



MEASURING OXYGEN DEMAND QUICKLY, CLEANLY, ACCURATELY

For many years industry has needed a fast, efficient way to predict the impact of waste streams on downstream treatment plants and the environment. This impact is commonly measured through BOD tests which require five days or more, so permit-holders often turn to laboratory COD tests to approximate BOD. Most of these methods are variations of the Dichromate test; providing a faster test but with fundamental drawbacks. Combustion analysis offers a much-needed path forward.

OXYGEN DEMAND

Organic waste degrades in treatment plants - as in nature - through oxidation, which can be the result of biological, chemical or thermal processes. Each of these processes forms the basis for an oxygen demand test method.

BOD

Biological Oxygen Demand (BOD) is often found on discharge permits as a required measurement. The test involves seeding a sample with bacteria, then measuring the drop in oxygen over a period of days. So a 5-day measurement is known as BOD₅.

At only five days oxidation is incomplete, so variations of the test may call for longer durations, but 100 percent oxidation is never achieved.

An obvious drawback to BOD testing is that the time required limits its value for process control. So industry often augments the required BOD testing with other faster methods.

COD

Chemical Oxygen Demand (COD) is determined in the laboratory using chemicals to accelerate oxidation.

The most prevalent laboratory COD tests are variations of the potassium dichromate method, also known as Method 410.4.

Using this method, sealed tubes containing sample, blanks, and standards are heated in the presence of dichromate at 150°C to digest the organic load. After two hours, the tubes are cooled and results are indirectly measured colorimetrically at 600nm.

Limitations of the Method

- ▲ Two hours required
- ▲ Hazardous Residue (chromic acid, mercury sulphate, sulphuric acid and titration reagents)
- ▲ Poor accuracy
- ▲ Limited to <900 ppm

THERMAL OXIDATION

TOD

Total Oxygen Demand (TOD) measures Oxygen Demand through high-temperature oxidation. In this method, a nitrogen carrier gas with a known amount of oxygen passes through a combustion chamber. As the sample is oxidized, oxygen is depleted and the reduction is measured directly using an O₂ gas detector.

TOD has been standardized as ASTM Method D6238. TOD can be correlated to both COD and BOD, providing effective on-line control.

LAR's QuickCOD combustion analyzers perform TOD measurement at 1200°C. At this temperature, **no catalysts or reagents are needed** for complete combustion, including particulates.

- ▲ Quick 3-minute measurements.
- ▲ High Range - As high as 250,000ppm without dilution.
- ▲ Accurate and repeateable. Repeatability of 3-percent or better is typical.

The **QuickCODultra** provides online TOD in up to six streams, with optional TOC and/or Nitrogen.

The **QuickCODlab** provides 3-minute TOD for the laboratory.

