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Hydrogen Sulfide And Its' Effects On Dissolved Oxygen Sensors

Hydrogen sulfide (H_2S) is a gas which is commonly encountered in wastewater treatment plants, especially in aeration basins where dissolved oxygen sensors are used. The presence of hydrogen sulfide can have detrimental effects on many commercially available dissolved oxygen sensors, thereby effecting their output, or reading.

H_2S reacts with most metals, and every dissolved oxygen sensor manufactured for wastewater treatment applications today, utilize metal as electrode materials. A commonly used reactive metal in dissolved oxygen sensors is silver.

Sensors which use silver as a cathode material have problems with the H_2S reacting with the silver to form silver sulfide (Ag_2S). This contaminating reaction causes a rapid change in dissolved oxygen sensitivity and a loss of calibration.

Sensors utilizing silver as an anode material encounter the same Ag_2S reaction, but it causes a slightly different problem. Because silver anodes are usually very small, an Ag_2S coating on the anode will depolarize the sensor in a relatively short period of time, again causing loss of calibration. Most manufacturers that use silver anodes require that they be serviced or replaced only by the manufacturer.

All Royce dissolved oxygen sensors utilize platinum cathodes and lead anodes. H_2S does not react with platinum but will react with lead to form lead sulfide (PbS), a chalky yellow material found on the anode after long periods of use. The anode surface area on Royce sensors is very large, so it can tolerate high H_2S concentrations for months at a time without loss of accuracy. Because of the sensor design, the Royce anode is readily accessible and can be cleaned quickly with a brush as part of normal maintenance. Eventually, because it is a sacrificial metal, the Royce anode can be replaced very easily and economically by the user.