ClorDiSys

Mold Prevention and Remediation Equipment and Services

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ClorDiSys

ClorDiSys Solutions, Inc. was established in 2001 in New Jersey. Our chlorine dioxide gas sterilization technology was developed at Johnson and Johnson, where our founders were part of the development team. We are a proud, woman-owned small business focused on providing reliable, highly effective decontamination products and services around the world. We provide personal attention to ensure customer satisfaction in all we supply, and our broad experience in a wide-range of industries allows us to offer a completely turnkey solution to microbial contamination challenges.

In 2014, we launched our line of ultraviolet light disinfection systems. We quickly found ourselves in the middle of the Ebola epidemic with our products being used at the Nebraska Biocontainment Unit upon discharge of Ebola patients and various other hospitals around the world. In 2020 during the COVID-19 pandemic, our products are helping disinfect N95 masks, EMS vehicles,
patient rooms, testing centers, and other areas both within and outside of the healthcare environment. This includes the utilization of liquid chlorine dioxide for decontamination via spray and wipe, fogging, and electrostatic spraying. Our line of chlorine dioxide and ultraviolet light products continue to grow and evolve to further support contamination control efforts within Pharmaceutical Production, Food Processing/Manufacturing, Mass Transportation, Schools/Universities, and Office Buildings.

Cannabis Industry

Mold Prevention and Remediation Program

Controlling mold and other pathogens is essential for your operation as it is a strong threat to cannabis, potentially wreaking havoc on crops. Mold is found everywhere, because it can grow on almost any substance when moisture is present. Mold can easily travel room to room, and even between attached buildings if the air ventilation systems are connected. Depending on your operation, there are different challenges to preventing or eliminating mold contamination.

At ClorDiSys Solutions, we take a broad look at your operation to determine the entry points for mold and other pathogens to provide expert advice and recommendations for environmental surfaces, tools, and the plants themselves. From creating stronger workflows to recommending new disinfection equipment and procedures, we aim to be a partner for your business. Drawing upon our experiences in contamination control within many different industry types, including pharmaceutical cleanrooms and food production, we deliver solutions that have been used successfully in some of the world's most critical environments.

From seed to store, ClorDiSys can help manage your risks and produce safer products for your business.

DECONTAMINATION OF EMPTY GROW ROOMS

traditional cleaning methods may not account for airborne mold spores, tight spaces, and human error or oversights

Chlorine Dioxide Gas

Gaseous chlorine dioxide is an EPA registered sterilant that can be utilized prior to any plants entering the space to ensure any pre-existing mold spores be remediated. This significantly reduces the risk of cannabis crops "catching" any new mold spores. For a complete kill of all potential organisms in the entire facility, chlorine dioxide gas is the optimal way to fill an entire space evenly and completely, decontaminating every surface, crack, or crevice with no residues or additional cleanup.

Ultraviolet Light Disinfection

Ultraviolet light (UV-C) is an easy way to achieve high-level disinfection to any exposed surface in minutes. It also eliminates odors. This chemical-free and residue-free disinfection method will help reduce mold spores, therefore minimizing future risk of exposure to the cannabis plant. This is best utilized in a completely clear space to ensure maximium exposure to the UV-C light. If there are complex shapes to the space or objects in the space, the unit may need to be repositioned or multiple units may be needed to ensure as many surfaces as possible are exposed to the disinfecting light.

Liquid Chlorine Dioxide

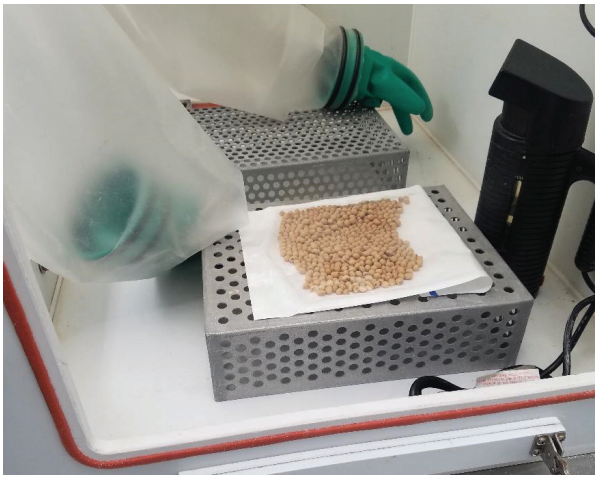
Liquid chlorine dioxide can be sprayed, wiped, or mopped onto walls and floors, environmental surfaces, growing vessels, or chambers to eliminate any existing harmful organisms. Liquid chlorine dioxide can also be dosed into irrigation water or used in hydroponic systems to eliminate any contaminents.

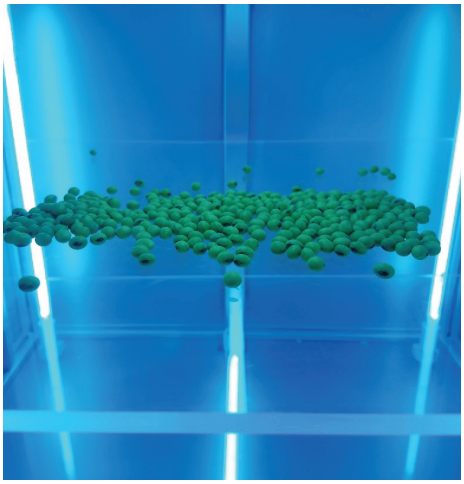
DECONTAMINATION OF SEEDS

Prior to entry into a clean growing facility, it is important to ensure seeds will not be carriers for mold. A contaminated seed can put the plant at risk for mold before it even grows.

Chlorine Dioxide Gas

A chlorine dioxide gas treatment of seeds can be completed in a chamber prior to use to deactivate any surface bacteria, mold, or other undesireable organisms. Because CD gas is a dry, residue-free sterilant, this will ensure that the seeds are in optimal condition and no longer pose risk to a plant developing mold during the growing phase. Utilizing a Tyvek pouch will allow the gas to penetrate through, keeping the seeds sterilized until ready for use.





Ultraviolet Light

Ultraviolet light (UV-C) can be applied to seeds utilizing a tabletop disinfection chamber. While the seeds are inside, they receive 360 degrees of UV-C exposure so long as they are spread out atop quartz glass shelving, limiting overlap and shadowed areas. A 99% kill on any surface mold will result without any undue harm to the seed, destroying any surface organisms that may cause mold issues in the future during the plants' growth.

Liquid Chlorine Dioxide

Seeds can soak for mere minutes in a liquid chlorine dioxide solution to eliminate any surface contaminants that may be present. The removal of such contaminants will improve the future health of the plant by diminishing the risk of mold.

DID YOU KNOW?

According to California's Bureau of Cannabis Control testing of 10,695 legal marijuana samples from July 1 through August 29 2018, their findings produced1,904 failed standards. This included 403 failures due to pesticides, 99 failures for residual solvents or processing chemicals, and 114 failures due to microbial impurities such as mold, E. coli, and salmonella.

BUREAU OF CANNABIS CONTROL
CALIFORNIA

DECONTAMINATION OF PLANTS

GROWING

Ultraviolet Light

As a fast, high-level method of disinfection without the involvement of chemicals, ultraviolet light (UV-C) can be utilized in numerous ways throughout the growing process. This includes the elimination of odors. It can be used on a continuous, preventive basis to avoid the spread of any mold introduced or on an as-needed basis.

- Portable devices can be used in both the upright and inverted positions illuminating surfaces with UV-C light, then repositioned and repeated to ensure every location is receiving necessary exposure levels.
- Portable devices can be placed on a track or automated vehicle to provide continual exposure to plants without manual repositioning.
- UV-C lighting fixtures can be installed overhead for easy and consistent exposure. These fixtures may also be installed in other facility locations for additional disinfection coverage.
- UV-C can disinfect the water sources used for irrigation. This allows for any contaminants within a water source to be both filtered out and eliminated.

DRYING and CURING

Ultraviolet Light

Buds can be treated by UV-C light to eliminate mold that may grow on the surface during the drying and curing phases. UV-C light may be emitted via a wall unit or transportable device during the drying phase in order to destroy surface contaminents. At any point, including curing, the buds may be placed inside a UV-C disinfection chamber to receive direct 360 degree exposure quickly killing spores wherever the light shines. UV-C is also proven to eliminate odors.

Chlorine Dioxide Gas

If mold is present or forms while drying or being stored, chlorine dioxide gas can be utilized. ClorDiSys' EPA-registered CD gas will inactivate all microbiological contaminants without leaving a residue. This treatment can be performed either in an enclosed chamber when only a select few plants are of issue or the decontamination of an entire room if there is a widespread outbreak. Prior to decontamination, users should confirm compliance with legislation.

HYDROPONIC AND AEROPONIC GROWING

Chlorine Dioxide

Chlorine dioxide is proven to remove biofilms that are commonly present in water reservoirs, tanks, pipes, and tubing. A biofilm is defined as a "microbially-derived sessile community which is characterized cells that are irreversibly attached to a substratum or interface, or to each other" are embedded in a matrix of extracellular polymeric substances (EPS). More simply put, microorganisms including bacteria, algae, and fungi attach to surfaces and develop biofilms. Biofilms can form where there is low flow within a system allowing the microorganisms to stick to a surface without being washed off by the flowing fluid.

Cells in a biofilm have the ability to survive cleaning and sanitization. Most biocides only kill the surface of the biofilm, because the biocide cannot penetrate it. The resistance to sanitizers increases with the maturity of the biofilm. Chlorine dioxide is different as it is a dissolved gas in water. This allows chlorine dioxide to readily penetrate the biofilm and oxidize what is holding it together, so the microorganisms are no longer protected and can be washed away.

Ultraviolet Light

Ultraviolet light (UV-C) is a superior method of water disinfection because harmful organisms are destroyed simply by light and without the need for any chemicals. Chemical water treatments may result in taste and odor problems, undesirable chemical reactions with substances present in the water, or dangerous handling issues. UV-C also prevents biofilms.

the FLASH FLOOD™

UV-C Water Treatment Disinfection

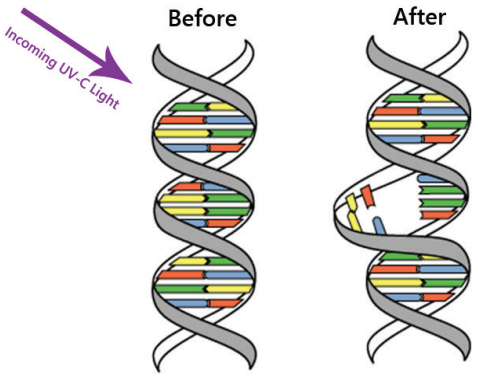
The Flash Flood is a UV-C water treatment device that operates inline with your water system. The Flash Flood differs from traditional water filters by actually killing organisms rather than simply trapping and storing living and viable organisms.

ULTRAVIOLET LIGHT DISINFECTION

In addition to chlorine dioxide, ClorDiSys offers a line of ultraviolet light products and services.

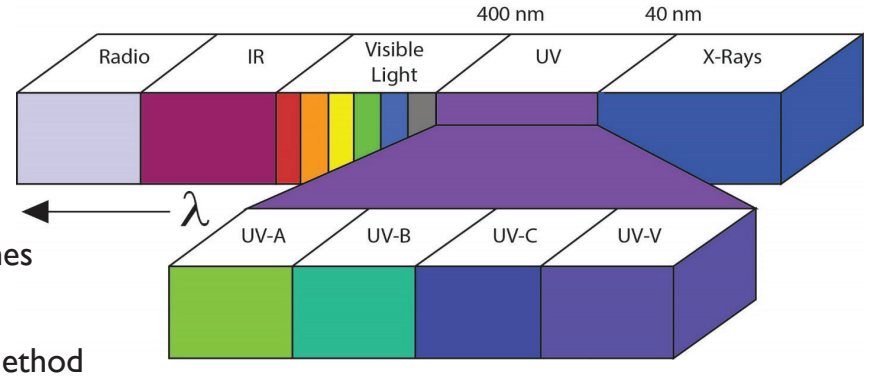
EPA Est. #80802-1

Ultraviolet light is a specific part of the electromagnetic spectrum of light that offers bactericidal effects. Ultraviolet light is divided into UV-A, UV-B, and UV-C rays. It is the wavelengths in the UV-C spectrum which offer great germicidal potential. When a microorganism is exposed to UV-C, the nuclei of the cells are altered due to photolytic processes. This process prevents further replication and causes cell death. Therefore, UV-C is able to provide high level disinfection of many viruses, bacteria, fungi, and spores.



BENEFITS

- Cost pennies per cycle
- No room preparation needed
- Quick to learn and easy to operate
- Fast cycles allow for quick turnover times
- Requires little maintenance or upkeep
- A dry, chemical-free, and residue-free method
- Unaffected by temperature, pressure, or humidity level

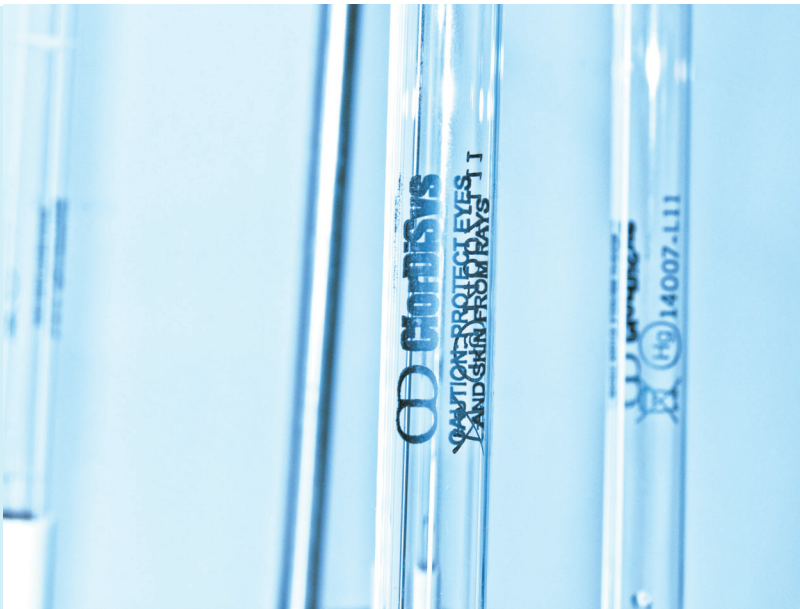


SAFETY

UV-C presents a hazard to skin and eyes, so direct exposure is always to be avoided. UV-C is blocked by a number of materials, including glass (but not quartz glass) and most clear plastics, so it is possible to safely observe through a window. UV-C is chemical-free, so there are no dangerous residues to be wiped down or neutralized after the disinfection occurs.

COMMON APPLICATIONS

- Retail spaces, offices, and other rooms
- Electronics, tools, and supplies
- Trucks, trailers, and shipping containers
- Processing tanks and vessels
- Reduction of airborne organisms
- Elimination of odors
- Packaging and components
- Boots and shoes



the TORCH™ and TORCH +™

Portable UV-C Disinfection Tower

the TORCH and TORCH+ are easy-to-operate, portable, powerful disinfection systems designed to provide a rapid and highly effective method to disinfect surfaces, components, and common touch points. The TORCH and TORCH+ contain eight high powered UV-C lamps to provide quick disinfection times. They plug into standard wall outlets and produce an efficient UV-C output of 200 μw/cm^2 at 8 feet (12 mJ/cm^2 per minute) to get a calculated 99% reduction of harmful organisms in seconds and spores in minutes.

The TORCH+ comes with an iPad™ for remote operation and monitoring. Data recording and management becomes easy and efficient with cycle data stored on the iPad™ at the end of every use. Data stored includes date, time, address, room number, and operator name. Disinfection cycles can be controlled based on time or by accumulated UV-C dosage using the integrated UV sensor in order to provide the right process to meet your needs.

TORCH and TORCH+ SPECS

Overall Size:	Weight:	Power: 110-240VAC	Bulb Lifespan:
23" W x 23" D x 68" H	72 lbs	6 Amps, 50/60 Hz	16,000 Hours

the FLASHBAR™

UV-C Lighting System

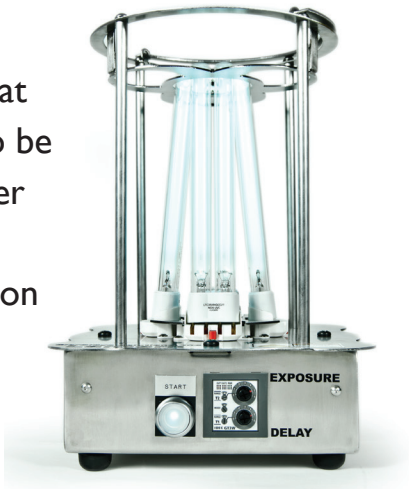
Turn any room into a quick and cost-effective disinfection room using our Flashbar UV-C lighting system. A custom design can be made using as many or as few units necessary for the desired application. A UV-C room provides effective disinfection of plants, racks, tools, equipment, and other surfaces. Flashbars can be wired to a switch for simple operation, controlled by timers, or connected to more sophisticated systems utilizing motion sensors and other advanced control mechanisms.

The 2-bulb, 4 foot Flashbar outputs UV-C light at 68 μW/cm² at ten feet to provide disinfection of surfaces in minutes.

the LANTERN™

Portable UV-C Disinfection

The Lantern is a lightweight, easily transportable UV-C generator that can be used in both the upright and inverted positions, allowing it to be hung from the ceiling, rails, or along a track system to easily pass over any area of concern. Both an exposure and delay timer allow for operators to safely exit the space, but also achieve desired disinfection time. The Lantern produces an efficient UV-C output of over 130 mw/cm^2 to get a calculated 99% bacterial kill in 1 minute and a 99% reduction of spores in 5 minutes for surfaces within 4 feet.



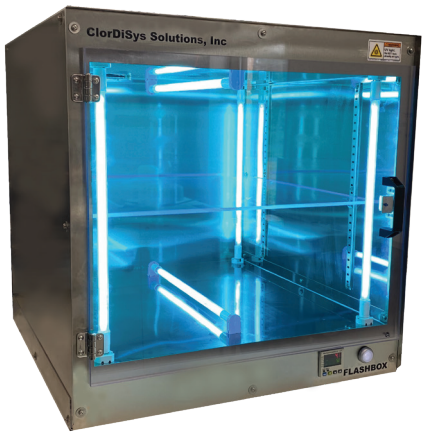
LANTERN SPECS

Overall Size:	Weight:	Power: 115 VAC	Bulb Lifespan:
14" H x 10" L x 10" W	10 lbs	4 Amps, 60 Hz	9,000 Hours

the FLASHBOX™ and FLASHBOX-MINI™

UV-C Disinfection Chambers

The Flashbox and Flashbox-mini provide a highly effective method to disinfect laptops, phones, growing and pruning tools, shoes, seeds, electronics and components. Disinfecting components without removing them from the room to minimize cross-contamination, both offer a calculated 99% reduction of common viruses and bacteria in 30 seconds and spores in minutes.

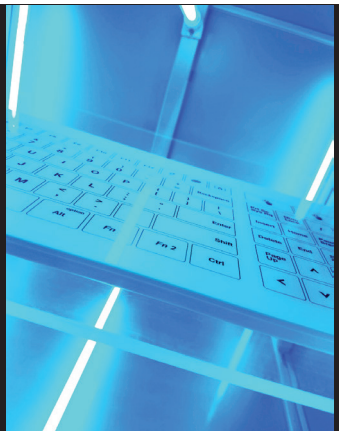


The Flashbox-mini contains 2 protected UV-C bulbs, one on the top and one on the bottom, and a quartz glass shelf. The Flashbox contains 6 protected UV-C bulbs and a quartz glass shelf, providing increased disinfection coverage of items inside. Quartz glass shelving allows for full exposure of all surfaces on items.

A 2017 MIT study determined the Flashbox-mini was the most effective and consistent method for sanitizing smartphones.

FLASHBOX SPECS

Usable space for items:
14" H x 23" D x 18" W
Overall Dimensions:
25.75" H x 24" L x 24" W
Weight: 90 lbs.
Power: 115 VAC, 3 Amps
Bulb Lifespan: 16,000 Hours



FLASHBOX-MINI SPECS

Usable space for items:
5" H x 6" D x 12" W
Overall Dimensions:
9" H x 8" L x 14" W
Weight: 11 lbs.
Power: 115 VAC, 2 Amps
Bulb Lifespan: 11,000 Hours

the TORCH-AIRE RECESSED™

Continuous Room Air Disinfection

Designed to replace a standard ceiling tile, the Torch Aire-Recessed installs easily to reduce airborne pathogens. The Torch Aire-Recessed is designed to help eliminate airborne microbes, particularly in crowded or poorly ventilated areas, and in situations where the risk of cross contamination is high.

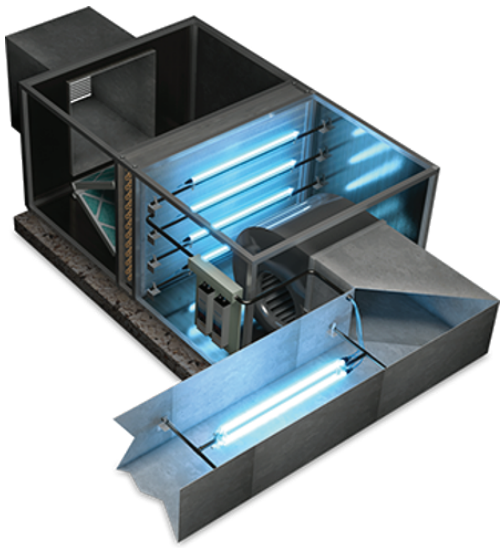
Constructed of stainless steel with a reflective aluminum exposure chamber, air passes over enclosed UV-C bulbs to kill harmful organisms and sent through a filter to catch large particulates, then returned into the environment. This design prevents UV-C exposure to those in the room, making it safe for people to be in the space at all times. Bulbs last up to 10,000 hours or 416 days if running continuously.

AIRGLOW™

UV HVAC Disinfection

AirGlow is an in-duct ultraviolet light disinfection system that can be installed in any HVAC system to help reduce and/or eliminate the growth of bacteria, mold and spores as well as prevent the spread of contaminants throughout a facility. Ultraviolet light disinfection systems can also be placed over the cooling coils of an HVAC system to remove and reduce the formation of biofilms.

As the air passes over the UV-C emitting bulbs, the ultraviolet light will disinfect the air, killing harmful organisms that would be traveling through the system. Bulbs can be positioned in the supply and the return to further optimize kill. The AirGlow can continuously run, even while people are present, because the UV-C bulbs are enclosed within the ductwork.



The AirGlow comes in varying lengths to accommodate the needs of specific HVAC systems. Units are also available with either two or four high output, quartz glass, UV-C bulbs, depending on the desired efficiency.

WHAT IS CHLORINE DIOXIDE?

Chlorine dioxide (CD) has been recognized as a disinfectant since the early 1900s. It is a proven broad spectrum, anti-inflammatory, bactericidal, fungicidal, and virucidal agent, as well as a deodorizer. It is widely used as an antimicrobial pesticide and an oxidizing agent in drinking water as well as to whiten paper for the pulp and paper industry.

Chemical Formula:	ClO_2
Molecular Weight:	67.45 g/mole
Melting Point:	-59°C
Boiling Point:	-40°C
Density:	2.4 times that of air

ClorDiSys Solutions' chlorine dioxide gas, specifically, is registered with the US Environmental Protection Agency (EPA) as a sterilant. The US EPA defines sterilant as able "to destroy or eliminate all forms of microbial life including fungi, viruses, and all forms of bacteria and their spores," meaning ClorDiSys' chlorine dioxide gas will inactivate all microbiological contaminants. It is applied in a number of different applications and industries to provide a 6-log (99.9999%) sterilization level decontamination. The rapid sterilizing activity of CD is present at ambient temperature and a wide range of gas concentrations, from 0.3 to 20 mg/L. It is non-carcinogenic, non-flammable, residue-free, and safer on materials than bleach, ozone, and hydrogen peroxide.

True Gas at Room Temperature

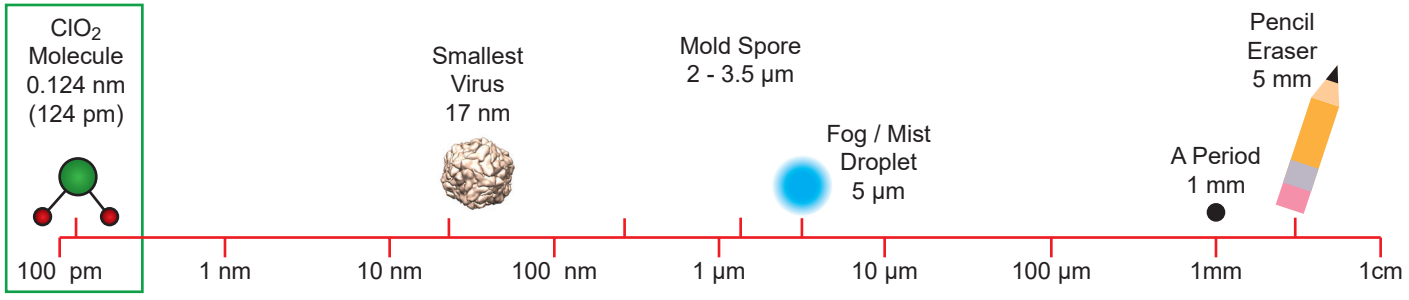
Chlorine dioxide is a true gas at room temperatures which enables it to fill the space it is contained within evenly and completely, just like oxygen in air. This property is essential when trying to eradicate pathogens from an area, as the gas will get everywhere and not allow anything to "hide" from it.

Measured and Controlled

Due to its yellow-green color, chlorine dioxide gas can be measured using a photometer. A photometer measures the darkness of the gas (darker color = higher concentrations) which allows for a highly accurate and reliable measurement to ensure tight process control.

Different from Chlorine

While "chlorine" is in its name, chlorine dioxide gas is **VERY** different. Chlorine dioxide's method of kill is oxidation, where chlorine kills through chlorination. Therefore, unlike chlorine, chlorine dioxide does not produce environmentally undesirable organic compounds and is safer on materials.



MOLECULE SIZE MATTERS

Chlorine dioxide gas has a molecule size 100x smaller than the smallest virus. This allows the gas to easily penetrate any cracks or crevices, so no organism can hide.

CHLORINE DIOXIDE GAS DECONTAMINATION

Overall Size:
30" W x 56" H x 24" D

Power: 100-240 VAC
5 amp, single phase

the MINIDOX-M™

Portable Chlorine Dioxide Gas Generator

The Minidox-M provides a rapid and highly effective method to sterilize volumes up to 70,000 ft^3 in ideal conditions, including rooms, isolators, passthroughs, laboratories, etc. It is portable in design and can be easily moved throughout your facility. The system features a sophisticated concentration monitoring system allowing for a tightly controlled and reliable sterilization process. It has the capability to interface with nearly any chamber or room, as well as building management systems. When sterilization cycles are completed, a run record is produced that contains cycle data including the date, cycle time, cycle steps, as well as temperature, pressure, and chlorine dioxide concentration. Easy to learn and easy to use, our portable CD generators are perfect for routine decontamination. No cycle development is needed. The same cycle works regardless of the application or space.

DECONTAMINATION SERVICES

Decontamination Services can be utilized for a variety of applications from tented pieces of equipment and small chambers up to entire facilities. This can be done for new or renovated facilities prior to starting production and existing facilities facing mold and other contamination issues. ClorDiSys has the capability to decontaminate areas over 4,000,000 ft^3 (113,267 m^3). Services can be arranged for contamination response or preventive control needs. They can be scheduled as needed or contracted for routine prevention, scheduled maintenance, and shutdown periods.

Only gaseous decontaminating agents are truly effective in areas that are diffcult to reach such as floor drains, HVAC grills, beneath furniture and components, inside of cabinets, hinges, instruments and components, and other difficult to reach areas. CD is non-carcinogenic, does not require neutralization, leaves no residues, and provides an extremely fast method for decontamination.

SERVICE CONTRACTS ARE AVAILABLE FOR MONTHLY, BI-MONTHLY, QUARTERLY, OR YEARLY OCCURRENCES.

CHLORINE DIOXIDE LIQUID SOLUTION DECONTAMINATION

Liquid chlorine dioxide can be sprayed, wiped, or mopped onto surfaces. It can also be used as a rinse on plants, in water for irrigation, and other applications.

CSI 3000™ Liquid Chlorine Dioxide Concentrate

CSI 3000 is an EPA-registered (#75757-2-80802) pure chlorine dioxide concentrate. No on-site mixing or "activation" is required, just dilute from the 3000 ppm to your use concentration. It is used to control microorganisms in food, research, production, pharmaceutical and agricultural applications. It is easier to apply, safer to handle, and more effective than chlorine or bromine-based products.

- DOT-approved for transport
- Ready-to-use, no activation required
- Storage stable at room temperature
- Applied by simple chemical feed pump
- Maintains efficacy at pH up to 9

CD-TABS™ Chlorine Dioxide Generating Tablets

CD-TABS offer a simple method for generating chlorine dioxide liquid. Simply drop one tablet into a gallon of water to produce a generic, 100 ppm solution of liquid chlorine dioxide. Chlorine dioxide keeps all of its properties when dissolved in water. With a long shelf life, CD-TABS are inexpensive and easy to use and provide a non-acidic, chlorine dioxide odor-control solution. If higher concentrations are desired, simply add another tablet.

LAB TESTING

CHEMICAL COMPOSITION TESTING

Cannabis samples treated with chlorine dioxide gas and UV-C light to determine chemical composition before and after treatment

TESTING RESULTS

Cannabis Test (Strain: Animal Blues Indica/Sativa 50/50)	Test Type	Control	90 ppm-hrs ClO2 Gas 65% rH	720 ppm-hrs ClO2 Gas 0% rH	746 mJ/cm^2 UV-C
TAC (%W/W)	Cannabinoid	22.41	23.35	23.33	24
THAC (%W/W)	Cannabinoid	20.93	21.73	21.3	21.98
THC (%W/W)	Cannabinoid	0.68	0.81	1.23	0.62
THCV (%W/W)	Cannabinoid	0	0	0	0
CBC (%W/W)	Cannabinoid	0	0	0	0
CBG (%W/W)	Cannabinoid	0.52	0.63	0.68	0.66
CBDA (%W/W)	Cannabinoid	0.05	0.05	0.08	0.74
CBD (%W/W)	Cannabinoid	0.22	0.12	0.03	0
CBN(%W/W)	Cannabinoid	0	0	0	0
Total Terpenes (mg)	Terpene	8.1	7.6	7	6.4
Alpha Pinene (mg)	Terpene	0.2	0.3	0.2	0.2
Linalool (mg)	Terpene	0.4	0.4	0.4	0.3
Myrcene (mg)	Terpene	2.6	2.3	2.5	2
Beta-Caryophyllene (mg)	Terpene	4.4	4.1	3.4	3.5
Limonene (mg)	Terpene	0.5	0.5	0.5	0.4

*Treatment preformed by ClorDiSys Solutions Inc. Lab testing performed by MassBiolytics.

Chlorine dioxide gas has successfully treated cannabis that previously failed testing for the presence of Aspergillus. These treated samples can then be kept as bud or can go through extraction.

Test	Result
Batch	Pass
Cannabinoids	Complete
Moisture	7.1%
Water Activity	0.55 aw (Pass)
Terpenes	Complete
Microbials	Pass
Mycotoxins	Pass
Pesticides	Pass
Heavy Metals	Pass
Foreign Matter	Pass

ClorDiSys

Microbial Decontamination Products and Services

PROVIDING THE SAFEST AND MOST EFFECTIVE DECONTAMINATION SOLUTIONS AVAILABLE SINCE 2001

Our ultraviolet light disinfection and chlorine dioxide decontamination technologies provide efficient kill of molds and spores as well as other common bacteria and viruses.

Mold can occur at any point of the cannabis growing process, potentially wreaking havoc on your entire crop. A large percentage of mold begins after harvest, and during the drying process, mold will form if the moisture level is too high. A sterile environment from the start, as well as only sterile items being introduced into that environment, will help best assure lack of mold and other contaminants. If any mold is introduced to the environment, various methods of disinfection can be utilized. Chlorine dioxide gas is the optimal solution for any decontamination scenario as it is a gas as room temperature, ensuring it will come in contact with every spore on every surface, even the tiniest of cracks and crevices. Ultraviolet light disinfection is a fast, simple to use, and chemical-free method, capable of providing a 99% reduction of spores within minutes.

ClorDiSys Solutions is a worldwide leader in contamination control.

Founded in 2001, ClorDiSys utilizes the most effective method of decontamination available, chlorine dioxide gas, as well as ultraviolet light for less critical environments. Our chlorine dioxide gas decontamination process was developed in the pharmaceutical industry at Johnson and Johnson™, where our founders were part of the development team. Keeping the same high standards for purity, quality, and efficacy, ClorDiSys provides solutions for operating cleaner and safer than ever before by eliminating pathogens from the hardest to reach locations without leaving a residue or additional clean up.

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