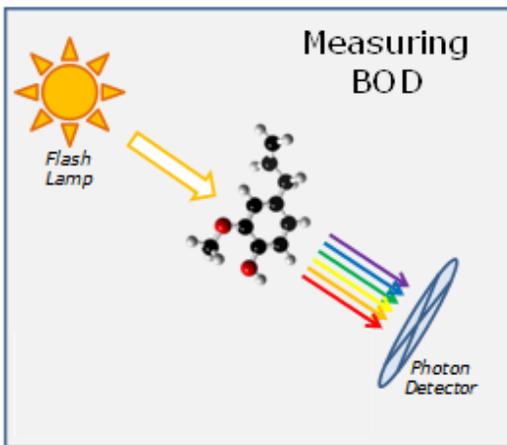
Measuring Biochemical Oxygen Demand

Biochemical Oxygen Demand (BOD), and its cousins **Carbonaceous BOD (cBOD)** and **Chemical Oxygen Demand (COD)**, are essentially measurements of energy. They are the energy contained in the molecular bonds of the carbonaceous and nitrogenous organic substances in a wastewater stream.

That organic material is food for microbes, which break the bonds and consume the energy released in the process. In an aerobic environment, the breaking of bonds consumes oxygen. Thus, the profile of types and quantities of molecular bonds in the molecules in the wastewater stream determine its “oxygen demand.”

The classic BOD₅ test is one way to estimate the potential of waste to consume oxygen. It involves seeding a sample with live microbes, incubating and waiting for five days, then reading the oxygen depletion to gauge the result. This method is time-tested, being in use for over 100 years, but it's messy, imprecise, and most importantly, slow. The time delay from sample to results means that test results are useless for detecting transient problems or engaging in real-time process control.

For faster BOD monitoring, the LiquID Station from ZAPS Technologies an innovative, optical method. Instead of watching microbes eat for days,



High-powered light is measured at different frequencies to map the molecular bond energies of organic substances – both particulate and dissolved – in the wastewater stream.

LiquID bathes a continuous sample fluid with broad spectrum light and collects multispectral readings about every two minutes, then processes those readings using software algorithms. The light interactions at different frequencies are determined by the quantities and types of molecular bonds ... the same bonds that microbes use during degradation. In contrast to the classic indirect process, the LiquID directly measures the consumption potential in

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.



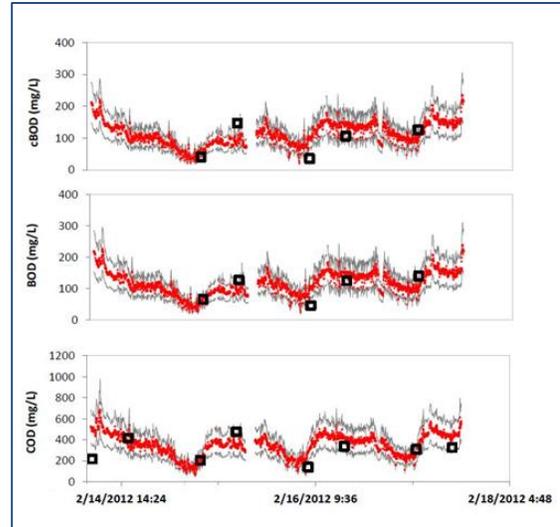
your process stream, allowing real-time process monitoring and control.

The method is ZAPS-own proprietary invention, and iterations of it are used for cBOD and COD monitoring as well. With spectral light mapping the bonds and software to process the data, the LiquID provides robust measurements of oxygen demand in continuous real-time.

Effective in Multiple Matrixes

One key benefit of LiquID's optical-algorithmic methodologies for BOD, cBOD and COD measurement is its extensibility across a broad range of solids concentrations. Stated another way, the LiquID Station can monitor the various kinds of oxygen demand in matrixes from very clean wastewater effluent all the way up to raw wastewater influent.

In addition to being robust to solids, the novel optical array at the heart of the LiquID Station also provides highly sensitive measurements. In most matrixes, BOD, cBOD and COD are measurable with a sensitivity of below one part per million.



The graph above shows comparative data from grab samples analyzed using traditional lab techniques (black squares) and continuous data from the LiquID Station.

Value of Real-Time BOD Monitoring

When a plant first installs a LiquID Station and starts continuously monitoring parameters like BOD, cBOD and COD, which were previously monitored only with periodic grab or composite samples, one of the major challenges is figuring out next what to do with all that data. The data reveals aspects of the plant's diurnal cycles and irregular events that most never knew existed. At ZAPS, we refer to this as "the secret life of the wastewater treatment plant."

Every treatment plant is different, but in general it is valuable just to see that secret life as it is taking place. Putting that data in operator's hands gives them information, which leads to knowledge, and over time that knowledge leads to insight. More specifically and proactively, real-time BOD data can enable advanced process control, such as through better response to influent changes in the raw feed through flow equalization, or avoiding overtreatment in the aeration basin. Moreover, monitoring effluent BOD and other parameters provide operators and managers with increased confidence in their plants' operation, 24/7. Contact ZAPS representatives to learn how LiquID BOD, cBOD and COD monitoring will benefit your wastewater treatment plant.

Contact ZAPS
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