HOCl
220 ppm

CLFine™

IONLESS™ HYPOCHLOROUS WATER

REVOLUTIONIZING
WHOLE-ROOM DISINFECTION

BROAD-SPECTRUM | HYPOALLERGENIC | LOW-CORROSION | HIGH STABILITY

NIPRO

Hypochlorous Acid Water (HOCl)

BALANCING SAFETY, EFFICACY, MATERIAL COMPATIBILITY, AND SHELF STABILITY

Maintaining sterile environments while minimizing Healthcare-Associated Infections (HAIs) requires a disinfectant solution that harmonizes efficacy against pathogens, safety to humans, reduced corrosion, and shelf stability.

Traditional solutions like **bleach** - Sodium Hypochlorite (NaOCl) - may be shelf-stable and broadly effective, but they are also toxic to humans[1] and corrosive to medical equipment,[2] making them less than ideal for sensitive environments. The active ingredient in chlorine-based disinfectants like bleach is actually **hypochlorous acid (HOCl)**, a molecule produced naturally by the immune system, which is increasingly manufactured as a stand-alone disinfectant in many countries.[4]

HOCl is widely used as a topical antiseptic and wound-healing agent,[14] as a disinfecting wash for vegetables and food processing equipment in schools and hospitals,[16] and as a mouthwash for gargling at the dentist.[2]

Preferred by Healthcare Workers

HOCl has emerged as the superior chlorine-based alternative to bleach, due to its exceptional combination of safety, broad-spectrum efficacy, and ease of integration into primary and secondary disinfection protocols.[2,7] Healthcare workers, especially in low-resourced hospitals, reported higher satisfaction and willingness to use HOCl, due to its odorlessness and reduced corrosiveness compared the strong odor and irritating fumes of bleach.[5,6]

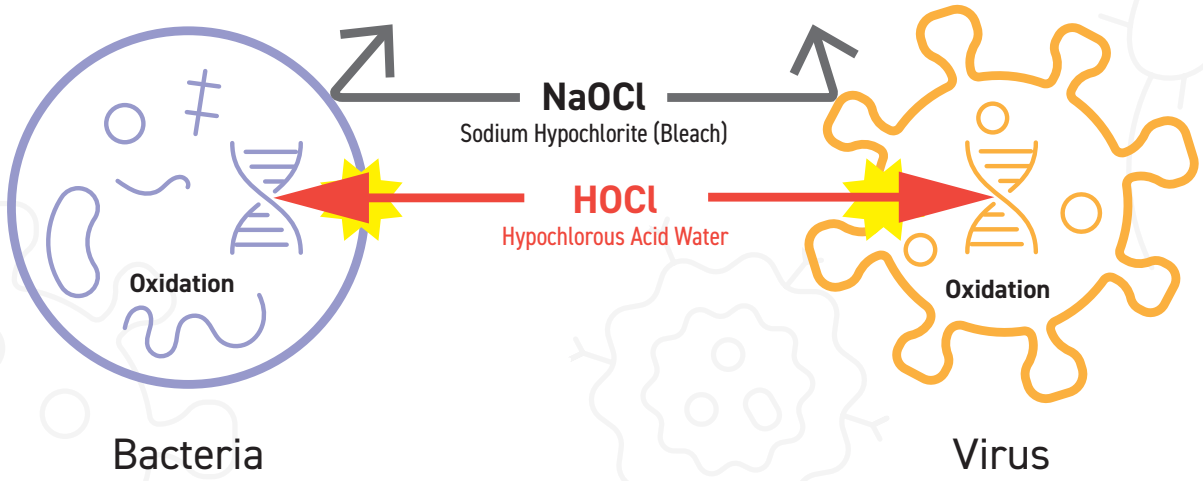
Profile Comparison of Hypochlorous Acid (HOCl) vs. Sodium Hypochlorite (Bleach)[1,2,3,8]

	Hypochlorous Acid (HOCl)	Bleach (NaOCl)
Manufacturing	3 chamber electrolysis of diluted saline (NaCl) into HOCl and NaOH	Chemical reaction between chlorine (Cl^-) and sodium hydroxide (NaOH)
pH	5 - 6 (slightly acidic)	13 (highly alkaline)
Precautions	No special precautions necessary for atomization	Mask, rubber gloves, and goggles (with ventilation)
Instructions for Use	Programmable misting with CLeer 100	Bleach is a two-step process, must be rinsed with clean water to remove residue
Efficacy	HOCl reduces >99.9999% of bacteria[9,18] and renders >99.99% of viruses non-infectious in under 1 minute.	Bleach must remain wet on surfaces for up to 10 minutes for comparable efficacy to HOCl
Skin and Eye Safety	HOCl is gentle to the eyes and helps skin repair itself	Bleach can cause permanent nerve and tissue damage in the eyes and burns skin
Odor	Deodorizing	Strong
Side Effects	Hypoallergenic and non-irritating to the airways and mucous membranes	Bleach can cause nausea and severe irritation to mucous membranes
Disposal	Inactive HOCl degrades into a benign saline solution	Bleach requires hazardous waste disposal

Rapid Antimicrobial Action

Recognized by the World Health Organization (WHO) as a highly effective and hypoallergenic disinfectant, HOCl is safe for humans, environmentally friendly, and does not irritate the skin, eyes, or airways.[16] HOCl's powerful, fast-acting antimicrobial action against bacteria, viruses, fungi, and even multidrug-resistant organisms is well-documented in clinical studies and laboratory tests.[8,9,10,11,12,13]

Unlike negatively charged bleach which repels pathogens, HOCl has a neutral charge that attracts rather than repelling bacteria. Rather than slowly crushing pathogens by oxidizing their outer shell as bleach does, HOCl is absorbed by bacteria as if it were a nutrient, more easily penetrating biofilm[13] and cell pathogen cell walls. This allows HOCl to exert an internal oxidizing effect directly on the DNA of viruses and bacteria[8,9], removing opportunities for resistance development.[2,4,15]



Uncompromising Production Quality

While many HOCl products on the market are effective, they often come with compromises. Added sodium hydroxide (NaOH) buffers for stability can increase ion content, leading to greater conductivity and higher risks of surface oxidation and corrosion.[2,3]

IONLESS™ Hypochlorous Acid

Nipro removes rather than adding impurities to stabilize its HOCl product, dramatically reducing its ion content and corrosivity. Purification through a reverse osmosis membrane produces an ultra-pure product having all the advantages of HOCl with none of the corrosion or stability issues seen with other everyday HOCl manufacturing brands.

Nipro produces a highly stable[17] HOCl product with such extremely low ion content that not only is our product less corrosive than bleach, and less corrosive than other everyday HOCl products - **our HOCl product is less corrosive than tap water.**[18]

Ion Content and Conductivity of CLFine and Tap Water[18]

Contents	IONLESS™ HOCl	Tap Water in Japan	Tap Water Quality Standard
Effective chlorine concentration (ppm)	46	1	≤1
pH	6.14	7.73	5.8-8.6
Na+ (ppm)	2.7	23.5	—
NaCl amount (ppm)	6.8	59.8	—
Anions (ppm)			
Cl^-	11.5	27.6	≤200
ClO_3^-	0.01	0.05	≤0.6
ClO_2^-	—	—	≤0.6
BrO_3^-	—	—	≤0.01
SO_4^{2-}	0.03	18.8	—
$NO_3^{\wedge-}$	0.03	4.67	≤10
Triaholamethane (ppm)			
$CHCl_3$	0.005	0.015	≤0.06
$CHBrCl_2$	0.0004	0.021	≤0.03
$CHBr_2Cl$	0.002	0.025	≤0.1
$CHBr_3$	0.011	0.001	≤0.09
Total	0.018	0.061	≤0.1
Conductivity (μS/cm)	4.6	335	—

That is why we call it

IONLESS™

Gentle to Humans, Deadly to Pathogens

CLFine™ IONLESS™ Hypochlorous Water

IONLESS™ Hypochlorous Water

LESS CORROSIVE THAN TAP WATER & SHELF-STABLE,
DEACTIVATES THE MOST CONTAGIOUS AND DEADLY PATHOGENS

CLFine is an ultra-pure HOCl disinfectant that rapidly deactivates and reduces viral, fungal, and bacterial HAIs[22] with proven superior efficacy,[19,20] while being hypoallergenic,[2] shelf-stable,[17] and less corrosive than tap water.[18]

Paired with the CLeer™ 100 ultrasonic humidifier, CLFine 220ppm can disinfect entire unoccupied rooms at the push of a button, integrating easily into your hospital's disinfection protocols.

Broad-Spectrum

In suspension tests on the most common bacteria and viruses, HOCl at just 40 ppm concentration is equally or more effective than bleach at 1 000 ppm concentration in terms of efficacy and required contact time.[20]

CLFine deactivates MRSA and Staphylococcus aureus, achieving a more than 99.9% reduction in adhered bacteria - at low concentration (40ppm) - 10 seconds in clinical suspension tests and within 4 hours in controlled atomization tests of 25 m² to 30 m² chambers.[19]

CLFine deactivates COVID-19 (SARS-CoV-2) rendering the virus non-infectious in under 20 seconds in clinical suspension tests from 30 ppm concentration and in under 60 minutes in controlled atomization trials.[10,19]

Hypoallergenic, Humidifying, and Deodorizing

CLFine, unlike bleach, is gentle on human skin, non-toxic to the environment, and shows a high disinfecting and deodorizing effect.[8]

CLFine eliminates odors and provides safe humidification without the risk of harboring pathogens like Legionella.[2,7]

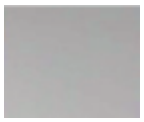
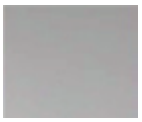
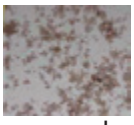
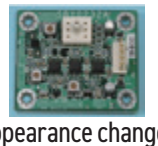
Less Corrosive than Tap Water (IONLESS™)

Extended shelf-life achieved through reverse osmosis purification, ensuring prolonged effectiveness without compromising safety.

Accelerated material compatibility testing, under normal and humid conditions, found the corrosivity of CLFine 40 ppm equivalent to or less than the corrosivity of tap water.[18]

CLFine maintains a shelf life of 18 months when stored properly below 25°C and away from sunlight.[17]

Accelerated Testing for Material Compatibility[18]

Test material	CLFine IONLESS™ HOCl		Tap water	5% NaCl water
	airborne concentration 0.02 ppm	airborne concentration 0.5 ppm		
Stainless Steel	 Appearance change: None	 Appearance change: None	 Appearance change: Slight	 Appearance change: Slight
Iron	 Appearance change: Yes	 Appearance change: Yes	 Appearance change: Significant	 Appearance change: Significant
Electronic substrate component	 Appearance change: None	 Appearance change: None	 Appearance change: None	 Appearance change: Yes

Test sample exposure for 2 hrs (at 15-35°C). Allowed to stand in humid environment for 22 hrs (at 40°C/ 93%RH) x 4 days + Allowed to stand in standard atmospheric condition for 3 days (at 23°C/45-55%RH). (1 week per cycle x 5 cycles)

Antimicrobial Efficacy Rates of HOCl vs Bleach[7,19]

Pathogens		Hypochlorous acid water (40 ppm)	Sodium hypochlorite (1 000 ppm)
Gram-positive bacteria	*Staphylococcus aureus*	◎ (10 seconds)	◎ (10 seconds)
	MRSA (methicillin-resistant staphylococcus)	◎ (10 seconds)	◎ (10 seconds)
	Bacillus cereus	△ (3-5 minutes)	△ (3-5 minutes)
	Mycobacterium tuberculosis	△ (2.5 minutes)	▲ (30 minutes)
	Other mycobacteria	△ (1-2.5 minutes)	▲ (2.5-30 minutes)
Gram-negative bacteria	Salmonella Enteritidis	◎ (10 seconds)	◎ (10 seconds)
	Vibrio parahaemolyticus	◎ (10 seconds)	◎ (10 seconds)
	Escherichia coli	◎ (10 seconds)	◎ (10 seconds)
	Campylobacter jejuni	◎ (10 seconds)	◎ (10 seconds)
	Pseudomonas aeruginosa	◎ (10 seconds)	◎ (10 seconds)
virus	*Candida albicans*	◎ (10 seconds)	◎ (10 seconds)
	Influenza viruses	◎ (10 seconds)	◎ (10 seconds)
	Coronavirus (SARS-Cov-2)	◎ (10 seconds)	◎ (10 seconds)
	Herpes virus	◎ (10 seconds)	◎ (10 seconds)
fungus	*Candida (Candida albicans)*	◎ (10 seconds)	◎ (10 seconds)
	Black mold (*Aspergillus niger*)	△ (5 minutes)	✕ (120 minutes)
	Blue mold (*Penicillium cyclopium*)	△ (5 minutes)	✕ (120 minutes)

Decreasing ratio of bacteria/viruses:

◎ Not less than (NLT): 99.9% | ○ NLT 99% to LT 99.9% | △ NLT 90% to LT 99% | ▲ LT 90% | ✕ Ineffective

CLFine™
IONLESS™ Hypochlorous Water

HOCl 5 ppm

HOCl 40 ppm

HOCl 220 ppm

Cleer™ 100

Ask us about Nipro's other CLFine products, including CLFine 5 ppm and 40 ppm, for misting in occupied spaces with Cleer™ 100.

- Automated sanitizing, humidifying, and deodorizing of waiting rooms, small event halls, and childcare playrooms.
- Cleans surfaces and clears away airborne pathogens with a gentle mist at low but effective concentration of CLFine 40 ppm.

Cleer™ 100

NIPRO's Ultrasonic Humidifier for CLFine™

Intermittent Mode Setting

Setting	Mist	Stop
1	1 minute	3 minutes
2	1 minute	6 minutes
3	1 minute	9 minutes
User 1	0.5 to 90 minutes	0.5 to 90 minutes
User 2	0.5 to 90 minutes	0.5 to 90 minutes

User 1 and User 2 are customizable

Hybrid Mode Setting

1	2	3
10 minutes	20 minutes	30 minutes

Continuous mist timer auto-shifts back to intermittent

Continuous Mode
3 levels of spray capacity

Speed Clean Mode
Auto-shift to intermittent

Intermittent Mode
Cycle of spray and interval

Key Lock / Off Timer
For safety and efficiency

COMPLIANCE

Implementing Regulation (EU) 2021/347

EU regulation approves active chlorine released from hypochlorous acid (HOCl) as an active substance for use in biocidal products across several product types.

CDC Guidelines for Disinfection and Sterilization in Healthcare Facilities (2008)

CDC guidelines highlight hypochlorous acid as a highly effective and versatile disinfectant when used under appropriate conditions.

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Nipro Clinical Studies and Laboratory Tests

17. Internal Stability Testing
18. Internal Corrosion Study (Compatibility with Surfaces)
19. Internal Atomization Trials (Efficacy of Misting)
20. Internal Suspension Tests (Efficacy of Direct Application)

GLOBAL PRESENCE AND EXPERTISE

Nipro is a leading global healthcare company established in Japan in 1954. With over 38 000+ employees worldwide, Nipro serves the Medical Device, Pharmaceutical, and Pharma Packaging industries. As a total solution provider of renal care products, medical devices, and pharmapackaging, Nipro supplies life-saving technologies, building long-term, meaningful partnerships with clinics and hospitals around the world. Together with its people, products, and processes, Nipro is committed to improving patient outcomes and quality of life, offering safe and superior products that optimize time, effort, and costs.

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