

Measuring Wastewater



The most common way to measure wastewater strength is through a BOD₅ test. As the name suggests, this takes 5 days to complete. By the time the test has been run, the reason/cause for the results may not be known, and operators are left scratching their heads about what to improve. But, there are new technology products that allow for near real-time wastewater analysis.

Introduction

If the conventional BOD test takes too long, are there other options to quickly measure organic concentrations in wastewater? YES, and it starts by considering other measurement approaches such as COD.

The difference between BOD and COD is that BOD provides a measure of all the organic matter that can be biologically oxidized, whereas COD provides a measure of everything that can be chemically oxidized in the water.

For a given wastewater source, the ratio between BOD and COD is usually consistent. The critical benefit of COD is that it is a much faster test than BOD, with the time ranging from several minutes up to three hours depending on the methodology. Historically COD testing required harmful chemicals, a laboratory, and specially trained people. Now this test can be run by simply pressing a button. BLOOM decided to test this new technology.

The Thought Behind the Pilot Projects

**[BOD Explained](#)
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The composition of wastewater is a good indicator of process issues and therefore presents opportunities for operational improvements. The concentration of organic materials in wastewater is commonly measured as BOD (mg/L).

Understanding "cause and effect" is critical for making improvements to any operation or process. For wastewater, the first step is getting a firm grasp on how operational practices impact organic strength. This is critical and requires rapid access to analytical results.

'Rapid results allow for rapid decisions'

The good news is the availability of new, real-time, analytical technologies that will generate rapid results. Having quick and reliable information at their fingertips will empower food and beverage producers to improve production operations, reduce waste ending up in their water, and mitigate regulatory compliance fines.

The Pilot Projects

BLOOM recognized the need to demonstrate the feasibility and potential of these new real-time or near real-time systems within food and beverage processors.

A COD system that is representative of this new approach was identified: the PeCOD® analyzer by MANTECH. ([link](#))

PeCOD® analyzer units were installed and tested at three different facilities: a winery, a bakery and a brewery. The purpose was to undertake "real-world" measurement and analysis of effluent wastewater. The installed analyzers were configured to automatically collect and test samples periodically through the day over a period of 4-6 weeks. Duplicate effluent samples were collected on a regular basis and sent for independent laboratory analysis for COD and BOD levels.

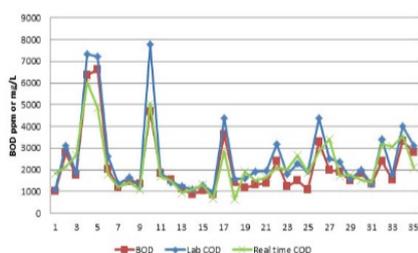
The objectives of the pilot demonstrations were to:

- Characterize the facilities' wastewater composition
- Compare on site "real-time" analysis with both standard laboratory BOD and standard laboratory COD analysis
- Establish correlation ratio relationships between laboratory results and on site "real-time" results to support the predictive ability of "real-time" COD.

The Results

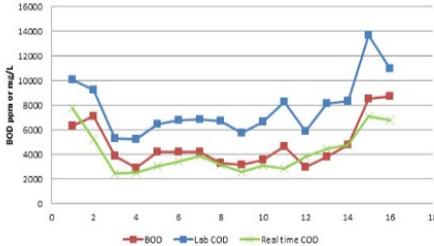
Near real-time COD testing is accurate at estimating BOD levels, as shown in Figures 1-3. There is no need to wait for results.

Figure 1 - Winery BOD and COD readings



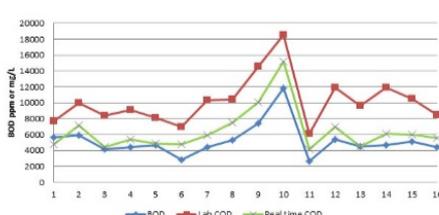
Number of Samples	Laboratory COD:BOD Ratio (standard deviation)	Laboratory COD: Real-time COD Ratio (sd)	Real-time COD:BOD Ratio (sd)
39	1.22 -0.19	1.2 -0.37	1.12 -0.49

Figure 2 - Bakery BOD and COD readings



Number of Samples	Laboratory COD:BOD Ratio (standard deviation)	Laboratory COD: Real-time COD Ratio (sd)	Real-time COD:BOD Ratio (sd)
16	1.69 -0.25	1.96 -0.36	0.89 -0.19

Figure 3 - Brewery BOD and COD readings



Number of Samples	Laboratory COD:BOD Ratio (standard deviation)	Laboratory COD: Real-time COD Ratio (sd)	Real-time COD:BOD Ratio (sd)
16	2.01 -0.32	1.63 -0.24	1.25 -0.21

Conclusion

Food and beverage companies can accurately determine the amount of organic concentration in wastewater using new technologies that complete a COD test in minutes. The COD data can be used to identify "cause and effect" relationships between process operations and wastewater composition, opening the door to improvement opportunities.

Rapid COD measurement technologies have the capacity to accurately predict BOD. Given that BOD is a wastewater regulatory parameter; this is a key tool for those processors looking to proactively manage their compliance risks.

About BLOOM Section

BLOOM is changing the game on water use to mitigate risks and improve competitiveness for the Ontario food and beverage sector. BLOOM makes it easier for industry to adopt sustainable improvements. This is achieved through a sector focused approach.

