

DESOL

Hypochlorous Acid Water Generating System

Your DEFENSE SOLUTION, DESOL Co., Ltd.



+DESOL Co., Ltd. strives to contribute to society and the environment through its HOCl -hypochlorous acid with pH 5.0~6.0 / ppm 10~80 - generating solution that uses just water and diluted 6% HCl, producing disinfectant that is not only harmless but also contains powerful disinfecting properties.

Through the HOCL sterilization system developed with exceptional technology, our company aims to contribute to a healthier human society and environment.

















Verification completed

Coronavirus19 (COVID-19/SARS-CoV-2), tests on the sterilization of various pathogens 99.99%, including pneumonia and salmonella

Stability test done on skin irritation, eye irritation, acute oral toxicity, corrosivity, etc.

35 non-detection tests of carcinogens and harmful substances for human











DESOL Hypochlorous Acid Water(HOCL) Generating System

04	DS-HOCL 1200 G2W
08	DS-HOCL 1200 G2S
10	DS-HOCL 1200 G2T
15	Technological Competitiveness
16	Price/Performance Competitiveness

DESOL Hypochlorous Acid Water (HOCL)

Status of Hypochlorous Acid	18
Origination of Hypochlorous Acid [H-O-CI]	20
Hypochlorous Acid Water(HOCL) Generating System	21
Sodium Hypochlorite(NaOCL) vs. Hypochlorous(HOCL)	22
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DS-HOCL 1200 G2W

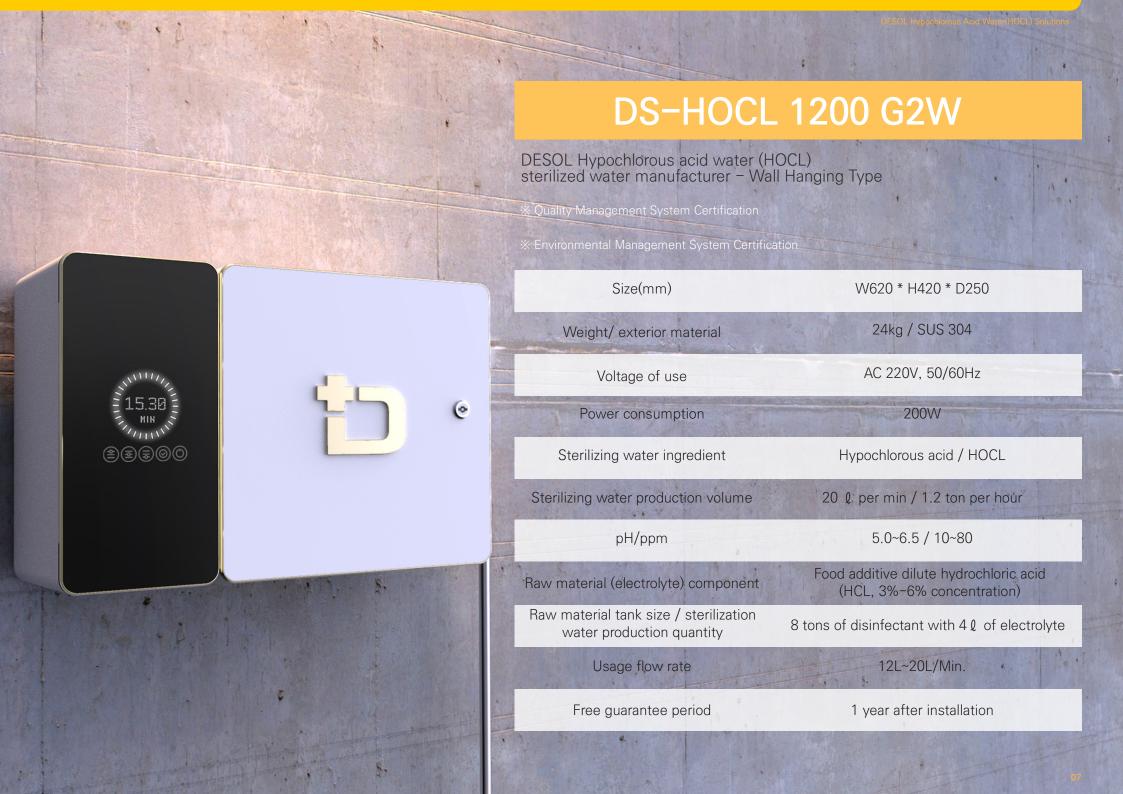
DESOL Hypochlorous acid water (HOCL) sterilized water manufacturer - Wall Hanging Type

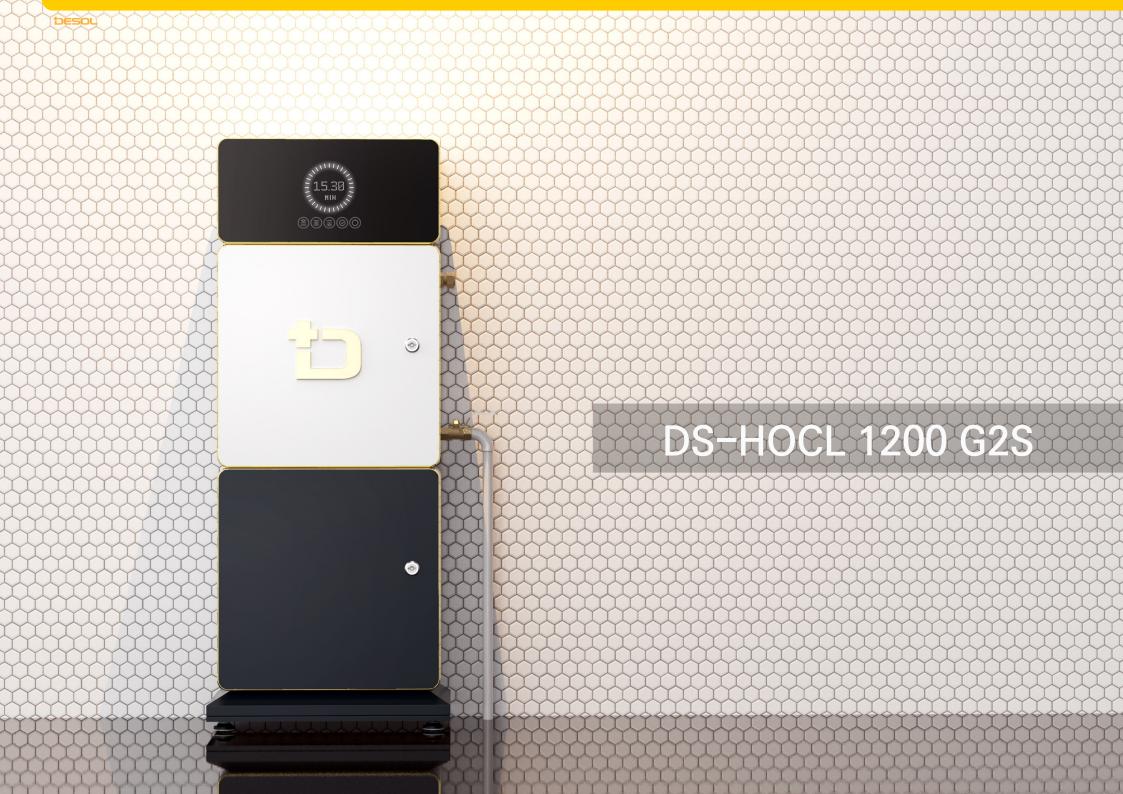
※ Environmental Management System Certifica	tion
Size(mm)	W420 x H620 x D250(mm)
Weight/ exterior material	24kg / SUS 304
Voltage of use	AC 220V, 50/60Hz
Power consumption	200W
Sterilizing water ingredient	Hypochlorous acid / HOCL
Sterilizing water production volume	20 @ per min / 1.2 ton per hour
pH/ppm	5.0~6.5 / 10~80
Raw material (electrolyte) component	Food additive dilute hydrochloric acid (HCL, 3%-6% concentration)
Raw material tank size / sterilization water production quantity	8 tons of disinfectant with 4 l of electrolyte
Usage flow rate	12L~20L/Min.

Free guarantee period

1 year after installation









DS-HOCL 1200 G2S

DESOL Hypochlorous acid water (HOCL) sterilized water manufacturer – Standing Type

X Quality Management System Certification

※ Environmental Management System Certification

Size(mm)

W420 x H1040 x D250(mm)

Weight/ exterior material

32kg / SUS 304

Voltage of use

AC 220V, 50/60Hz

Power consumption

200W

Sterilizing water ingredient

Hypochlorous acid / HOCL

Sterilizing water production volume

20 per min / 1.2 ton per hour

pH/ppm

5.0~6.5 / 10~80

Raw material (electrolyte) component

Food additive dilute hydrochloric acid (HCL, 3%–6% concentration)

Raw material tank size / sterilization water production quantity

40 tons of disinfectant with 20 $\ensuremath{\text{\textit{Q}}}$ of electrolyte

Usage flow rate

12L~20L/Min.

Free guarantee period

1 year after installation





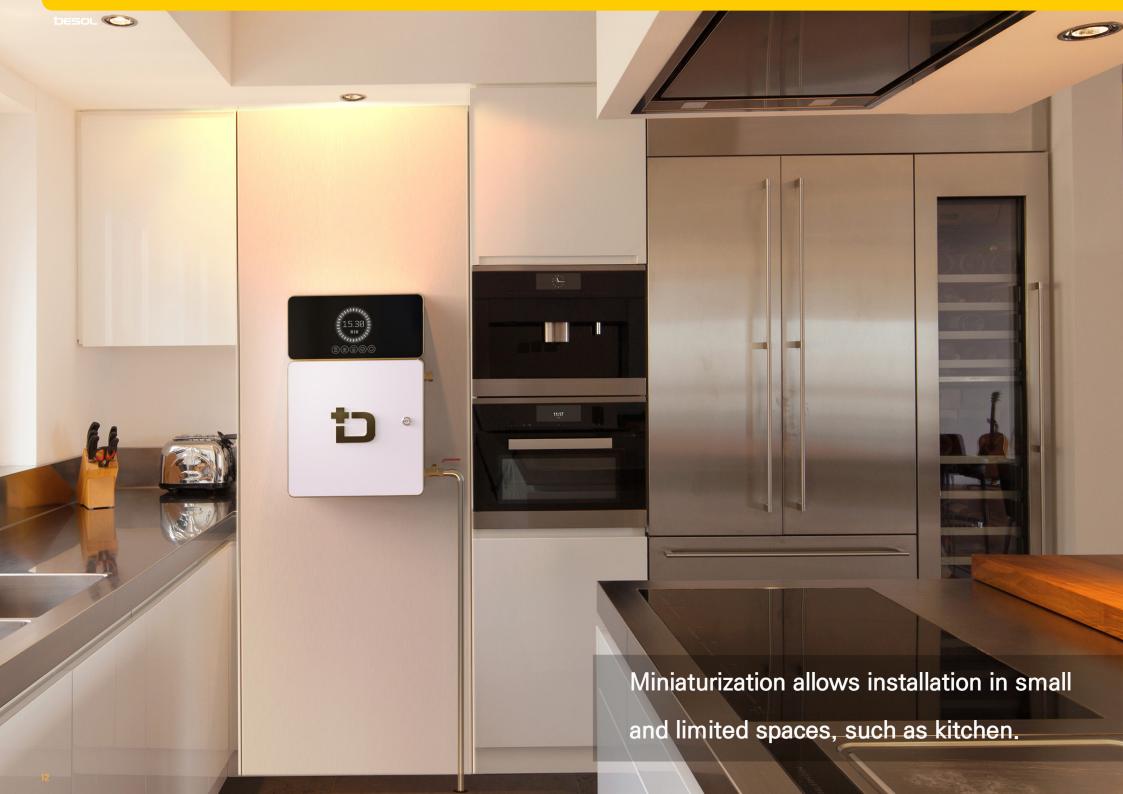
DS-HOCL 1200 G2T

DESOL Hypochlorous acid water (HOCL) sterilized water manufacturer – Table Type

※ Quality Management System Certification

Environmental Management System Certification

REINTONMENTAL Management System Certifica	auon
Size(mm)	W420 x H620 x D250(mm)
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pH/ppm	5.0~6.5 / 10~80
Raw material (electrolyte) component	Food additive dilute hydrochloric acid (HCL, 3%–6% concentration)
Raw material tank size / sterilization water production quantity	40 tons of disinfectant with 20 0 of electrolyte
Usage flow rate	12L~20L/Min.
Free guarantee period	1 year after installation



DESOL Hypochlorous Acid water (HOCL) generator

DESOL is a product with superior performance and price competitiveness compared to other similar products



Flexible Design for specific environment

Design considered to fit in various installation locations



OEM production available for bulk orders

Technological competitiveness

The DESOL-HOCL 1200 sterilized water manufacturing models have been applied with highly advanced technology to maintain highest quality of the product.



Why DS-HOCL 1200?

- Superior production rate of 1200L per hour
- Price that would surprise you
- Only uses HCl as an electrolyte unlike many competitors

Status of hypochlorous acid water(HOCL) Manufacturers Korea Procurement Service's Nara Marketplace General Shopping Mall

	Company A	Company B	Company C	Company D
Picture				
Model	BC-500	FS-5000	SLB-120	JD-1200
Output per hour	500L/h	600L/h	120L/h	960L/h
Selling Price(USD)	13,100	5,300	5,600	16,300
Electrolyte	HCL	HCL	HCL	HCL

The DESOL-HOCL 1200 sterile water manufacturing models offer the best possible purchasing power with superior performance and low cost compared to other similar products that available in domestic and abroad market



DESOL HOCL-1200 G2T

DESOL HOCL-1200 G2W

DESOL HOCL-1200 G2S



DESOL Hypochlorous Acid Water (HOCL)

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30	Safety test
31	Convenience/environmentalism
32	Universality-application fields

Hypochlorous acid is accepted all around the world as an effective high-level disinfectant and safe for human use and environment.



Organizations	Approval	연 도
APQA(Animal and Plant Quarantine Agency) / KOREA	(Animal) Medical Devices and Supplies	2013
MHLW(Ministry of Health, Labor and Welfare) / JAPAN	Specific pesticide control agent	2013
MHLW(Ministry of Health, Labor and Welfare) / JAPAN	Fillet sterilizing disinfectant	2012
MFDS(Ministry of Food and Drug Safety) / KOREA	Disinfectant income agents such as instruments / Food Additive	2008/2007
MHLW(Ministry of Health, Labor and Welfare) / JAPAN	Food Contact Disinfectant	2002
FDA-FISI (United States Food Safety Inspection Agency) / USA	High-level Disinfectant	2000
FDA(United States Food and Drug Administration) / USA	GRAS (usually nontoxic) fruit and vegetable sterlizing water	2000
USDA(United States Department of Agriculture) / USA	Used in bacteria such as E. coli, 0=157, Salmonella,	etc. 1999
EPA(US Environmental Protection Agency)/USA	Disinfectant Generating Device	1998

Hypochlorous acid is accepted all around the world as an effective high-level disinfectant and safe for human use and environment.



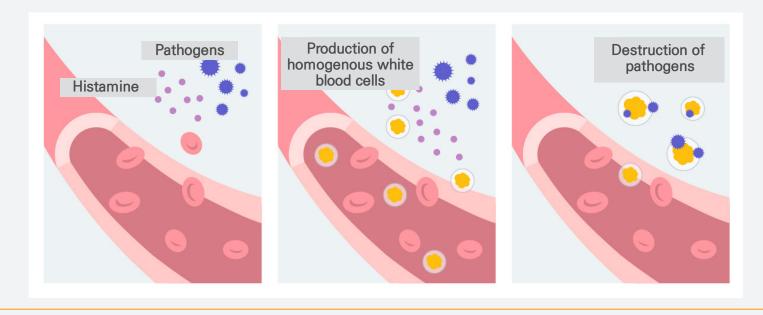
[Europ	[Europe: Biocidal Products Committee opinions on active substance approval]				
PT 1	Human hygiene products (available for skin and wounds)	Applied on or in contact with human skin or scalps.			
PT 2	Human and Public Health Area Disinfectants and Other Pesticides	Used for the disinfection of surfaces, materials, equipment and furniture which are not used for direct contact with food or feeding stuffs. Usage areas include, inter alia, swimming pools, aquariums, bathing and other waters; air conditioning systems; and walls and floors in private, public, and industrial areas and in other areas for professional activities. Used as algaecides for treatment of swimming pools, aquariums and other waters and for remedial treatment of construction materials.			
PT 3	Animal Sanitary Pesticides	Used for veterinary hygiene purposes such as disinfectants, disinfecting soaps, oral or corporal hygiene products or with anti-microbial function.			
PT 4	Food and feed disinfectants	Used for the disinfection of equipment, containers, consumption utensils, surfaces or pipework associated with the production, transport, storage or consumption of food or feed (including drinking water) for humans and animals.			
PT 5	Drinking water disinfectant	For drinking water for both humans and animals.			

Method of producing Hypochlorous acid water

Hypochlorous acid is a key sterilizing ingredient created by our body's immune system.

Neutrophils, which accounts for 60-70% of white blood cells in our human body, is a useful immune system that makes hypochlorous acid (HOCI) by an enzyme called MPO based on hydrogen peroxide in the body and operates first and preemptively when harmful bacteria invades into body.

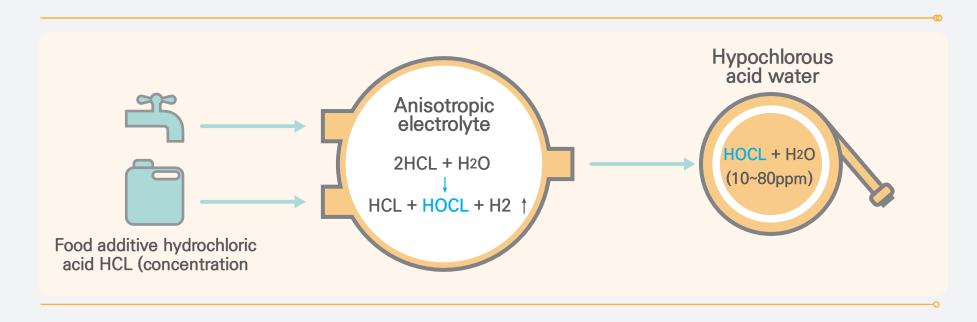
Neutrophils produce HOCI, which has a strong sterilization power that constantly produces and destroys germs in the human body, and the surplus combines with organisms in the body to be neutralized and returned immediately, making sure defense against bacterial intrusion is made without affecting our daily life.



- 1. When pathogens enter the human body, they generate chemical signals such as histamine.
- 2. White blood cells react to histamine signals, produce a neutron and move to the bacterial infestation area.
- 3. Neutrophils covers the pathogens and produces HOCL, destroying the pathogens.

Method of producing Hypochlorous acid water

Hypochlorous acid water is safe to use and does not have any tolerance against our body



Acid is largely divided into organic acids (citric acid, glacial acetic acid, lactic acid, appleic acid, oxalic acid) and inorganic acids. Water-diluted 'diluted hydrochloric acid' is used in food manufacturing.

Typical foods are used as food additives in various places, such as to disassemble the dehydrated soybeans as soy sauce and to make soy sauce (oxygenic soy sauce), and to peel tangerines for corn processing and canned food.

Sodium Hypochlorite(NaOCL)



Sodium hypochlorite is easy to manufacture, but it can have

harmful effects on various human bodies and environments.

O Generating Method

Lax is the main ingredient of sodium hypochlorite, which is produced by electrolysis of salt (saline solution).

Content

Lax sold at the market contains more than 50,000 ppm of effective chlorine, which produces 80~130 ppm or 200 ppm of NaCIO.

O Usage Criteria

It should be used only for sterilizing food, such as fruits and vegetables, and should be removed before final food is completed. It is recommended that vegetables and fruits be sterilized at a concentration of 80 to 130 ppm, and cooking tools and appliances at a concentration of 200 ppm. Caution: Do not mix with acid cleaning agent (floor cleaning agent.) No hot water dilution.



Sortation	Sodium hypochlorite (Na0CL)
рΗ	7.5 and above
Effective chlorine concentration	50~300ppm
Electrolyte	Natrium
Sterilizing power	Weak
Salt residue	Exists
Environmental problem	Salt wastewater generation
Sterilizing agents such as food additives/furniture, etc.	Designation
Chloroform	Occurs when used, created
Hand stiffness	Strong
Metal reaction	Corrosion of metal
Human influence	Eye, Skin, Respiratory Effect
Spatial sterilization	Impossible

vs. Hypochlorous(HOCL)

HOCL can be used in various places.



Hypochlorous Acid (HOCL)		Advantages
5.0~6.5		Close to neutral
10~80ppm	→	Equal/ Excellent sterilization
Food additive dilute hydrochloric acid (3 to 9%)	→	45% cheaper than NaOCL
Strong	─	spore-forming bacterial sterilization weak
None	──	Debris can be removed
Reduced to water	──	No wastewater
Designated		
No Occurrence		
None		
Almost none		
Non-toxic, skin toxic-free	→	Safe for the human body and environment
Possible	→	Excellent effect on sterilization and odor removal

O Generating Method

Hypochlorous Acid Water, or HOCI, produces dilute hydrochloric acid through a method of electrolysis.

Considering the effects and safety of the body and environment, the hypochlorous acid water (pH 5.0 to 6.5) is the safest and most sterilizable.

O Content

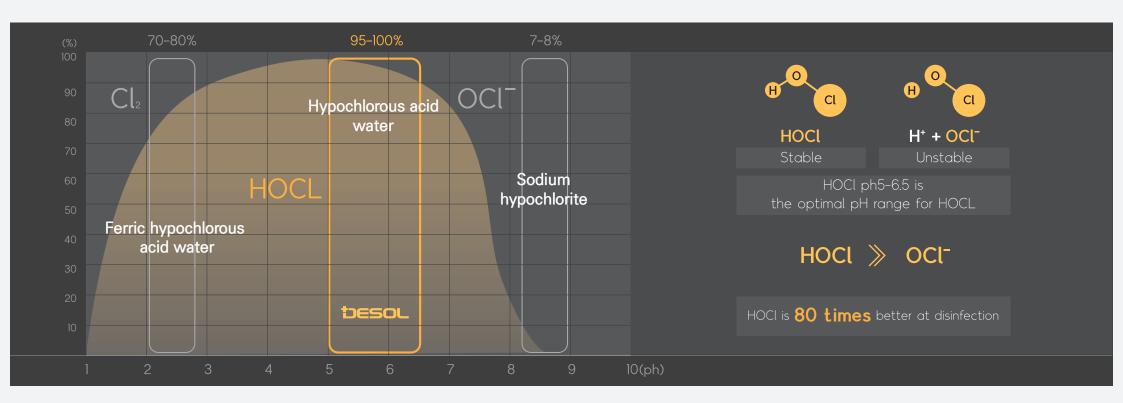
DESOL's hypochlorous acid water generator uses only 6% of diluted hydrochloric acid concentration used as a food additive to contain pH 5.0-6.5, effective chlorine 10 to 80 ppm, which are closest to the human body.

O Usage Criteria

HOCI has a wide range of sterilizing effects, ranging from germs, viruses and birds, and is used worldwide in the food industry, agriculture, medical devices, and other areas. In Korea, it is used for sterilization of fruits, vegetables, and other food products.

The HOCL method of sterilizing and disinfecting food ingredients removes foreign substances (soil, etc.) and can be easily used by rinsing 2 to 3 times in running water after 1 to 2 minutes of deposition without any additional dilution.





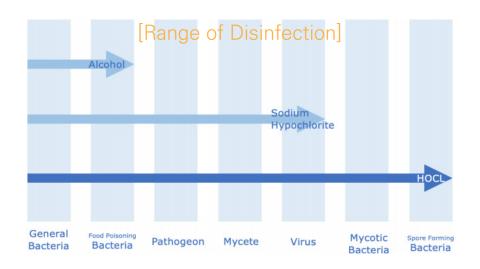
Hypochlorous acid (HOCI)

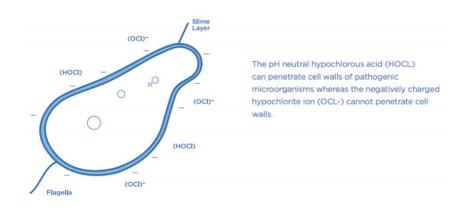
After the electrolysis of 3~9% diluted HCl, Hydrogen and Chlorine gas mix with water to produce HOCl disinfectant. pH 5.0~6.5, Free Available Chlorine (ppm) 10~80ppm

Sodium Hypochlorite (NaOCl): After the electrolysis of salt or saline solution, products of electrolysis are mix with water to produce NaOCl solution, the main ingredient of chlorine bleach. pH >7.5, Free Available Chlorine (ppm) 100~200ppm

Hypochlorous acid and Sodium hypochlorite are DIFFERENT

Hypochlorous acid – Effective





Hypochlorous acid (HOCL) is 80–100 times more effective and kills microorganisms faster than hypochlorite ions (OCI–).

Hypochlorous acid (HOCl) which is electrically neutral and hypochlorite ions (OCl-) which is electrically negative will form Free Available Chlorine (FAC). This results in disinfection, but both substances have very distinct behaviors.

The cell wall of a pathogenic microorganisms is negatively charged by nature. The negative charge of the hypochlorite ion (OCL-) will be repulsed by the negative charge of the pathogenic microorganism cell wall making it a weak disinfectant. The neutral hypochlorous acid (HOCL) molecule can penetrate the cell wall of the pathogenic microorganism very easily, thus making it a very effective disinfectant.



DESOL Co., Ltd.



Ministry of Food and Drug Safety

Permission to operate sterilizing agents such as food additives and appliances



Korea Institute of Food Science

Self-Quality Certification, Sterilization Test



Korea Research Institute of Chemical Convergence

Eye irritation & corrosivity test, skin irritation & corrosivity test. 33 harmful ingredients test. electromagnetic safety certification



FITI Testing Laboratory

Safety Checklists. Inspection of Living Chemical Products. Sterilizers & Deodorants



Korea Institute of Environmental

Verification of compliance with safety standards



ALLPASSBIO

Sterilization check, MSDS analysis



ISA

HOCL Content Analysis



Korea Institute of Construction Life Testing

Sterilization & Deodorant Inspection



Patent Office

Patent and Design



Public Procurement Service

HOCL Sterilizing Water Manufacturina System



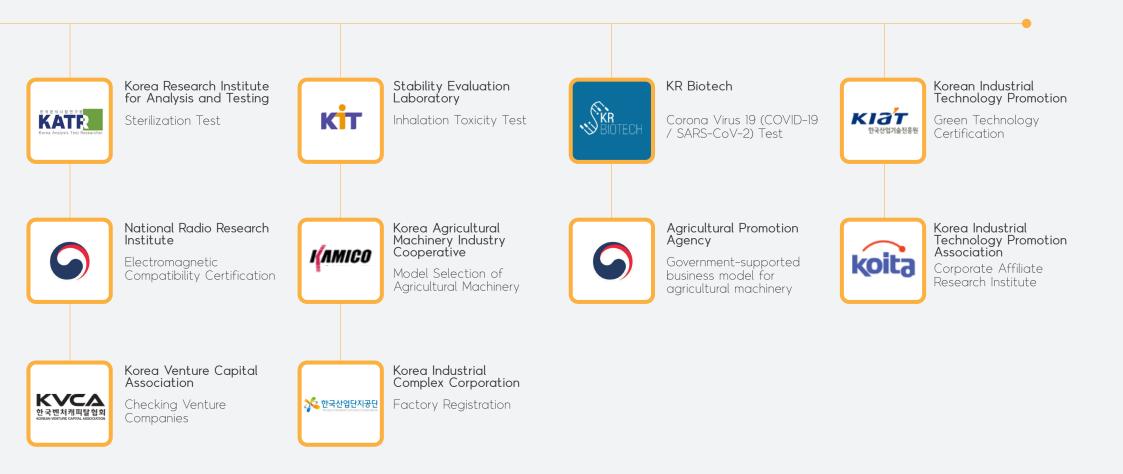
School Marketplace

HOCL Sterilizing Water Manufacturing Device





DESOL Corporate Affiliate Research Institute



Sterilizing test

DESOL's sterilization and disinfection solution has been verified through sterilization tests on various pathogenic bacteria such as COVID-19.

■ Test results for sterilization, virus inactivation

Classification	Inspection Items	Testing Organization	Test Report No. / issue Date	Test Conditions	Test Results	References
	E. coli	ALLPASSBIO *1	2020- R- M-021 / '20.04.21	Contact Time: 10 seconds	99.999%	Appendix 01
Pathogenic bacteria	E. coli, yellow grapes epithelial bacteria	Korea Food Science Institute *2	R20200406-0169 / '20.04.06	Contact Time: 5 minutes	ALL 99.999%	Appendix 02
and food poisoning causative bacteria	Pneumococcus, MRSA bacteria	Korea Institute of	CT20-020727K / '20.03.10			Appendix 03-1
	E. coli, rustic bacteria and yellow grapes epithelial bacteria	Construction and Living Environment *3	CT20-020728K / '20.03.10	Contact Time: 30 seconds	ALL 99.9%	Appendix 03-2
Virus	COVID-19 (SARS-CoV-2)	KR Biotech corp. *4	KR-2007-025-DSL01-C / '20.08.03	Contact Time: 30 seconds, 1 minute, 5 minutes.	ALL 99.99%	Appendix 04-1 Appendix 04-2

^{* 1} Test method: Food additive manufacturing-IV. General test method-37. Sterilizing sterilization test method

■ Test results for sterilization power according to effective chlorine concentration(ppm) and hydrogen ion concentration(pH)

Concentration(ppm/pH)	Inspection item	Testing institution	Test Report No. / issue Date	Test Conditions	Test Results	References	
10 ppm / pH 6.5	E. coli, yellow grapes, upper lip bacteria	yellow grapes,	ellow grapes, Korea Institute of Analyses *1 KAAAM200706-005 / Contact			Appendix 05-1	
25 ppm / pH 6.1				· ·	Contact Time: 1 minute	ALL 99.9%	Appendix 05-2
30 ppm / pH 5.4							Appendix 05-3
40 ppm / pH 5.7			KAAAM200706-006 / '20.07.06			Appendix 05-4	
50 ppm / pH 5.0			KAAAM200706-007 / '20.07.06			Appendix 05-5	

^{*1} test method: Guidelines for the Valuation Method of External Disinfectant (non-medical items) /June 2014

^{*2} Test method: Food additive manufacturing-IV. General test method-37. Sterilizing sterilization test method

^{*3} Test method: KCL-FIR-1002:2018

^{* 4} test method: refer to the attached test reports

Deodorization test

HOCI removes odor-causing bacteria and odor-causing substances including ammonia.

Odor removal in vehicles, recycling, and garbage section, food waste at home, toilet, dog, and cat homes is highly effective.

		_	
Dead	orizatio	n Test	Results

Classification	Inspection Items	Testing Organization	Test Report No. / issue Date	Test Conditions	Test Results (deodorization effect)	References
Stench	Ammonia	Korea Institute of Construction and Living Environment *1	CT20-049469K / '20.05.06	Measurement time: 30 minutes, 60 minutes, 90 minutes, 120 minutes	99.0%	Appendix 06-1
Onion-flaking	Methyl Mercaptan (Methanethiol)		CT20-083701K_M1 / '20.07.27		98.8%	Appendix 06-2
Fish-smell	Trimethylamine		CT20-083702K_M1 / '20.07.27		82.5%	Appendix 06-3
Egg- rotting smell	Hydrogen sulfide		CT20-083703K_M1 / '20.07.27		78.0%	Appendix 06-4

^{*1} test method: Put 66ml of samples into an 11L reactor and seal them. measured by the gas detector SPS

















Safety test

DESOL's HOCL has been proven through official institutions' various safety tests and certification. tests and certification.

■ Test results for toxicity, harmful substances (35 types in total)

Classification	Inspection Items	Testing Organization	Test Report No. / issue Date	Test Conditions	Test Results (deodorization effect)	References
Toxicity	Acute skin irritation and corrosivity	Korea Testing Laboratory *1	TNK-2019-000194 / '19.11.06	The Animal Protection Act and the Experimental Animal Act	No skin irritation and corrosivity	Appendix 07
	Eye irritation and corrosivity		TNK-2019-000195 / '19.11.06		No eye irritation and no corrosivity	Appendix 08
	Acute oral toxicity		TBK-2020-003212 / '20.08.28		No toxicity	Appendix 09
Hazardous Substances	32 types other than IPBC		TAK-2020-057284 / '20.04.21	Hazardous Substances Detection Test (33 types in total)	No detection	Appendix 10
	1 type other than OIT	FITI Testing Laboratory	M286-20-03497 / '20.07.24	Hazardous Substances Detection Test (2 types in total)	No detection	Appendix 11

^{*1} Test method: National Institute of Environmental Research Notice No. 2019-23, Party 5, Paragraph 3: Acute Skin Irritability and Corrosion Test, Paragraph 4: Acute Skin Irritation and Corrosion Test.

■ Safety check results of living and chemical products subject to safety verification

Classification	Inspection Items	Testing Organization	Test Report No. / issue Date	Test method	overall evaluation	References
Disinfectants and disodorants Containers packaging and value of the containers of t	Chemical materials	FITI Testing Laboratory	M287-20-00763 / '20.03.20 M287-20-00764 / '20.03.20 M287-20-00795 / '20.03.20 M287-20-00796/ '20.03.20	Ministry of Environment and National Institute of Environmental Research	Appropriate	Appendix 12-1 Appendix 12-2 Appendix 12-3 Appendix 12-4
	Containers, packaging and weight					
	Children-safe packaging					

^{*1} Inspection method

⁽¹⁾ Designation of daily chemical products subject to safety verification and safety marking standards (Environmental Notice No. 2019–54)

⁽²⁾ Regulations on the Standards and Methods for Testing and Inspection of Living and Chemical Products Subject to Safety Verification (National Institute of Environmental Research Notice No. 2019–70)

Convenience / Environmentalness

Sterilizing methods of food ingredients and appliances – Site guidelines for food sterilizers (Food and Drug Safety Ministry, 2019)



Sterilization/ Sterilization method 1

Food sterilizer 'micro-acid hypochlorite'

Put in a solution containing 20–70 ppm of effective chlorine for 1–2

minutes and rinse 2-3 times with



Sterilization/ Sterilization method 2

Food sterilizer 'Sodium hypochlorite'

Soak it for 5 minutes in a solution containing 80–130 ppm of effective chlorine and rinse it 2–3 times under running water.



Sterilization/ Sterilization method 3

Baking soda, vinegar, etc.

If vegetables or fruits are washed only with water, baking soda, or vinegar, there is a risk of food poisoning caused by microorganisms or parasites.

DESOL's hypochlorous acid water contributes to the reduction of employees working hours, alleviation of labor intensity, and increases workers efficiency.

Compared to the ineffective chlorine concentration of sodium hypochlorite (lax), the hypochlorous acid water has a more effective chlorine concentration, saving up to 80% of the time (lax soaked for 5 minutes, hypochlorous acid water 1 to 2 minutes) compared to Lax.

DESOL's hypochlorous acid water contributes to resource conservation and environmental protection; it does not contain salt, so it is safe for the human body and the environment.

While maintaining high sterilization power, low effective chlorine concentrations are also important for the same or superior sterilization as Lax, which means that instead of rinsing 2–3 times in the running water after sterilization, it minimizes energy to produce water and water waste by reducing to 1 to 2 rinsing times, and contributes to environmental protection by saving resources. It also prevents salt contamination of soil and groundwater.

Universality / DESOL's HOCL's application fields

HOCL is a safe disinfectant derived from the human immune system. It is effective in removing odor causative substances such as ammonia by quickly sterilizing and disinfecting various pathogens and viruses. It is also safe to be returned to water after playing its role. DESOL's HOCL generation system does not use salt (sodium) as an electrolyte material. This allows safe use of animals and plants, including humans, as well as preventing environmental damage caused by salt discharge



Food Processing

Supermarket, food, seafood, meat, liquor, rice cake, beverage, canned food

Food, cooling water, containers and utensils, workplace sterilization and disinfection



Service Industry

restaurant, accommodation, hot spring, swimming pool, public bath, karaoke

Disinfection of ingredients, Disinfection of rooms, deodorization and Disinfection of toilets



Medical/Health Industry

Medical facilities, nursing homes, nurseries, funeral homes

Hand disinfection, instrument cleaning, air purification, inflammation prevention, sterilization and odor removal in the hospital room



Farming/livestock/fishing industry

Orchard, vinyl house, flower garden, barn, farm, animal hospital, zoo

Sterilization of seedlings, pest control, sterilization of crops, sterilization of bacterial microorganisms, deodorization of livestock and fishery products



And more

Waste incineration plant, water treatment plant, wastewater treatment plant, building maintenance, park management

Facility sterilization and odor prevention, deodorization

Universality / DESOL's HOCL's application fields















More information is available in our Youtube channel 'DESOL'



DESOL provides the best and most effective disinfection solutions for our safe and clean environment.

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