Justrite™

Using Electrolyzed Water Disinfectant

Essential

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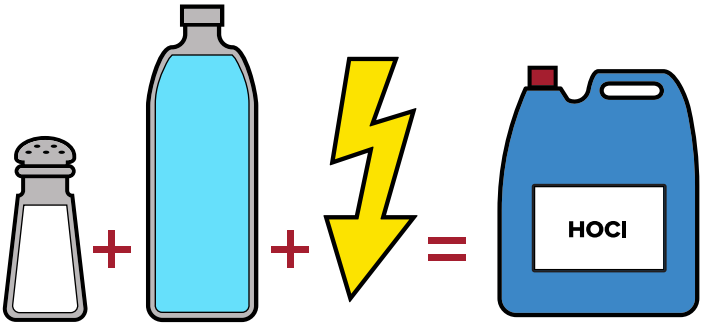
Justrite introduces Electrolyzed Water Disinfectant to its range of sanitation and disinfection solutions. This organic disinfectant kills 99.99% of viruses and bacteria and has been proven to also kill the COVID-19 virus. Due to the acidic pH, it is non-toxic, does not leave residue on environmental surfaces, and is safe for human tissues.

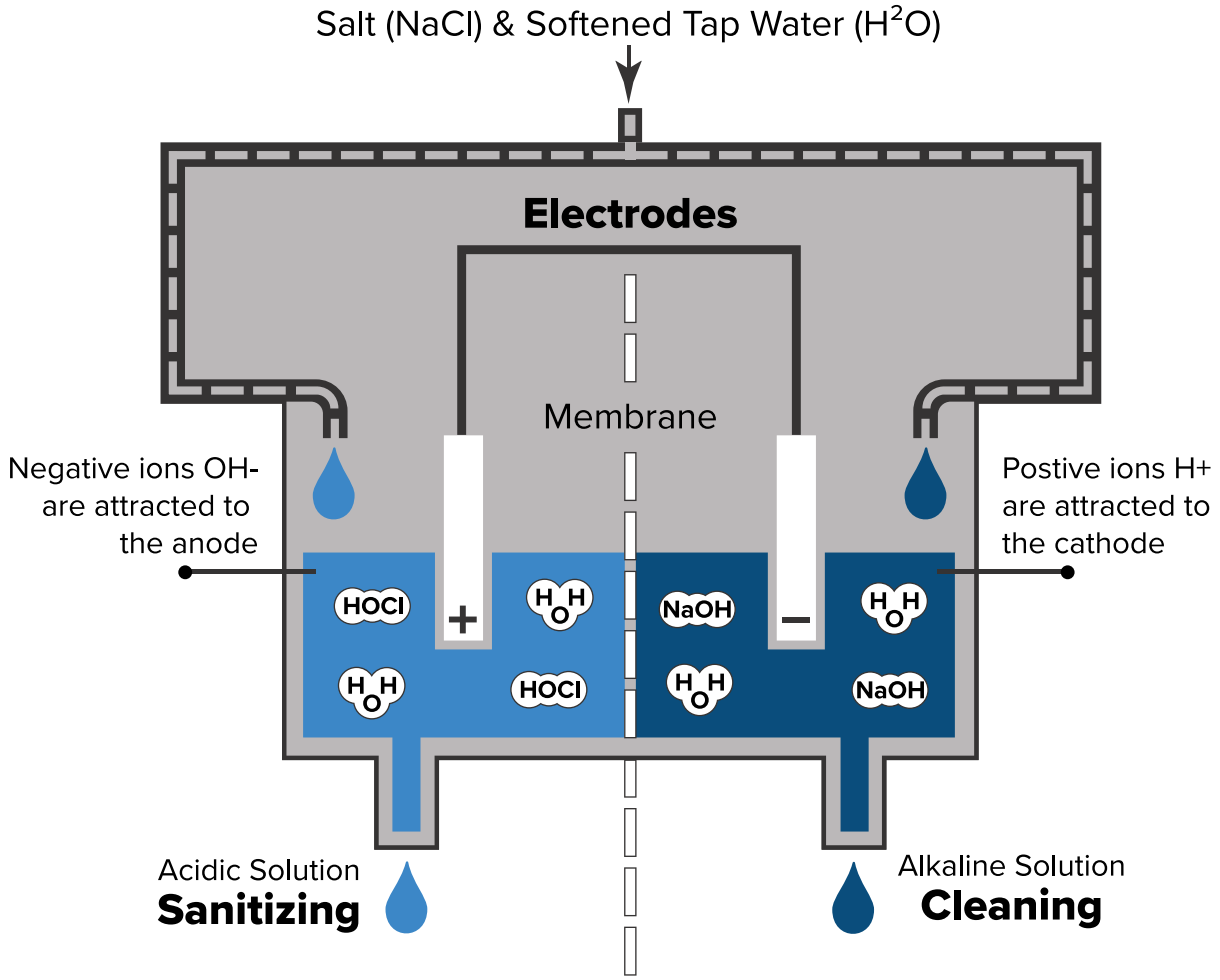
The fine mist helps to kill the virus on hands, clothing and shoes without any irritation to eyes or skin and does not damage or bleach clothing. Electrolyzed Water Disinfectant can be used as sanitizing liquid in the Notrax® 346 Sani-Trax® sanitizing entrance mats. Other Justrite brands will also be using Electrolyzed Water Disinfectant in the fight against COVID-19.

Quick highlights

Electrolyzed Water Disinfectants are:

- A powerful oxidant that kills 99.99% of bacteria, fungi, and viruses
- Has faster reaction rates than household bleach, being approximately 50 to 100 times more effective
- A weak acid similar to a mild citrus juice, therefore non-toxic and does not leave residue on environmental surfaces
- Safe for human tissues and is made naturally by white blood cells in all mammals for healing and protection
- Is used in healthcare, food safety, water treatment, and general sanitation





Electrolyzed water has been used in the medical field for over a century. Before antibiotics were available, electrolyzed water was used to irrigate and disinfect wounds in World War I. The main challenge of using this disinfectant has been keeping it in a stable form for use as a disinfectant. This challenge was overcome in the '70's and electrolyzed water is now used in hospitals, commercial laundries, swimming pools, cruise ships, water treatment, livestock and even produce sections in grocery stores.

Recent publications on the fight against the COVID-19 virus have also cited Electrolyzed Water as "a Powerful Natural Tool for Killing Bacteria and Viruses".

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Use

According to the Centres for Disease Control and Prevention (CDC), SARS-CoV-2 is believed to spread primarily from person-to-person through airborne respiratory droplets. But it may be possible for the virus to spread on surfaces too. Scientists know that similar respiratory viruses expelled into the air by coughing, breathing, or speaking can settle on surfaces, where they can linger in an active state for days. Although scientists aren't sure yet how long the novel coronavirus remains active on a surface, one study conducted in a hospital found that similar coronaviruses can persist on hard surfaces like glass, metal, or plastic for up to 9 days (Journal of Hospital Infection 2020). During that time the virus can potentially be spread to anyone touching the surface, and to whatever they touch next.

Cleaning and disinfecting

Speed is of the essence, because high-touch surfaces such as doorknobs, countertops, and electronic equipment can easily transmit viral and bacterial diseases. When using electrolyzed water as a surface sanitiser, simply spray on the surface and let it dry or use a sponge to spread it evenly. It does not leave any streaks and dries quickly.

Cleaning removed dirt and grime from surfaces to physically remove germs from surfaces. Cleaning alone does not kill germs to reduce the risk of spreading infection. The CDC recommends a two-step daily routine to clean frequently touched surfaces followed by disinfection.

The effectiveness of the disinfectant will also degrade through exposure to dirt and organic matter. In practice, the cleaner the water the longer the residual effect lasts. Cleaning is an essential part of disinfection. Organic matter can inactivate many disinfectants. Cleaning reduces the soil load, allowing the disinfectant to work. Regimens should include first cleaning the surface to remove dirt and organic matter, followed by disinfection. Similar to shoes, a cleaning process first to remove as much dirt and grime before disinfection.

Handwashing and disinfecting

Handwashing remains the No. 1 tip for preventing the spread of Coronavirus (COVID-19). It's common sense and it works. However, it must be done properly. Common recommendations are to use soap and water or as the next best option an alcohol-based hand sanitizer. However, over time repeated use of alcohol or strong soaps may lead to hand dermatitis.

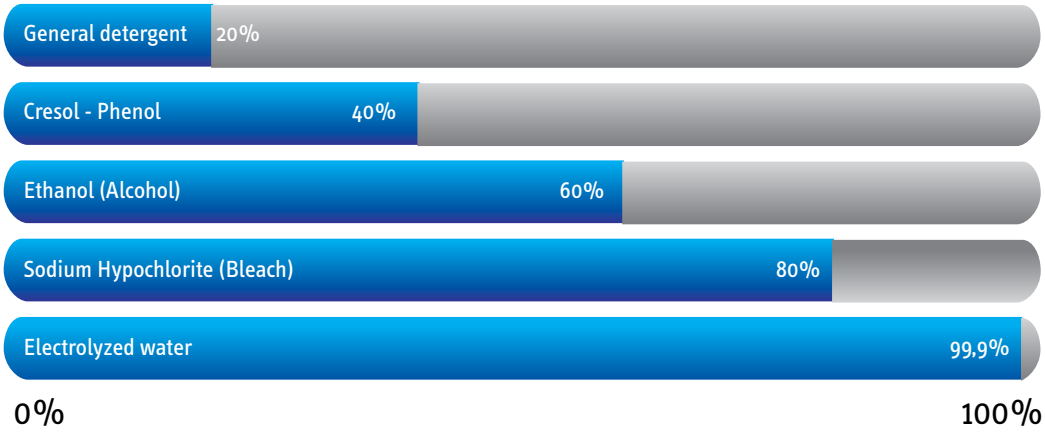
Electrolyzed water is not a gel like alcohol-based hand sanitisers, it is a liquid. When used as a hand sanitiser it is therefore best if it's sprayed on to the hands in a fine mist. Spray each hand by pumping 2-3 times on the bottle to ensure both hands feel "wet", then spread the liquid evenly over the hands, ensuring all areas of the hands have been wet. Let your hands air dry, this normally only takes a few seconds.

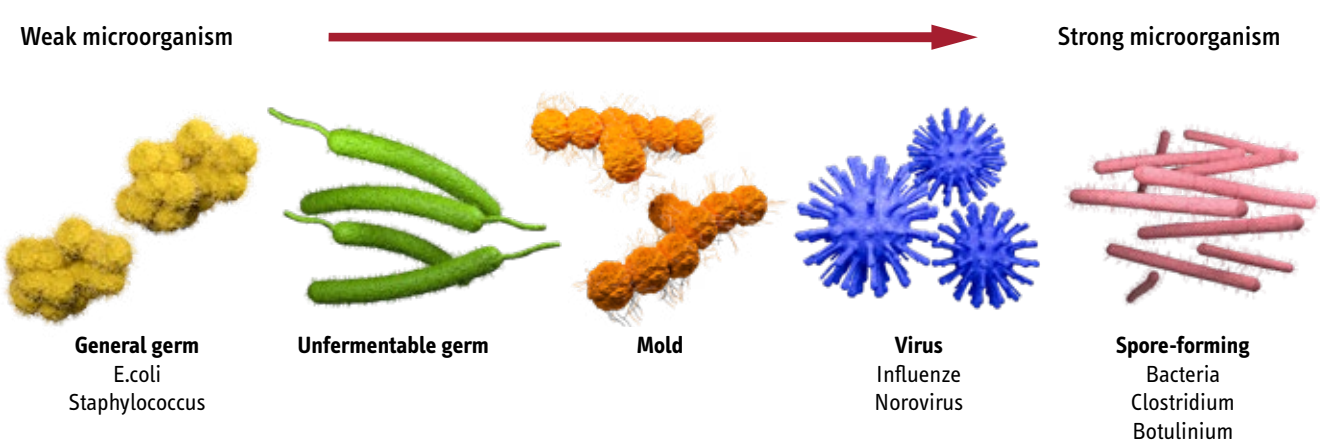
Electrolyzed water can even be sprayed on your face before the removal of your facemask. The further away you spray the liquid, the weaker it was. The disinfectant does not cause any irritation to eyes, skin or damage or bleaching of clothing.

Sanitizing footwear

A research team from the CDC at a hospital in China discovered the virus on floors, computer mice, trash cans, sickbed handrails and doorknobs. What is most revealing in their study is that half of the medical teams' shoes tested positive for the virus. The CDC concluded at the end of their study that stricter measures should be taken to sanitize footwear.

Using Electrolyzed Water Disinfectant





Effectiveness

Most pathogens are killed immediately on-contact. The weak acid hypochlorous solution had excellent microbicidal effects against a broad microbicidal spectrum of standard strains and clinical isolates in a short time. The disinfectant works by using oxidation to take away electrons disrupting the cellular structure of bacteria which basically destroys the cell walls of bacteria and protein coats of viruses, plus its low molecular weight makes if effective in penetrating cell walls and protein coats and reacts faster where it destroys the DNA and RNA inside of bacteria and viruses – on a cellular level this is what our immune systems do. The hypochlorous acid moves quickly, it's able to oxidize the bacteria in a matter of seconds, while the hypochlorite ion might take up to a half hour to do the same. Germ surfaces carry a negative electrical charge which results in a repulsion of the negatively charged hypochlorite ion to the area of the germ surfaces, making hypochlorite ion less effective at killing germs. The ratio of the two compounds is determined by the relative acidity (pH) of the water. Water treatment specialists can adjust the pH level to make hypochlorous acid more dominate, as it is more efficient at killing bacteria.

The hypochlorous acid's lack of electrical charge allows it to more efficiently penetrate the protective barriers surrounding germs.

Previous studies have reported that HOCl showed a germicidal effect within 0.5~1 min at 80 ~100 ppm [6, 7]. Justrite's Electrolyzed Water Disinfectant has over 400 ppm increases the effectives and decreases the time to be specific.
In the 2005 International Conference on Antimicrobial Agents and Chemotherapy, it was reported for "the first time that dilute solutions of hypochlorous acid, or free chlorine, as low as 200 -- or even 20 -- milligrams per litre will completely inactivate noroviruses on surfaces such as stainless steel and ceramic tile." More recent tests on SARS and COVID-19.

It has consistently been proven to lower the colony count of microbial pathogens and spoilage organisms by 5 to 7 log. The highest percentage that is generally used is 99.9999%. In scientific research papers, this percentage is written as "a 6 log10 reduction", but in medical shorthand it's known as "a greater-than 6-log reduction" or "a 6-log kill rate."

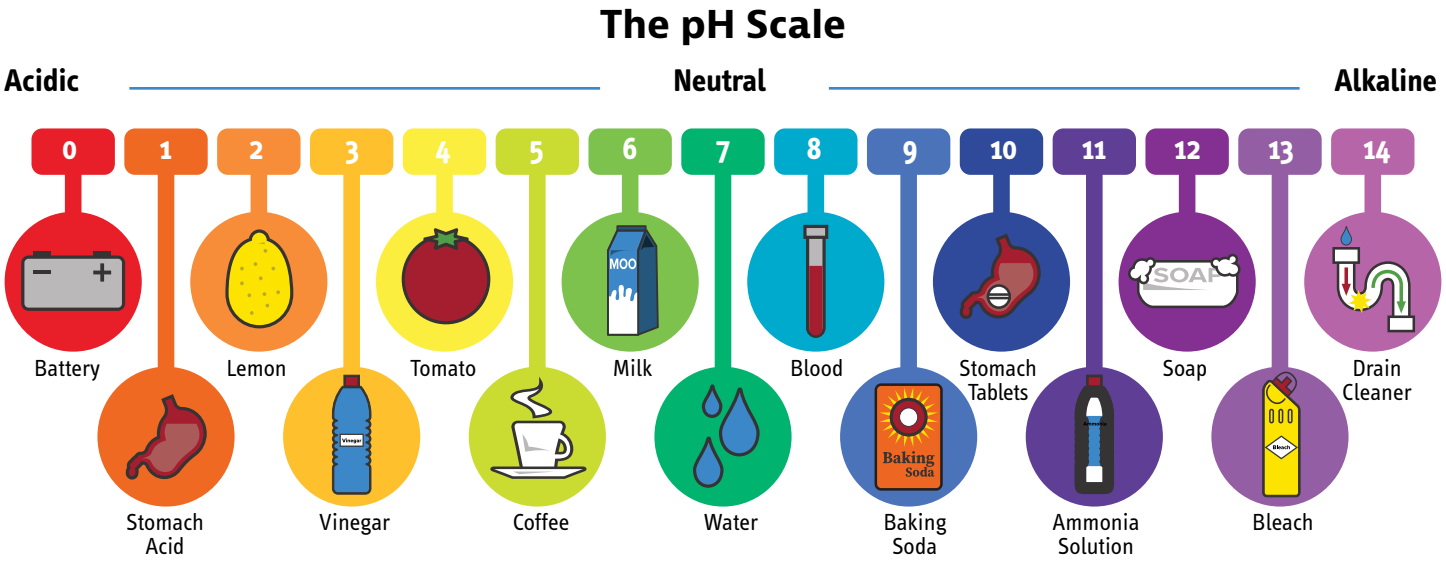
Speed of disinfection

Most pathogens are killed immediately on-contact. For example; E. coli exposed to hypochlorous acid lose viability in less than 0.1 seconds due to inactivation of many vital systems. Electrolyzed water can reach 99.99% kill rate in 30 seconds.

Test	Description	Log reduction	Time	Test	Description	Log Description	Time (min)
EN1276	E.hirae	> log 7	1 min	EN13704	C.sporogenus	> log 6	1 min
EN1276	S.aureus	> log 7	1 min	EN13704	C.dificili	> log 6	1 min
EN1276	P.aeruginosa	> log 7	1 min	EN13704	B.subtilis	> log 6	1 min
EN1276	E.coli	> log 7	1 min	EN13704	B.pumilis	> 3.88	1 min
EN1276	Poliovirus	4.33	30 sec	EN13704	B.cereus	> 3.24	1 min
EN1276	Adenovirus	4.67	30 sec	EN13704	P.glucanolyticus	< 3.12	1 min
EN1276	A.nigur	> log 6	1 min	EN13704	B.subtilis (stainless steel)	> log 6	1 min

Impact on the environment

Electrolyzed water is non-toxic and non-flammable and therefore does not require hazardous or chemical storage or handling precautions. Nor any special shipping or export requirements. Electrolyzed water has no toxic material disposal requirements and is not considered by OSHA to be hazardous waste adding yet another advantageous element. This development seems especially fitting amidst growing concerns about eco-persistence of synthetic chemicals, and antimicrobial resistance trends amongst newly resurgent agents of disease. Further, during use, electrolyzed water does not harm surfaces, metals, clothing or wood. It is even used in the food industry as it does not leave any residue or change the taste of food. Most fabrics can be completely submersed in a solution of highly concentrated electrolyzed water disinfectant and will not suffer damage by corrosion or bleaching.



Alternative disinfectants

Bleach

Bleach is widely used in hospitals and medical practices and shares the same chlorine family as HOCl, the active ingredient in Electrolyzed Water Disinfectants. Although, research shows that they both kill bacteria, fungus, spores, and viruses, electrolyzed water has much faster reaction rates than household bleach and is approximately 80 times more effective. Study results indicated that HOCl is more effective than OCl- for inactivation of these bacteria. These results have been confirmed by several researchers that concluded that HOCl is 70 to 100 times more effective than OCl- for inactivating bacteria (Culp/Wesner/Culp, 1986). Electrolyzed water is neutrally charged and can easily penetrate the negatively charged cell walls of bacteria. Whereas bleach is negatively charged and is repelled similarly to the way magnets with the same charge repel against each other. Chlorine chemistry has been studied for over 100 years and it has always been an undisputable fact that electrolyzed water is a stronger oxidant and a more powerful disinfectant than household bleach.

Bleach is corrosive, which means it can irritate or burn your skin or eyes. It can also corrode ("eat") metals. When mixed with certain other chemicals or cleaners, it can produce toxic gases which can damage your lungs or be deadly. In addition, bleach is highly irritating to the eyes, skin, and lungs- and inhalation over long periods could be carcinogenic. Protective eye wear should be worn as well as gloves and other protective gear and should only be handled in well ventilated areas. Bleach should only be used on hard, non-porous surfaces as it can damage textiles, metals, and wood finishing.

Chlorine is widely used to disinfect drinking water and wastewater prior to discharge, and when used appropriately, its role in preventing the spread of waterborne infectious diseases is well established. Low levels of residual chlorine, however, can be harmful to aquatic life if drinking water or heavily chlorinated wastewater is discharged into the environment. Cited by the US Department of Agriculture.

Comparison of other alternative disinfactants



Safety	Electrolyzed Water	Household Beach	Isopropyl Alcohol
Does not irritate eyes	✓		
Safe on Skin	✓		✓
Odorless	✓		
Organic	✓		
Eco-Friendly	✓		
Non-Flammable	✓		
Non-Toxic	✓		
No Allergens	✓		
Non-Bleaching	✓		✓
Safe Waste Disposal	✓		

Comparison of other alternative disinfactants

Use and Applications	Electrolyzed Water	Household Beach	Isopropyl Alcohol
Cleaning and Disinfection	✓	✓	✓
Hand Sanitation	✓		✓
Spraying	✓		✓
Sanitizing Mats	✓	✓	

Common uses of powerful yet mild disinfectant

Isopropyl Alcohol
Isopropyl alcohol is a popular disinfectant to use in clinics for wiping down instruments, furniture, and is a key ingredient in hand sanitizers. Ethyl alcohol (70%) is considered more effective compared to isopropyl alcohol. Both are bactericidal, fungicidal, and viricidal but are not effective against bacterial spores.

Hand sanitizers with alcohol are used daily in many medical offices, but over time repeated use may lead to hand dermatitis. In one study, the prevalence of contact dermatitis related to hand hygiene ranged from 25 to 55 percent. Fortunately, HOCl acid can also be used in place of hand sanitizer with no irritating side effects.

Alcohol is also a class 3 flammable and has a flash point of 82,5 °C or 53°F which requires proper flammable storage and handling practices. Isopropyl alcohol vapor is denser than air and is flammable, with a flammability range of between 2 and 12.7% in air. It should be kept away from heat and open flame. Distillation of isopropyl alcohol over magnesium has been reported to form peroxides, which may explode upon concentration.


Hospitals and terminals rooms


Commercial laundries


Eye drops


Fish, fruit and vegetables


Cruise lines


Waste water treatment


Swimming pools


Gyms

Maintaining effective levels of the active ingredient

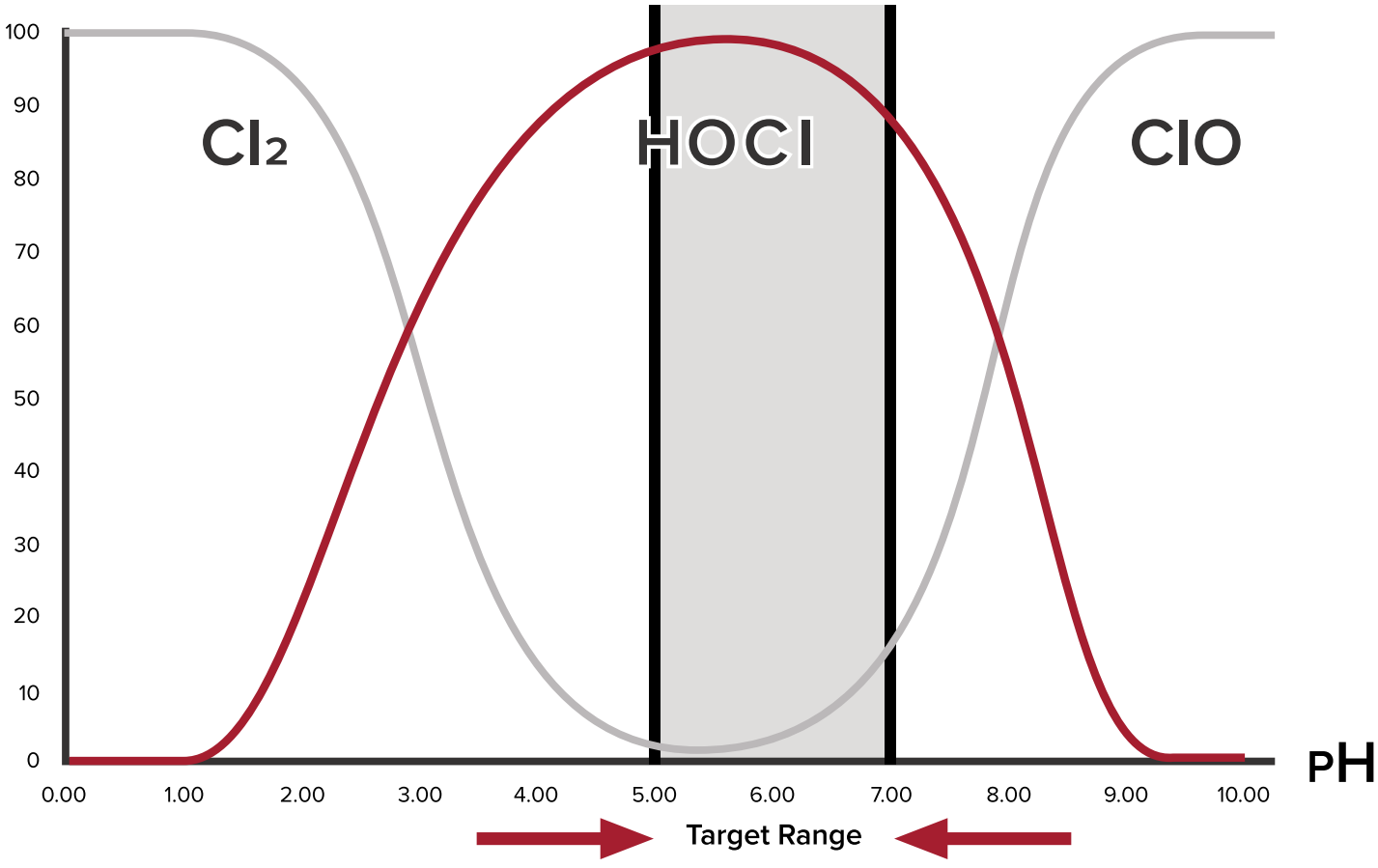
pH Stability

Electrolyzed Water proved to be bactericidal for up to 12 months however 6 months is recommended, and sporicidal for 3 months. Technological challenges around the inherent instability of HOCl have been overcome by electro-engineering advances, enabling large-scale production of stable and pure formulations (Terry and Williams, 2016).

In solutions where the pH is 7.5 or greater HOCl solutions contain more hypochlorite (–OCl). Eventual reduction of oxidative chlorine to the chloride ion (Cl–) leads to a decrease in antimicrobial activity over time in conventionally prepared HOCl solutions and are described as “highly unstable” (USDA-AMS August 2015).

Measuring concentrations

Electrolyzed water (hypochlorous acid) is measured with the exact same test strips that are used to measure the concentration of chlorine bleach.



Quotes and Extracts

"Superoxidized water," produces a cidal activity 50 to 100 times that of household bleach, addressing growing resistance issues of standard terminal cleaning agents.

Electrolyzed sodium hypochlorous acid (HOCl), produces an efficient disinfecting adjunct to standard terminal cleaning and provides many advantages in optimizing infection prevention in the hospital environment. (3) The wand spray device distributes the product in a sequential back and forth motion producing a uniform distribution of the powder coating to all areas of the environment. Due to the neutral pH of the HOCl, it is non-toxic, does not leave residue on environmental surfaces, and is not corrosive to hospital equipment as traditional bleach and phenolics have long demonstrated. (4)"

(Except article from Infection Control Today).

"The more recent recognition of its role as a 'first responder' in the natural defense systems of mammals and most other vertebrates, including fish, creates an exceptional opportunity for the field of infection control in the broadest sense." (Klebanoff, 1975; Albrich et al., 1986; Black and Pickering, 1998; Marcinkiewicz et al., 2000).

"In practice, the cleaner the water the longer the residual effect lasts. "

"Electrolyzed Water has been used in the medial field and infection prevention that inactivates viruses, bacteria, endospores, and fungi, is safe for human tissues, is environmentally benign requiring no toxic waste disposal or hazardous material management. HOCl is considered by the FDA to be "the form of free available chlorine that has the highest bactericidal activity against a broad range of microorganisms" (US FDA, 2015)

"Technological challenges around the inherent instability of HOCl have been overcome by electro-engineering advances, enabling large-scale production of stable and pure formulations." (Terry and Williams, 2016)

"Disinfection is essential in terms of the public health or environmental hygiene. Hypochlorous acid (HOCl) solution was developed as a disinfectant in Korea. We evaluated the germicidal activity of HOCl against various pathogenic microbes.

Thirty-one ATCC strains were exposed to HOCl solution at various concentrations (20, 40 and 80 ppm) for 1 minute. All the strains of bacteria, yeasts and mycobacteria were killed at 80 ppm after exposure to HOCl. The results suggest that HOCl solution could be used to effectively disinfect public areas. These results show that the weak acid hypochlorous solution has practical applicability in such places as hospitals and establishments related to the food industry. "

"Hypochlorous acid has much faster reaction rates than hypochlorite, being approximately 80 times more effective. "

"Alternative disinfection technology utilizing a product derived from saline and electricity, "superoxidized water," produces a cidal activity 50 to 100 times that of household bleach, addressing growing resistance issues of standard terminal cleaning agents. Electrolyzed sodium hypochlorous acid (HOCl), produces an efficient disinfecting adjunct to standard terminal cleaning and provides many advantages in optimizing infection prevention in the hospital environment. (3)

"HOCl has no toxic material disposal requirements and is not considered by OSHA to be hazardous waste adding yet another advantageous element to HOCl use (OSHA Hazard Communication Standard). The additional protein denaturing activity of HOCl and in particular, its inactivation of prion proteins, also suggests new opportunities for the design and execution of disease control measures in healthcare institutions (Hughson et al., 2016). Prion infectivity is especially concerning as prions are known to be both potentially pervasive and exceptionally difficult to eradicate (Abbott, 2015)."

"HOCl may therefore offer contributions to patient care that are becoming feasible just as they become necessary. The significance of HOCl is increasing as we witness the emergence of resistant microbes, from exotic flaviviruses to highly invasive forms of commonplace Candida yeasts (Sherry et al., 2017; Clancy and Nguyen, 2017). The fields of environmental hygiene, disinfection, food safety, and sanitation are now likely to benefit from HOCl as an untapped resource in infection control.

1. https://infectioncontrol.tips/2017/10/06/hypochlorous-innate-response/
2. https://www.jstage.jst.go.jp/article/bio/17/3/17_129/_article
3. https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/hypochlorous-acid
4. https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/hypochlorous-acid

Justrite™

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