

COMMERCIAL SANITIZATION

gas-based reactive oxygen species air sanitization during and following the COVID-19 as an economic resource for businesses; our method, our technology, our product and why this solution is essential to the marketplace.

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White
Paper

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in the
CLEARZONE

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1. Introduction

The COVID-19 pandemic created a global health crisis that impacted individual's short-term health, but has also impacted long-term economic, environmental, and physical health. Over a year after the beginning of the crisis, health officials understand transmission more thoroughly, vaccinations are rolling out and businesses are beginning to reopen.

For the economy to get back on its feet, businesses need to mitigate risks of outbreaks to avoid lockdowns and give their staff and customers confidence in the safety of their facilities. Businesses need solutions for occupied spaces that are affordable, effective, and sustainable to decrease risks today and in the future.

2. Current Situation

Around the world, businesses are starting to reopen, however the threat of this Pandemic (and the next) continue to loom. Businesses are opening, but staff and clients must still follow health guidelines. The worst of the Pandemic is, foreseeably, behind us but it is more important now than ever, to ensure that it stays behind us.

Top scientists have suggested that the primary method of transmission of COVID-19 is through the air, which has led businesses to change their approach o protecting their people, particularly with the hope of masks becoming unnecessary soon.

2.1 Current Solutions

To address the problem of air-borne illness, social distancing, mandatory mask-wearing and decreased capacity in indoor spaces is being practiced. Additionally, air filtration products are rising in popularity as ongoing solutions for occupied spaces becomes the next frontier.

3 Problem

Businesses and Individuals need a way to manage air-borne risks to give their customers and staff confidence and avoid costly lockdowns. Businesses need to continue to demonstrate responsibility and care and are looking to do so in a way that can be sustained long-term.

4 Solution

Businesses need comprehensive solutions that are effective, affordable, avoid human error and labour and that provide long-term, broad-spectrum results.

4.1 Reactive Oxygen Species

Reactive Oxygen Species (ROS) are a collective term that includes both oxygen radicals, such as:

- superoxide ($O_2^{\cdot-}$) with a half life of 5s
- hydroxyl (OH^{\cdot}) with a half life of 2s
- peroxy (RO_2^{\cdot}) with a half life of 15s
- hydroperoxyl (HO_2^{\cdot}) radicals with a half life of 30s
- and certain nonradical oxidizing agents, such as ozone (O_3) with a half life of 20 minutes (Bayr)

These ROSs are known as “Nature’s Detergent” as they exist in nature. Hydroxyls, particularly, are formed in nature in the lower atmosphere, predominantly by the photolytic decomposition of ozone by UV radiation, to yield concentrations of about one to ten million molecules per cubic centimeter outdoors (Finlayson-Pitts; Crosley). The natural existence of ROSs outdoors mean that plants, animals, and humans are consistently exposed to ROSs at these concentrations and are biologically equipped to be exposed to them.

4.2. How ROSs Work

These ROSs are highly radical and will quickly attach to and inactivate pathogens or naturally break apart, reverting to normal oxygen. The radicalized particles that do attach to pathogens, disrupt their chemical bonds, changing their chemical structure. This results in changes to DNA and RNA strands and the inactivation of these pathogens. This covalent bond can also occur with mold, bacteria, allergens, volatile organic compounds (VOCs) and many other unwanted particles, inactivating them.

5. How HydroClear Works

ClearZone’s proprietary HydroClear Technology uses light waves and a catalytic process to produce reactive oxygen species that destroy contaminants. Our products use concepts developed by NASA for use in the International Space Station (NASA) while adding catalysts to increase the output of ROSs and decrease the time necessary to create them.

5.1 Photocatalytic Oxidation

The Photocatalytic Oxidation (PCO) process combines UVC irradiation with a substance (catalyst), which results in a reaction that changes malignant contaminants into water, carbon dioxide and detritus (Hamilton Thorne Inc.).

In The ClearZone uses non-ozone emitting UV light to react with oxygen, ambient hydrogen, and a catalyst to create ROSs continually. UV light breaks apart oxygen and

water molecules that are actively pulled into our products, creating ions that then go attach to pathogens and VOCs.

PCO technology is used in FDA approved medical devices and is approved by Health Canada for use in indoor occupied spaces (Mr. Natural).

In The ClearZone uses supplemental technologies to increase the number of particles being drawn into the product, increase output, destroy ozone, and increase the effectiveness of our products.

5.2 Efficacy

There is overwhelming scholarly research that proves the efficacy of ROSs at killing spores, mold, bacteria, and viruses, including resistant strains. ROS-generating products are approved Medical Devices by the FDA and are proven to kill COVID-19 (Group O.H.; Mohammed M.) and are effective at eliminating VOCs (Mr. Natural).

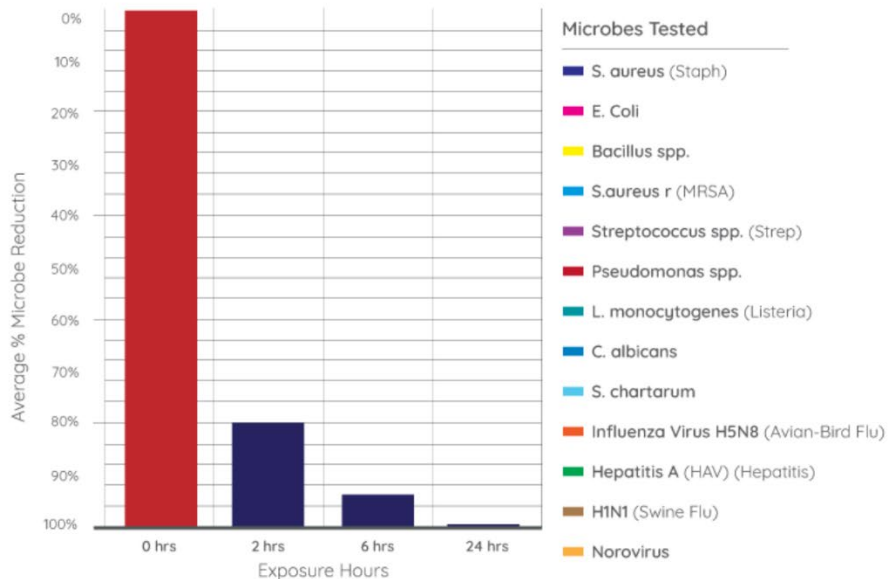
In The ClearZone's research is overseen by the ICFAR Research Institute, out of Western University, and overseen by Franco Berutti the previous Dean of Biochemical Engineering. We are continuously working to test our product and ensure that it is meeting the efficacy standards of existing research while conducting our own experiments. Below is industry data using similar technology and ROS outputs to ClearZone's HydroClear.

**AVG 80%
REDUCTION
OF MICROBES IN 2 HRS!**

**AVG 95%
REDUCTION
IN JUST 6 HRS!**

**AVG > 99%
REDUCTION
IN JUST 24 HOURS!**

Reduction of Surface
Contaminants - testing
conducted by **KANSAS STATE
UNIVERSITY**



Reduction of Surface Contaminants

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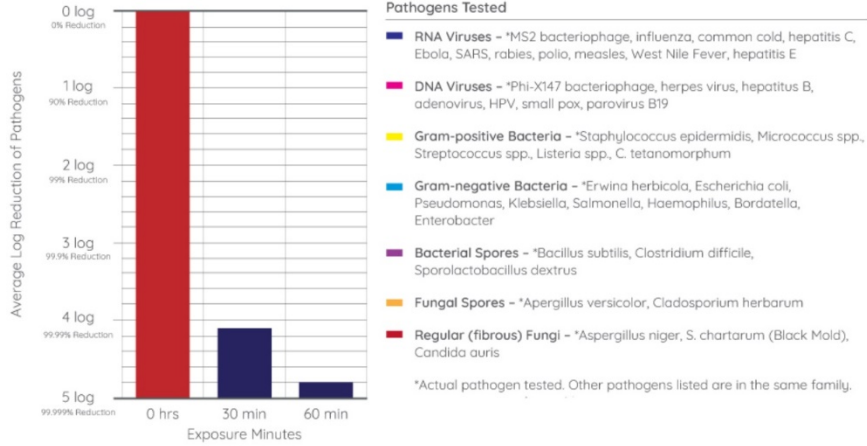
**AVG 3.83% LOG
REDUCTION**

IN 30 MIN

**AVG 4.92% LOG
REDUCTION**

IN 60 MIN

Reduction of Airborne
Contaminants - testing
conducted by
INDEPENDENT LAB



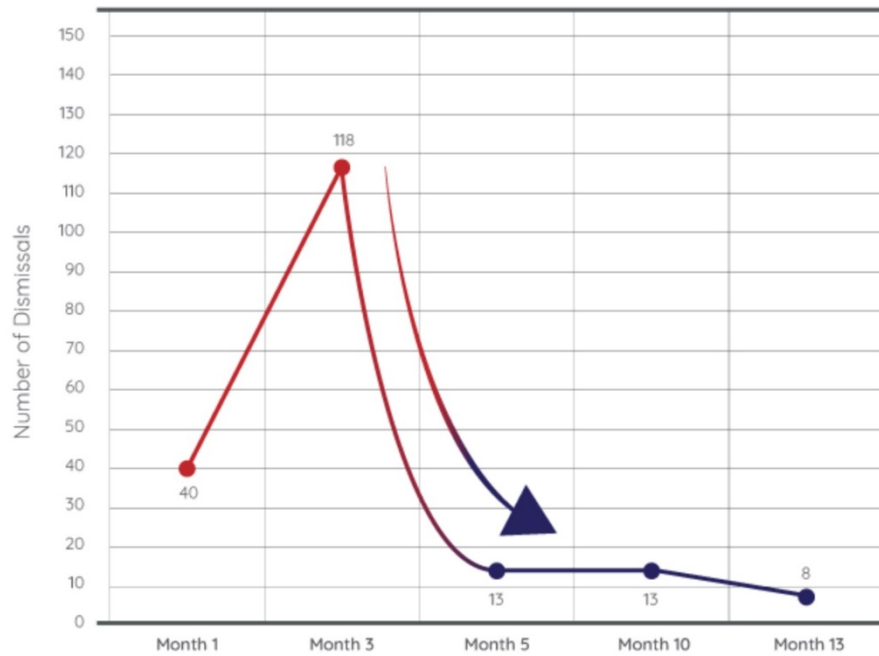
Reduction of Airborne Contaminants

**80% +
REDUCTION**
IN NUMBER OF FLU
RELATED DISMISSALS

4 MONTH: Installed half of
air purification units

10 MONTH: Installed
balance of air purification
units

installed in INDIANA
SCHOOL FACILITY

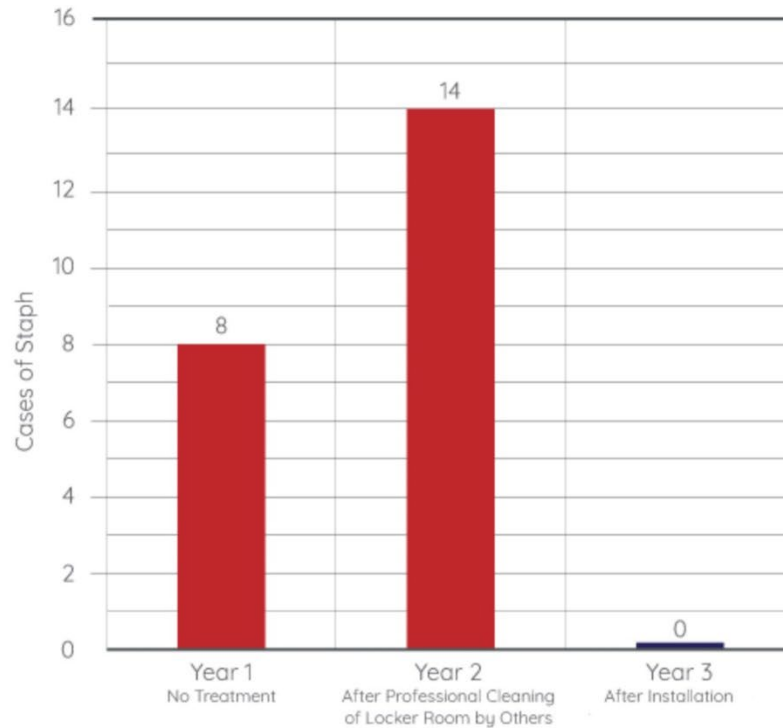


Reduction of Flu Related Dismissals

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100% REDUCTION IN CASES OF STAPH

installed in OHIO SCHOOL
SPORT FACILITIES



Reduction in Cases of Staph

6. In The ClearZone

In The ClearZone was created as a way to meet long and short-term health concerns by creating a comprehensive solution that is affordable and effective. Our solution addresses short term physical and economic health concerns while considering long term physical health and environment health problems that will result from excessive chemical use.

In The ClearZone has created a patented commercial sanitizing system using gas-based ROSs as a comprehensive sanitizer. Our sanitizing solutions were created for use in uninhabited and inhabited spaces, do not require an operator and do not require any chemical inputs, making it affordable.

7 The Product

In The ClearZone has created The Micro, a HydroClear-enabled product for use in small, occupied spaces. This ~2lb, portable product was created to solve logistical problems associated with people returning to work. The Micro releases low levels of ROSs to sanitize air and surfaces.

7.1 Specifications

The Micro is the most modern generator on the market to date. It is light, compact and quiet making it a great product for any small space. This generator produces 2 million ionized parts per cubic cm, which is in line with what is naturally created in the nature and is rated for 160 sq. ft space. It uses UV light and a non-thermal plasma field to break ions apart, a process that is amplified by the presence of catalysts.

7.2 CSA General Compliance

In The ClearZone complies with the CSA standards outlined in C22.2 No. 1867:20 for use of UV lights.

7.3 Tests

In The ClearZone is currently conducting VOC and ATP tests to maximize the number of ROSs created for maximized efficacy. In The ClearZone is conducting all experiments with compliance to regulations and existing research in hand to ensure our products can claim the results of existing research as supplementary evidence.

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