ORP

Oxidation/Reduction Potential, also known as redox (REDuction-OXidation) potential, or simply redox, is a common, single-value measurement for water quality, often used with aquaculture, pools, hot tubs and drinking water. ORP also plays an important role in sewage wastewater treatment and food processing facilities.

Follow the Electrons

ORP is a complicated measurement. In its simplest form, we typically think of redox reactions as the transfer of electrons, although a more accurate description would be a change in oxidation state.

Oxidation
LOSS of negatively charged electrons resulting in an increase in oxidation state.

Reduction
GAIN of negatively charged electrons resulting in a decrease in oxidation state.

In more practical terms, think of ORP as the ability, or potential, of water to break down the contaminants it contains. The higher the ORP reading, the stronger the water’s ability to destroy contaminants such as pathogenic microorganisms, chemicals, disinfectants, etc.

Digital meters measure ORP in positive and, in some special applications, negative readings, from -2,000mV (millivolts) to +2.000 mV. Unlike pH and EC-TDS, ORP measurements are not affected by water temperature. It is also important to note that changes in ORP levels are not instantaneous; however, the higher the ORP reading, the faster the contaminant breakdown occurs.

Why Does ORP Matter?

There is a strong correlation between bacterial activity and ORP levels. Therefore, ORP readings are good indicators of disinfection levels, and when targeted levels are achieved, can assure reliable disinfection. For instance, chlorine, bromine, and ozone are oxidizers and make good water sanitizers because they “steal” electrons (which increases the ORP level), thereby altering the chemical makeup of unwanted bacteria, algae and organic material and causing them to die.

How Does an ORP Meter Work?

An ORP meter is actually a millivolt meter, measuring tiny voltages that are generated when its probe is placed in water containing oxidizing and reducing agents. The meter’s probe houses two electrodes; one for measuring (usually made of platinum) and one for reference, made of silver wire. The voltage measured across the circuit formed by the two metal electrodes has a direct relationship with the potential of the oxidizer or reducer to perform a chemical task (disinfection).

Negative ORP Readings?
Readings below zero are utilized for some health/medical quality waters, and you’re probably asking, “What happened to the higher, the better?” Fair question. Negatively charged water is brought to this “unnatural” condition by special equipment, and the process begins with water that has already been purified.

To take negative ORP readings, the probe requires special conditioning - an oxidized coating must be formed on the diode. For more details about conditioning and storage, see “Negative Probe Preparation” in the Tech Tips section of our website.