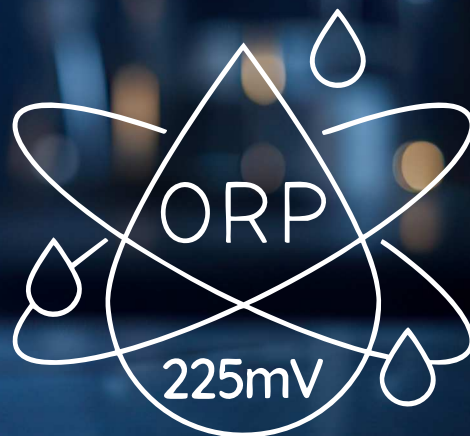


What is ORP in Water?

Understanding Oxidation- Reduction Potential



What is ORP?

ECA Technology - ORP

ORP stands for Oxidation-Reduction Potential, a measure (in millivolts, mV) of a solution's ability to oxidize or disinfect pathogens like bacteria and viruses. In HOCl (hypochlorous acid) technology, such as anolyte, higher ORP values indicate stronger antimicrobial power—typically >650-800 mV for effective disinfection, with premium anolyte often exceeding 900 mV. In liquid environments, oxidation-reduction potential is defined as the voltage difference between a redox (indicating) electrode and a reference electrode, providing a comprehensive measure of the redox condition of the solution.

A positive ORP value indicates that the water environment tends toward oxidation. The higher the value, the stronger the water's oxidizing ability, meaning it is more likely to capture electrons from other substances. For example, water containing chlorine, ozone, or a high concentration of dissolved oxygen typically exhibits a high positive ORP value.

A negative ORP value indicates that the water environment tends toward reduction. The lower the value, the stronger the reducing ability of the water, meaning it is more likely to donate electrons to other substances. For instance, under oxygen-deficient or anaerobic conditions, due to the presence of reducing agents such as hydrogen sulfide, ferrous ions, or high levels of organic matter, the water usually displays a negative ORP value.

How to Measure ORP

ORP (Oxidation-Reduction Potential) is typically measured in millivolts (mV) using specialized ORP sensors or probes. To take a reading, the probe is submerged in the liquid—this can be done using a portable device or an integrated system. These sensors work by detecting voltage through electrodes, allowing for quick and cost-effective readings across a wide range of applications. A higher oxidation-reduction potential value generally indicates a cleaner, more disinfected water source.

Factors that Affect ORP

ORP (Oxidation-Reduction Potential) value in water is the result of the combined effect of multiple factors. These factors can be divided into three categories: chemical (pH, dissolved oxygen, oxidants and reductants), physical (temperature, ultraviolet light) and biological (microorganism types and activities). They directly participate in the redox reaction or change the reaction conditions.

pH Value	Hypochlorous Acid (HOCl) Ratio	Hypochlorous Ion (OCl -) Ratio	ORP Trend
4.0 - 5.5	>95%	<5%	Very high (>800 mV)
6.0 - 6.5	~80%	~20%	High (about 750 - 800 mV)
7.0 - 7.5	~50%	~50%	Medium (about 650 - 750 mV)
8.0 - 8.5	~20%	~80%	Descending (about 600 - 650 mV)
>9.0	<5%	>95%	Low (<600 mV)

Why ORP Matters

HOCl is most effective at neutral pH where ORP peaks, allowing it to penetrate microbial cells rapidly. Lower ORP means weaker disinfection, even if ppm is high.

ORP Range	Disinfection Level
>900 mV	Excellent (anolyte)
650-800 mV	Good ~ Excellent (anolyte)
<650 mV	Poor, needs boost (anolyte)

Optimal ORP levels for HOCl disinfection are generally 650–900 mV, with higher values providing faster microbial kill.

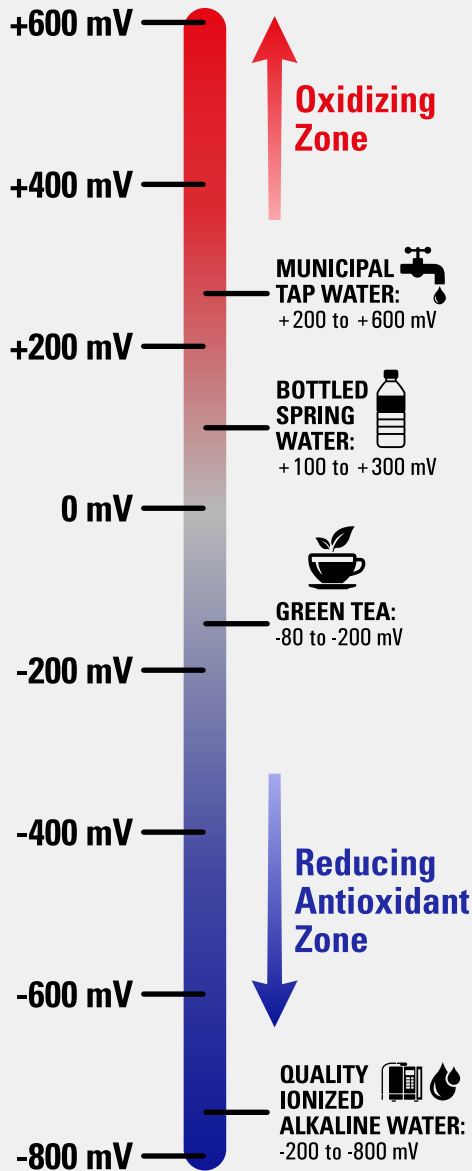
Key ORP Ranges

- 650–700 mV: Kills most bacteria (E. coli, Salmonella) and some yeasts in 30 seconds; standard for produce wash and poultry drinking water.
- 800–900 mV: Excellent for broad-spectrum disinfection including viruses and biofilms; ideal for anolyte in food processing.
- >900 mV: Premium level for maximum potency, often seen in pure HOCl generators.

Why ORP Range Matters

HOCl performs best at neutral pH (5.5–7.5) where ORP peaks due to maximum undissociated HOCl. Below 650 mV, disinfection slows significantly.

ORP Millivolt Scale



Maintaining Optimal ORP (750-900+ mV)

- Calibrate regularly
- Monitor pH (5.5-7.5): Even small pH shifts drop ORP sharply
- Clean probes monthly: Use storage solution; replace every 12-18 months to prevent drift.
- Generator settings: Increase salt dose, electrolysis time, or flow rate if ORP falls below target.
- Check demand: Low ORP at target ppm signals contamination—flush system and regenerate fresh HOCl.



Where to Read ORP on a Kirkmayer HOCl Generator

(The ORP Sensor is an option)



Your Leader in On-Site HOCl Hypochlorous Acid Generators

KIRKMAYER is a leading global provider of electrochemically activated solution (ECA) generators, delivering first-rate HOCl systems. Our mission is to design and build electrolytic cells that are more reliable, efficient, and durable than conventional ECA and HOCl generators available on the market today.



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