

The water quality and its measurement

The term water quality is of a general nature and should be seen in the context of the intended use of the water. Depending on use, for example as customary water in agriculture, as ultrapure water in pharmacy, or as drinking water or wastewater, different guidelines and limit values apply.

The most important guidelines for our health are the drinking water and wastewater regulations. Here, measured values are defined. Here, minimum requirements are set and referred to standards. In addition to many individual values, the TOC value is an important parameter.

The **T**otal **O**rganic **C**arbon value is an indication of the pollution of water with organic substances, regardless of whether, for example, bacteria, pesticides, or benzene.

The TOC, a so-called sum parameter, is often used in drinking and wastewater analysis. Its advantages are obvious:

With the DIN EN 1481 a standardised, Europe-wide approved procedure is available, which can be automated and realized relatively easily.

We at Gröger & Obst have been building analyzers for more than 30 years. These analyzers measure the TOC value using a continuous thermal-catalytic reaction. This is the only way to create real online results.

In wastewater technology, there is another sum parameter, the **COD**.

The **C**hemical **O**xygen **D**emand is a parameter that has to be determined in the laboratory.

"As a sum parameter, the COD is a size of the sum of all substances that are present in the water and can be oxidized under certain conditions. It indicates the amount of oxygen (in mg / l) that would be required for its oxidation if oxygen were the oxidant. "(Source: Lexicon chemie.de)

The manual determination of the COD requires potassium chromate, silver sulfate, mercury sulphate and 2.5 hours of time. A quick result is therefore unlikely. But it produces highly toxic laboratory waste, which must be disposed of as special waste.

Also, the cuvette quick tests are not a solution, because the fastest still need more than 30 minutes, you get here only a momentary value and they are still highly toxic. Although the so-called environmentally friendly tests no longer contain mercury, they provide COD surpluses as a result of the now almost everywhere existing chloride ions, and as a by-product the highly toxic chlorine gas.

However, COD is a very important parameter for the wastewater industry, as it serves, among other things, as guideline for controlling the biological degradation stage in sewage treatment plants. The easy to determine TOC is correlated to the COD. After determining the conversion factor, it was relatively easy to replace the COD by the TOC. But the conversion factor is only stable as long as the composition of the wastewater does not change.

But there are many different branches of industry, which at different times, from different processes, introduce different wastewater. This poses new, more difficult challenges for wastewater treatment plants, as the conversion factor TOC / COD can vary between 2 and 4, depending on the wastewater matrix. This makes it indispensable, for example, in wastewater treatment plants with problematic dischargers and in the wastewater control of various industrial parks to measure COD. Many of our customers who know the reliability of our TOC equipment came to us and asked for a device that allows them to permanently capture the COD value online, without a laboratory and without poisoning the environment.

The challenge was to find an approved measuring method that could also be used online.

An older American standard, the **ASTM D 6238-98**, describes a measurement method for measuring **Total Oxygen Demand (TOD)**.

Here, it is described, how the combustion of a liquid sample, with the involvement of catalysts, the determination of the oxygen reduction leads to **Total Oxygen Demand**.

For comparison again the COD in brief:

In the COD measurement, the oxidation of the sample is brought about with strong, aggressive acids and the oxygen requirement is determined.

It can be seen that in both measurements the oxygen requirement necessary for the oxidation of the sample is determined. Only the oxidation is brought about by other means. The **Total Oxygen Demand (TOD)** requires a high - precision oxygen meter to determine the oxygen demand, which can be used to determine the O₂ consumption that results from the combustion of the sample.

So far, the difficulties have been to achieve optimal combustion and to have a precise measuring device that can measure a consumption in the ppm range. In order to solve the latter problem, high-purity carrier gas with a very low O₂ content from a gas cylinder is often used. A measuring device, which solves the problems in this complex and expensive way, we consider not suitable for everyday use.

After lengthy research and testing, we succeeded in developing a true online measuring instrument which does not require high-purity cylinder gas and nevertheless measures the oxygen depletion with high precision on the principle of comparative measurement. Of course, TOC measurements are also possible at the same time.

Our device still has several options:

Important parameters such as the TC (total carbon) or the total oxygen demand of all substances with the exception of all inorganic carbons can also be determined.

So we can now present a measuring device, as our customers are used to from us:

**A real online measurement by continuous combustion.
Cheap and environmentally friendly to maintain because no bottled gas
and no toxic chemicals are needed.
Easy to maintain, by tradition, because we have never built units with
increased maintenance requirements.**

Have we piqued your interest? Contact us. We look forward to you.

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