



**Mold Prevention and Remediation  
Equipment and Services**



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# Cannabis Industry

## Mold Prevention and Remediation Program

Mold is found everywhere. Mold can grow on almost any substance when moisture is present. It reproduces by spores, which are carried by air currents. When spores land on a moist surface, which makes it suitable for life, mold begins to grow. Mold is a strong threat to cannabis, and an outbreak can be detrimental to an entire crop.

### 5 MAIN TYPES OF MOLD THAT AFFECT CANNABIS

**ASPERGILLUS:** The fungus' spores are present in the air we breathe and can cause damage in the range of a slight odor, spoilage, or to significant illness.

**PENICILLIUM:** Penicillium is found world-wide and can ruin fruit crops, or infect and harm animals and humans.

**RHIZOPUS:** This genus has about 10 species of fungi, the majority of which are decomposers that feed on a variety of dead organic matter. However, some species are parasitic or pathogenic.

**MUCOR:** Often found in soil and known to thrive in cooler environments, there are over 50 species.

**BOTRYTIS:** Since often afflicting plants, this mold coined the term bud rot. "Noble Rot" or dry rot is sometimes beneficial and is often used to enhance the flavor of some wines. Wet rot is a devastating killer for entire crops of strawberries, tomatoes, rhubarb, and cannabis.

### DETECTING MOLD

Mold will appear as black spots or spores, white, grey, brown, or yellow fuzz, or white, grey, or black web-like material. Cannabis buds naturally have tiny hairs with shiny wet globs on them that cover the buds and upper leaves called trichomes, which can look similar to mold. Trichomes instead are the fine appendages where the THC is produced and also provides aroma.

# AT-RISK SITUATIONS

## GROWING PHASE

A common location for mold to occur is within the grow room. If mold begins to spread from plant to plant, many, if not the entire crop, can be destroyed. A complete kill of microbial contaminants is necessary to prevent mold occurrence and must be achieved prior to any plants entering the space. A complete sanitization will ensure there are no lingering spores in the environment that could spread and wreak havoc once growing begins. Traditional methods of cleaning may not account for airborne mold spores, spores hidden in cracks or tight spaces, and human limitations.

## DRYING PHASE

A large percentage of mold begins after harvest. During the drying process, mold will form if the moisture level is too high. If air quality is left unmonitored, mold spores will grow. As long as buds have at least a 12.5% water by mass, it risks the development of mold. Buds can develop pockets of humid air, which are strong risk sites. If buds are too dry, growers sometimes place fruit peels amongst them to add moisture and flavor. However, this can introduce mold into the environment if the fruit is contaminated and spread spores to the cannabis buds.

## CURING PHASE

Once cannabis is at the correct state, the plant can be put into jars or airtight totes to begin the curing phase. Moisture from the stems and buds will seep into the air within the enclosed space and be exposed to the rest of the buds. This moisture removes impurities from the buds. This moisture also places buds at risk for mold. A grassy smell may indicate it has not been cured long enough and residual moisture may lead to mold.

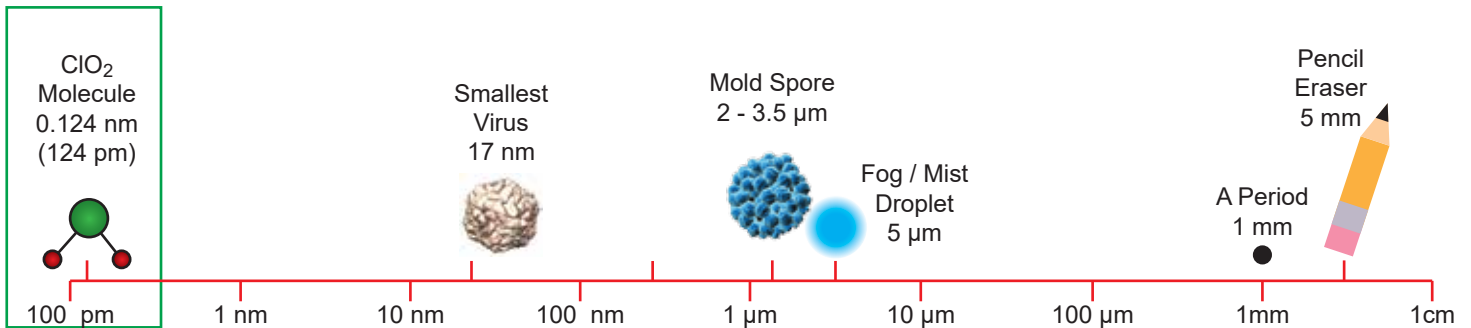
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## FACTORS TO CONSIDER

- Mold likes stagnant air and moist environments.
- Mold can easily travel room to room, and even between attached buildings if the air ventilation systems are connected.
- Mold prefers a humidity level of 55% in order to grow and spread.
- Any environment with at least a 15% humidity can have spores land on a plant and survive, only to further grow later.

# CHLORINE DIOXIDE GAS DECONTAMINATION

Chlorine dioxide has been recognized as a disinfectant since the early 1900s and approved by the US Environmental Protection Agency (EPA) and the US Food and Drug Administration (FDA) for many applications. It is proven effective as a broad spectrum, anti-inflammatory, bactericidal, fungicidal, and virucidal agent, as well as a deodorizer. ClorDiSys' chlorine dioxide gas, specifically, is registered with the US EPA as a sterilizer. The US EPA defines sterilizer 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 any form of antimicrobial life. It is non-carcinogenic, non-flammable, residue-free, and safer on materials than bleach, ozone, and hydrogen peroxide.



## MOLECULE SIZE MATTERS

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



## the MINIDOX-M Portable Chlorine Dioxide Gas Generator

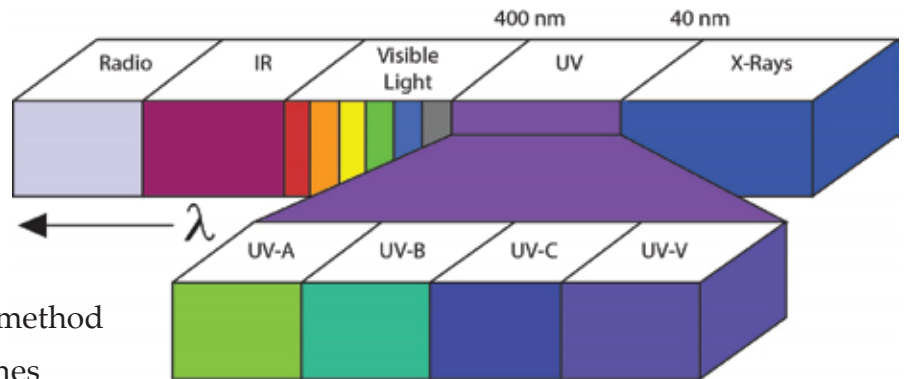
The Minidox-M provides a rapid and highly effective method to sterilize volumes up to 70,000 ft<sup>3</sup>, including rooms, isolators, passthroughs, cleanrooms, etc. It is portable in design and can be easily moved throughout your facility. The system features a sophisticated photometric sterilant concentration monitoring system allowing for a tightly controlled and consistent sterilization process. 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. Run Data can also be electronically logged to the included USB drive. The control system features a password protected, recipe management system with historical and real time trending of cycle data.

# ULTRAVIOLET LIGHT DISINFECTION

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
- A dry, chemical-free, and residue-free method
- Fast cycles allow for quick turnover times
- Unaffected by temperature, pressure, or humidity level



## the FLASHBAR UV Lighting System

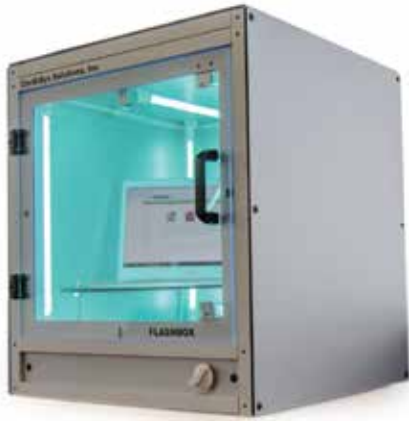
Turn any room into a quick and cost-effective disinfection room using our Flashbar UV lighting system. A custom design can be made using as many or as little units necessary for the desired application. Four high output UV-C bulbs are utilized to get optimal intensity for an efficient kill. A UV room provides effective disinfection of instrumentation, tables, and tools.



## the TORCH AIRE Portable UV Air Disinfection Tower

The TORCH Aire Disinfection Tower provides a rapid and highly effective method to disinfect room air. The TORCH Aire pulls air in and kills hazardous organisms rather than solely trapping them like a HEPA filter, which requires decontamination upon disposal. The TORCH Aire utilizes shielded UV-C bulbs allowing around the clock operation even when people are present.





## the FLASHBOX and FLASHBOX-MINI UV Disinfection Chambers

The Flashbox and Flashbox-mini UV Disinfection Chambers are easy to use and provide a rapid and highly effective method to disinfect laptop and tablet computers, keyboards, phones, miscellaneous electronics and components.

Both offer a calculated 99% reduction of bacteria in seconds and spores in minutes, disinfecting components without removing them from the room, which helps minimize the chance for cross-contamination. The Flashbox and Flashbox-mini both contain shelving to support items being disinfected and simply plug into any standard 120v wall outlet.



## the TORCH and TORCH + Portable UV Disinfection Tower

the TORCH and TORCH+ are inexpensive, easily transportable, 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 12 mJ/minute ( $200 \mu\text{w}/\text{cm}^2$ ) to get a calculated 99% reduction of harmful organisms in seconds and spores in minutes.

The TORCH+ features wireless tablet control and incorporates data logging of Parameters, UV Dosage, Operator Name, Room Number, as well as Time and Date. Run records are automatically emailed for documentation of the disinfection process as part of your Contamination Control program. ClorDiSys can also provide a weekly or monthly report generation service (optional).

## APPLICATIONS

AREA OF CONCERN	CHLORINE DIOXIDE GAS	ULTRAVIOLET LIGHT
<b>EMPTY GROW ROOM</b>	An entire facility can be sealed and decontaminated using gaseous chlorine dioxide to completely sterilize the space to a 99.9999% kill, eliminating any pre-existing organisms and their spores.	UV-C disinfecting units can be positioned in the room to achieve a 99% kill level on any surface the light is emitted onto in mere minutes.
<b>SEEDS</b>	By placing seeds inside of a Tyvek™ pouch, they can be decontaminated inside an isolator. The pouch will allow the gas to penetrate, while keeping the seeds sterilized and mold free.	Placing seeds inside of a UV-C light emitting chamber allows seeds to experience 360 degrees of direct coverage. This results in a 99% kill of any surface mold without any harm to the seed.
<b>GROWING PHASE</b>	A CD gas treatment can be used in critical situations when there are high levels of mold, difficult to remove organisms, or when an extreme action is the only solution to save the crops. CD gas would be generated in the sealed grow house, reach concentration, then aerated out to allow for the growing process to continue.	UV-C light fixtures can be positioned on the sides or from above in both a fixed position or via a track system. No studies have determined any detriment to the plant from low levels of UV-C light. UV-C can also be utilized to eliminate airborne spores via encased bulbs which let the air flow in and out, passing by the UV-C bulbs once inside.
<b>DRYING PHASE</b>	CD gas can be utilized after the growing period if a circumstance occurs where mold remains or starts to grow while drying or in storage. This can either be performed in an enclosed chamber if only a select few plants are of issue, or as a complete room decontamination if it is a widespread outbreak.	Buds can be treated in order to eliminate mold that may grow on the surface. UV-C light may be emitted via a wall unit or transportable device while hanging to dry. While curing, the buds may be placed inside a UV-C chamber to receive rapid 360 degree kill of spores where the light is emitted.



## Microbial Decontamination Products and Services

Over 15 Years of Providing The Safest & Most Effective  
Decontamination Solutions Available

**Our UV Light and Chlorine Dioxide Gas  
decontamination technologies provide:**



Efficient kill of molds and spores as well as any other bacteria and viruses that may enter your environment



CD Gas provides excellent distribution into hard to reach areas



Reliable kill due to superior process control

**ClorDiSys Solutions, Inc is a worldwide leader in contamination control.**

Founded in 2001, we utilize 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.

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