



Slightly Acidic Electrolyzed Water Device

+Our target • Quality Sterilizing • Eco-system Conservation • Natural Resources & Energy Saving

PAT.NO.5010037
PAT.NO.4594357
PAT.NO.4712915
(PCT.Applied)

HOCL Inc.

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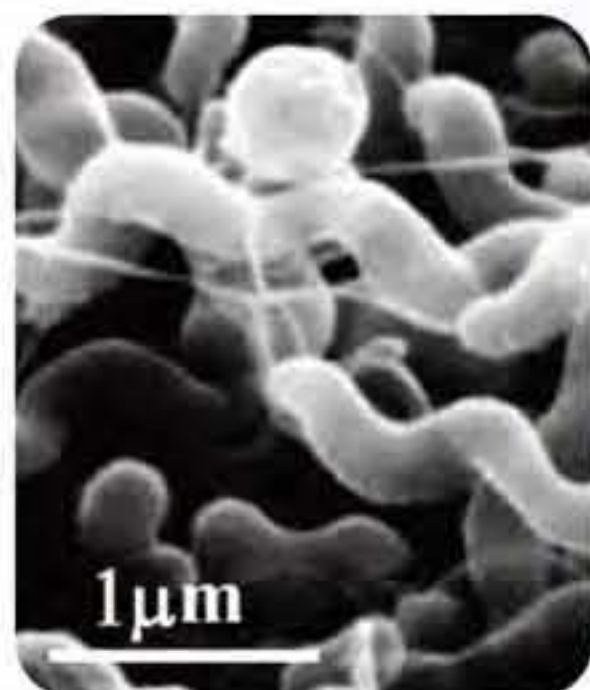


Slightly Acidic Electrolyzed Water

Food additive-designated sterile water • Official Name, "Slightly Acidic Hypochlorite Acid Solution"

Slightly Acidic Electrolyzed Water was invented in 1996. For more than ten years since then, it has been gradually filtering into a variety of fields requiring hygienic management, such as food industry. In 2002, the safety of the water was approved by Health, Labor and Welfare Ministry and it was designated as food-additive. For its superb properties differing from other chlorine-based sterilizing agents, Slightly Acidic Electrolyzed Water is expected to replace conventionally used sanitizing agents including sodium hypochlorite.

+HOCL® Features of Slightly Acidic Electrolyzed Water

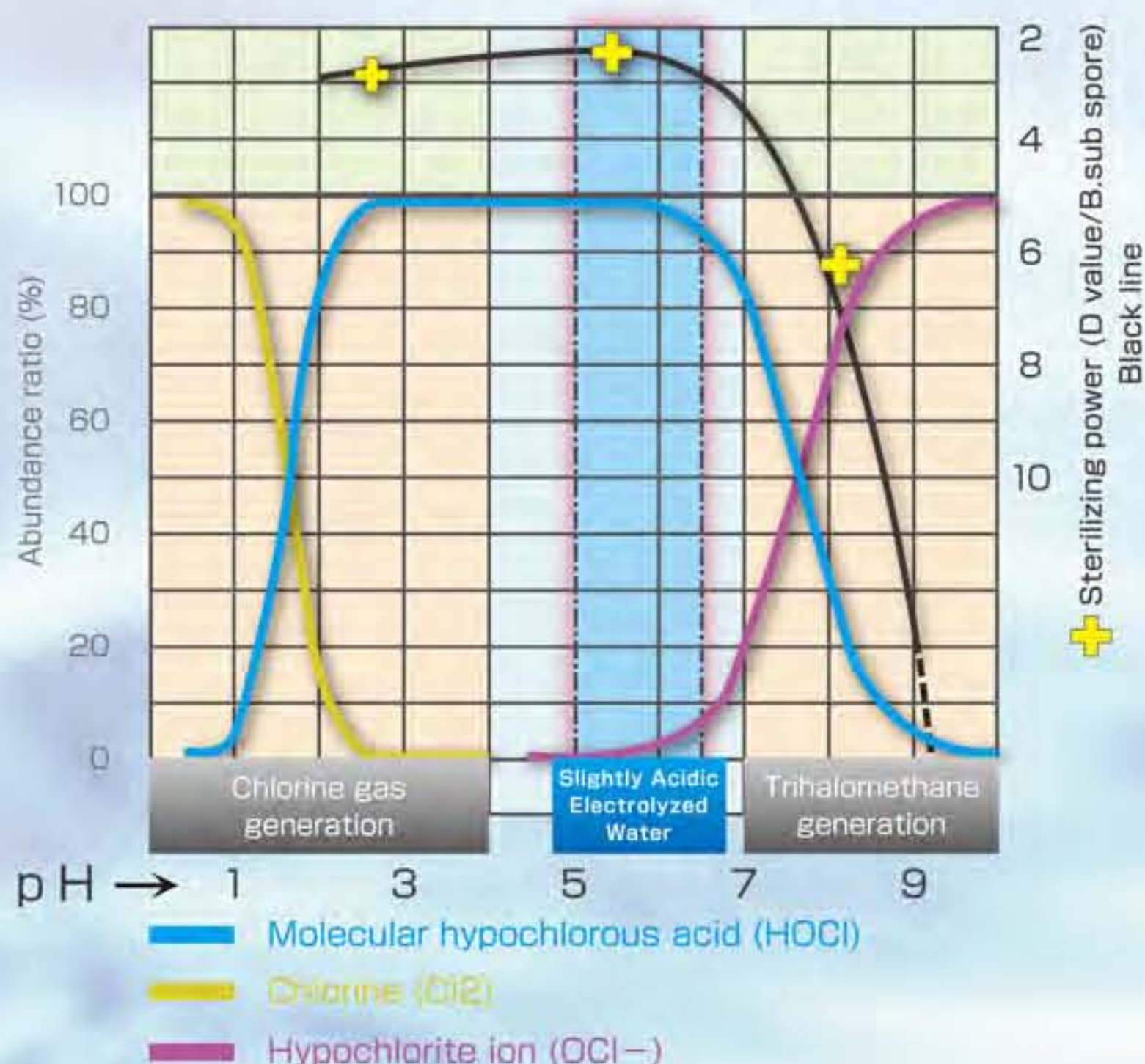


- Versatile Sterilization Effect** → for bacteria, fungus, yeast, virus, bacterial spores, etc.
- Quick Effect** → Sterilizes most of microbes by seconds.
- Safety** → Designated as food-additive and does not generate chlorine gas when used.
- Does not affect subjects** → Does not affect taste, color, smell, or nutrients of food, etc.
- Rinsing is not required** → Can be used in the same way as tap water, and be disposed as is after use.
- Inexpensive** → Can be run at cost only a little higher than tap water
- Incidental Effect** → Allows cut flowers, fresh vegetables, etc. to stay fresh longer. Plus deodorizing effect and fungus prevention.
- Application** → Multiple usages. Can be used anywhere with ease.
- Ecological** → Environmentally-friendly and does not produce trihalomethane (THMs).

+HOCL® Properties of Slightly Acidic Electrolyzed Water

Active substance for sterilization	Slightly acidic	Effective chloride concentration	Food-additive	Sterilizing power
hypochlorous acid (HOCl)	pH 5.0-6.5 (drinking water: approx. pH 7.5 in Japan)	10 - 30 ppm (drinking water; 0.1 - 0.4 ppm in Japan)	Health, Labor and Welfare Ministry designated food-additive, 2002 in Japan	80 to 150 times that of hypochlorite ion (OCl ⁻)

+HOCL® Why Slightly Acidic Electrolyzed Water?



The figure indicates the contained material ratio of the chlorine agent (chlorine gas, sodium hypochlorite, chloride of lime, etc) during the pH (acid-alkali index) change. The contained materials include molecular hypochlorous acid (HOCl), chlorine (Cl₂), and hypochlorous ion (OCl⁻). As the pH decreases (acidic), the ratio of chlorine shown in yellow-green line increases, whereas the ratio of hypochlorous ion in purple line increases as the pH increases (alkali). The ratio of molecular hypochlorous acid in blue line increases in the middle.

The molecular hypochlorous acid indicates the substantial, stable sterilization effect, while the hypochlorous ion shows the low sterilization effect and the chlorine is unstable due to gasification. The measurement result of grass bacillus sporules having the highest tolerance is shown in black line, indicating the highest sterilizing power between pH 5 and 6. Trihalomethane is generated at pH 7 or more (alkali); at pH 4 or less, chlorine gas is generated. Slightly Acidic Electrolyzed Water chooses the optimum pH range, from pH 5 to pH 6.5, indicated in sky-blue line in the figure, making it possible to avoid problems involving the usage.

Slightly Acidic Electrolyzed Water is a sterilizing agent that contains molecular hypochlorous acid that has high sterilizing power in stable condition. It has solved most of the deficiencies of sodium hypochlorite, is effective for microbes of a wider variety than sodium hypochlorite, and can be used for a large variety of usages.

The use of Slightly Acidic Electrolyzed Water in place of sodium hypochlorite in the future would reduce the effect on the environment.

The Effects of Slightly Acidic Electrolyzed Water

Provides quality sanitary management

- Effective for most of the microbes(ppm)



- Slightly Acidic Electrolyzed Water will realize the "Three Principles of Food Poisoning Prevention".

- Avoids bacteria (eliminates offending bacteria thoroughly)
- Does not increase bacteria (offending bacteria increase rapidly at room temperatures)
- Kills bacteria (thoroughly performs sterilization and sanitization)



+HOCL[®] Example of use of slightly acidic electrolyzed water



Sterilization of cutting vegetables

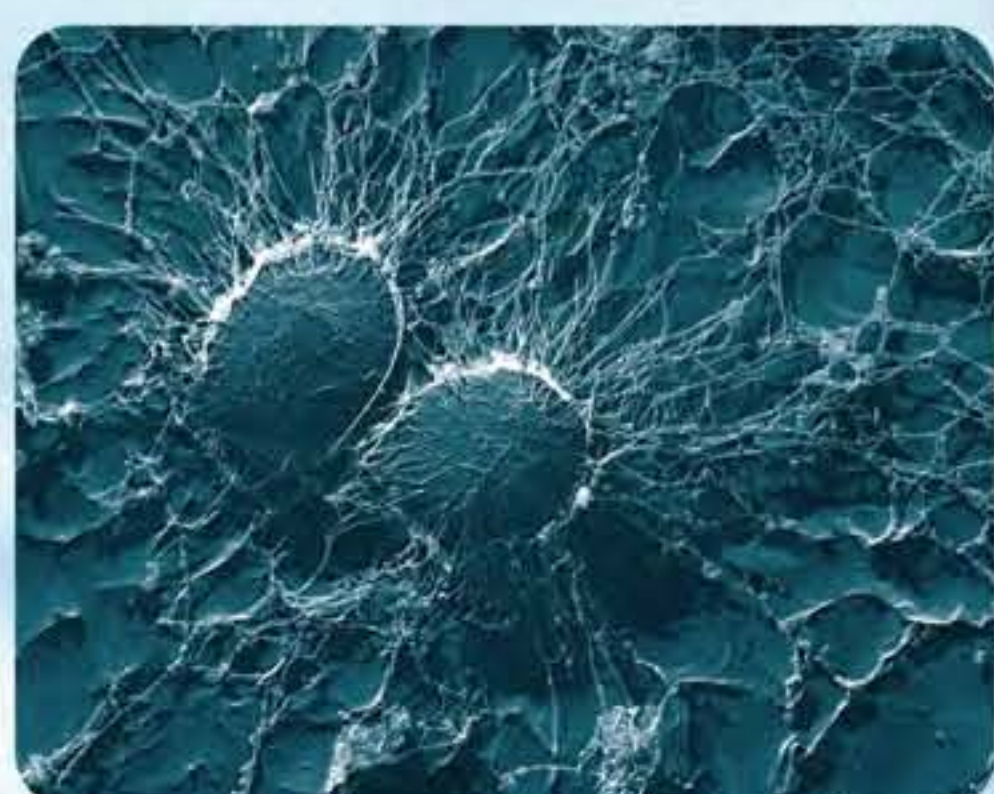


Beans sterilization/Spore-forming bacteria



Container sterilization

+HOCL[®] Sterilization effect of Slightly Acidic Electrolyzed Water against bacteria causing food poisoning



Bacterial Species	Before Treatment [cfu/ml]	After Treatment [Time]
<i>S.aureus</i> subsp.aureus IF012732	1.8×10^8	—(30 sec)
<i>Yersinia enterocolitica</i> IID981	4.8×10^8	—(30 sec)
<i>Campylobacter coli</i> ATCC33559	4.0×10^8	—(30 sec)
<i>Campylobacter jejuni</i> subsp.jejuni ATCC33560	6.0×10^7	—(30 sec)
<i>Salmonella enteritidis</i> IF03313	2.1×10^8	—(30 sec)
<i>Escherichia coli</i> ATCC43895 O157:H7	5.2×10^8	—(30 sec)
<i>Listeria monocytogenes</i> VTU206	2.5×10^8	—(30 sec)
<i>Serratia marcescens</i> IF012648	2.9×10^8	—(30 sec)
<i>Pseudomonas aeruginosa</i> IF013275)	3.7×10^8	—(30 sec)
<i>Vibrio parahaemolyticus</i> RIMD2210100	3.1×10^8	—(1 min)
<i>Clostridium botulinum</i> A CB21	2.6×10^4	—(1 min)

Models of Slightly Acidic Electrolyzed Water Device by HOCL Inc.

Model number	+HOCL 0.36t	+HOCL 0.96t	+HOCL 2t	+HOCL 5t	+HOCL 10t	+HOCL 20t
Generative capacity	360L/h	960L/h	2000L/h	5000L/h	10000L/h	20000L/h
PS/EP	100VAC/150W	100VAC/170W	100VAC/340W	1P200VAC/1kW	1P200VAC/2kW	1P200VAC/3.5kW
Size(WxHxD)	380x420x215	450x500x340	600x1300x420	1400x1900x750	1400x1900x750	1400x1900x750
Weight	About 15kg	About 25kg	About 55kg	About 200kg	About 250kg	About 300kg
Installation	On the board or wall-mounted	On the board	On the floor	On the floor	On the floor	On the floor
Material	S-MAT	S-MAT	S-MAT	N-MAT/T-MAT	N-MAT/T-MAT	N-MAT/T-MAT
Material consumption	150ml/h	410ml/h	820ml/h	1600ml/650ml/h	3200ml/1300ml/h	6400ml/2600ml/h
Pipe Size	13A	20A	25A	40A	65A	80A

* Design, size, color, and specifications could be changed without notice. * 20t model has a control chassis separately

Product photograph



The example of installation



HOCL0.36t
Line washing unit (Beverage factory)



HOCL0.96t
Floor, wall sterilization unit (Food processing factory)



HOCL2t
Food, line and CIP sterilization (Dessert factory)

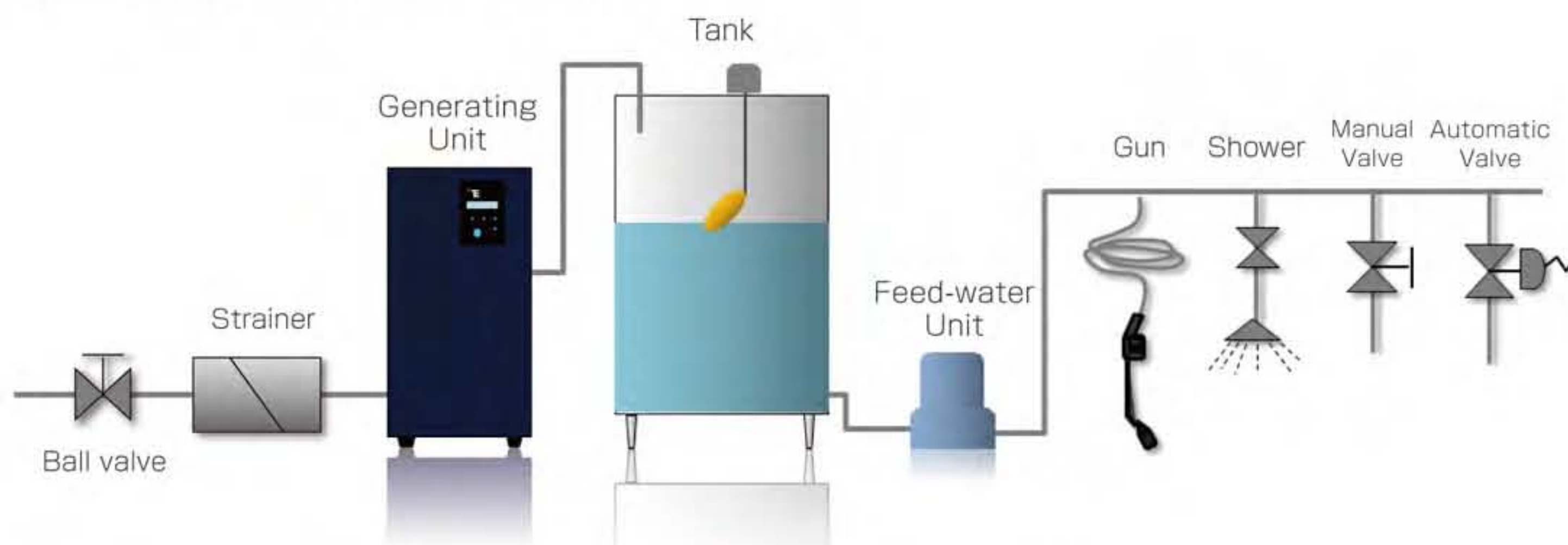


HOCL5t/10t
Line, CIP, and floor sterilization unit (Brewery)

* Its' options except above mentioned our devices.

+HOCL® Installation examples of HOCL Generating System

● Example of automatic operation facility



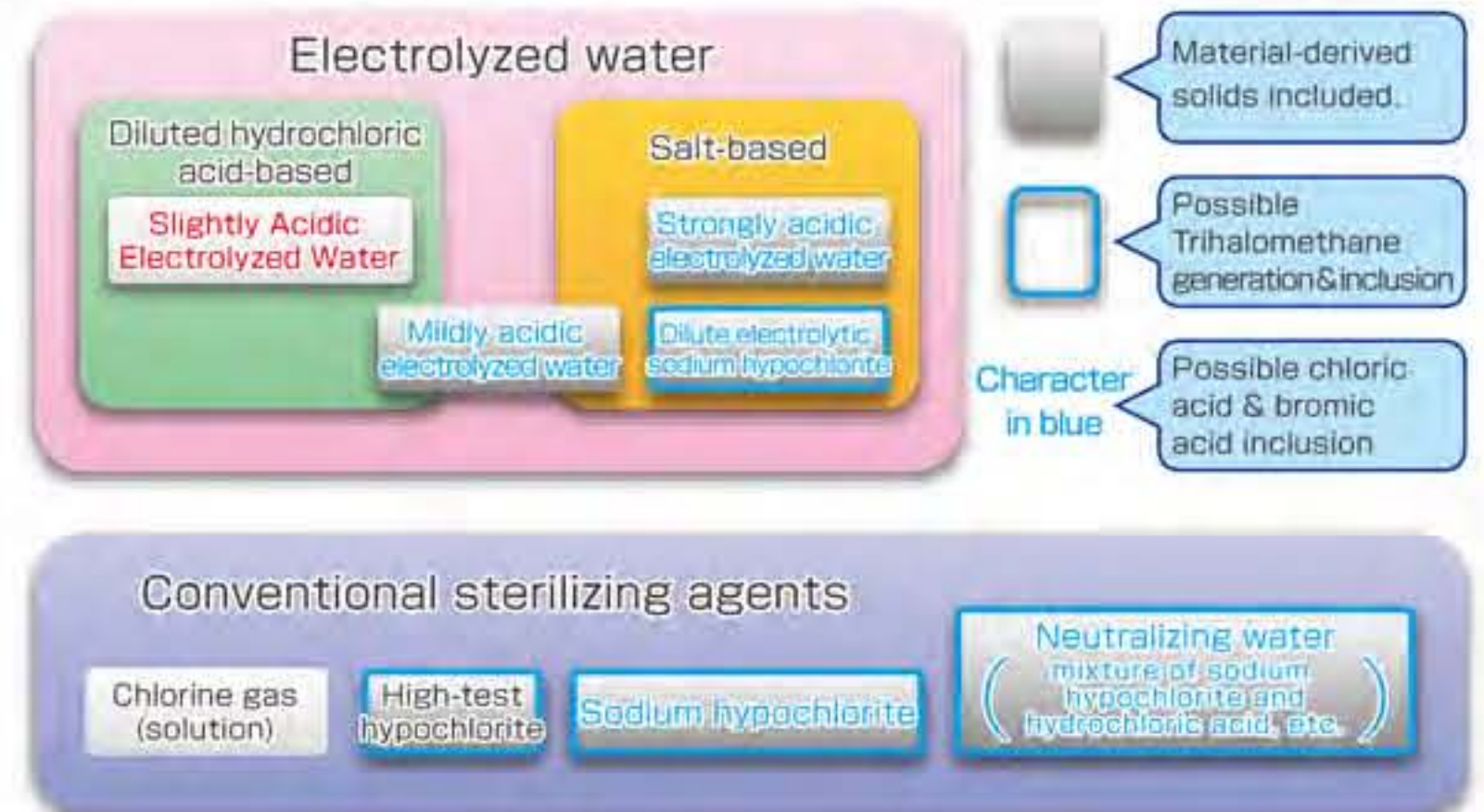
* The running cost can be drastically reduced.

The Comparison Against Slightly Acidic Electrolyzed Water

+HOCL® Differences between Slightly Acidic Electrolyzed Water and sodium hypochlorite

Item	+HOCL® Slightly Acidic Electrolyzed Water	NaClO Sodium Hypochlorite
Odor	No odor or slight chlorine odor	Strong chlorine odor (could be hazardous to health)
Eco-friendly Water Discharge	No neutralizing agent required.	Neutralization tank (trap) required. Trihalomethane & chloroform generated.
Working Environment	Drastically improved.	Strong odor, poisonous gas, and rough hands caused, requiring improvement.
Post-treatment	Also used as rinsing water.	A large amount of rinsing water required for odor & medical agent removal.
Saline Residue	None	The residue causes the metal to corrode.

Main chlorine-based sterilizing agents classification



+HOCL® Facility sterilization methods comparison

Item	Slightly Acidic Electrolyzed Water	Sodium Hypochlorite	Heat Sterilization
Sporular Sterilization	Can be sterilized	Can hardly be sterilized	Can hardly be sterilized (<100℃)
Odor-causing Incident	None	Possible	None
Wasted Water	None	Flushing water	Cooling water
Wasted Time	None	Flushing period	Cooling period
Energy Cost	Minimum	Minimum	Extra heating energy required
Waste water Treatment	No effect	Significantly affected. Pre-treatment & reserve tank required.	No effect
Equipment Damage	None	Corrodes equipment when concentrated.	Rapid temperature change will expand and contract equipment, which could cause crack and eventually pollution.
Hazardous Material	None	Possible contamination with chloric acid & bromic acid Trihalomethane could be produced.	None
Operational Safety			Dangerous

+HOCL® Comparison with other sterilization agents

	Slightly Acidic Electrolyzed Water	Sodium Hypochlorite	Sodium Hypochlorite Neutralizing Solution	Ozone Water	Strongly Acidic Electrolyzed Water	Alcohol	Chlorine Dioxide Water
Sterilizing Power	●	▲	●	●	●	▲	●
Anti-virus Effect	●	▲	●	●	●	▲	●
Stability	●	●	●	✗	✗	▲	●
Food-additive	●	●	✗	●	●	●	▲
Chloric acid, Bromic acid	●	✗	✗	●	▲	●	✗
Trihalomethane	●	✗	▲	●	●	●	●
Toxic Gas Generation	●	✗	✗	✗	✗	▲	▲
Salt Deposition by Drying	●	✗	✗	●	✗	●	✗
Organic Interfusion Effect	▲	▲	▲	▲	▲	▲	▲
Different Taste, Odor	●	✗	▲	✗	▲	✗	✗
Concentration Management	●	●	●	✗	▲	●	✗
Equipment Cost	▲	●	▲	▲	✗		▲

+HOCL[®] Slightly Acidic Electrolyzed Water Application

Slightly Acidic Electrolyzed Water is used in a variety of fields.

Industry	Sector	Application
Food Processing	Prepared food, fish & shellfish, Animal meat, Liquor, Miso & soy sauce, Dairy, Sweet stuff, Beverage, Pickle, Canned food, Cooked rice, Rice cake	Food sterilization, Ice, Grazing, Cooling water, Equipment sterilization, Container sterilization, Transport equipment sterilization, Hand washing, Cleaning, Clothing sanitization, Eco-cleaning of toilet
Service	Food retailing, Accommodation, Hot spring, Public bath, Spa, Bedrock bathing, Gym, Hotel, Pool, Restaurant, Pet hospital, Zoo, Passenger transportation, Funeral operator	Food sterilization, Fresh food drying prevention, Dish & appliances sterilization, Bath sterilization, Swimming water sterilization, Guest room sanitization & odor removal, Animal body cleansing, Exhibition room sanitization & odor removal, Toilet cleansing
Agriculture	Fruit farming, Protected horticulture, Mushroom growing, Livestock raising, Flower gardening, Plant factory, Guest farm	Seed & seedling sanitization, Plant sanitization, In-facility cleaning, Water supply, Disease prevention, Fungus planting work assistance, Humidification, Spray & cooling, Animal body cleansing, Odor removal, Plant harvesting
Fisheries	Fish farm, Market, Processing, Storage, Transportation, Catch landing spot, Fishing boat	Fish & shellfish sterilization, Cooling water, Keeping fresh, Ice storage, Fish farm sanitization, Transport equipment sanitization, Work area cleaning
Healthcare	Healthcare facility, Ambulance, Senior care home, Nursery, Nursing appliance rental	Hygienic management of kitchen, Toilet cleaning, Odor removal, Living room cleaning, Hand sanitization, Humidification, Bathroom sanitization, Nursing care appliance sanitization
Water & Air Treatment	Water-supply plant, Wastewater treatment, Intermediate water supply treatment, Building maintenance	Water supply sterilization, Supply-water & wastewater sterilization, Intermediate-water sterilization, In-building air sanitization & odor removal
Others	Park maintenance, Bio-terrorism, Waste treatment, Stable	Landscape water sanitization, Outdoor cooling, Outdoor decontamination, Resource waste odor prevention, Animal cleansing, Odor prevention