TELEDYNE API
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Application Note

Dissolved Ozone Monitoring with W1+465L

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Ozone is a powerful disinfectant and is used in the removal of harmful viral, bacterial, and parasitic impurities in many water treatment applications. Ozonation is also used in improving flocculation performance, removal of taste and odor causing compounds as well as oxidation of inorganic impurities; examples being iron and manganese, in municipal and wastewater treatment plants.

With traditional disinfection methods, the formation of harmful disinfection byproducts (DBPs) is formed with chlorine and other halogens. By utilizing ozone in place of chlorine, the result does not typically produce DBPs. One exception, if bromide is present in the source/raw water. The oxidation of bromide can result in production of bromate (BrO_3).

Ozone Measurement Methods

When working with ozone in water, it is necessary to measure and monitor the dissolved and residual ozone concentration during the treatment process. Defining the optimal ozone dose ensures the water quality is preserved while balancing energy costs for ozone production and operational efficiency.

Two techniques are used for measuring dissolved ozone, one being instrumental, the other involving wet chemistry (Iodometric Titration, DPD Colorimetric, or Indigo Trisulfonate) methods. With instrumentation, technologies consist of membrane probes, Oxidation/Reduction potential (ORP) and UV absorption. Measuring Dissolved Ozone in water treatment plants presents several challenges, and specific application needs can directly influence the measurement technique and technology success.

The Teledyne API W1+465L has demonstrated itself as a viable solution in municipal, wastewater and aquaculture installations. A 465L ozone monitor paired with model W1 transfer column, provides a highly accurate and low maintenance dissolved ozone measuring system using UV absorption technology. The ozonated

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water sample is gravity fed through the transfer column at a rate of 60L/hr. while the analyzer pump draws a slight vacuum on the column and forces ambient air to flow up the packed column. Mixing of the ambient air and the ozonated water sample transfer ozone out of the water stream to the air stream. The resulting air stream with ozone gas is pulled into the analyzer for measurement.

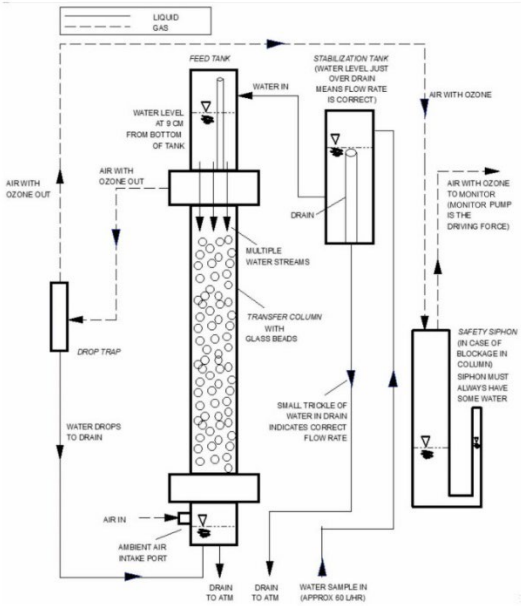

Figure 1: W1 Gas and Liquid Flow

Using Henry's Law, the ozone concentration measured by the analyzer has a direct relationship to the dissolved ozone in the water sample.

Cost Impact and Efficiency

Unlike other dissolved ozone technologies, the W1 stripping column does not use any electrolyte of silver anode amperometric type sensors, which can be potential sources of contamination.
The design is cost friendly, as no consumables are required other than general maintenance of the ozone monitor. Other measurement techniques, typically require frequent replacements of membranes, electro-chemical cells, reagents and or scrubbers, which adds up costs over the install life.

Accurate, stable, low concentration sensitivity

Challenges in accuracy and repeatability of dissolved ozone measurements can be a factor in using other technologies, which for example, may suffer from ozone spikes. In the case of membrane sensors, spikes are influenced by bubbles accumulating on the membrane. With the ozone transfer column stripping ozone from the water, the result is a smooth trend without spikes.

W1+465L measurement solution provides extraordinary sensitivity to low concentrations of dissolved ozone in water. Dissolved ozone concentrations as low as 0.001 mg/l are easily discernable by the UV analyzer once the ozone is transferred into gaseous phase.

Precise, Repeatable Measurement

Teledyne W1+465L provides an absolute measurement of ozone which is selective and repeatable. By separating out the ozone gas from the aqueous sample, the

consumable free column provides a cost positive monitoring solution.

Suited for harsh industrial applications (tolerating: bubbles, solids, turbidity) the W1+465L allows for a continuous, stable reading of ozone concentration to monitor and control ozone generation.

For more information, and product specification documents for the monitors covered in the note as well as safety and off gas monitors in the 465 series, please visit the TAPI website or contact our sales team at: api-sales@teledyne.com.