

- Real Estate Inspections
- Infrared Thermography
- Stucco Inspections
- Diagnostic Inspections
- and more



Providing Peace of Mind  
One Home At A Time  
Since 1989

## INSPECTION GROUP

FIG Services LLC d/b/a FOX INSPECTION GROUP  
8616 Daffodil St. Houston, TX 77063  
(Office) 713.723-3330 (Email) [office@foxinspectiongroup.com](mailto:office@foxinspectiongroup.com)

Mold Assessment Company License # AOC1129  
Mold Assessment Consultant License # MAC1452

This document was created to help educate others on the use of ozone to protect themselves, those they love, and those they are responsible for... from the effects of the current pandemic / coronavirus / Covid 19.  
Below the hotlink to the website I have listed "Cliff Note" style of condensed pertinent information that you may visit the website for additional information

Respectfully,

Mold Assessment Consultant MAC1452 Expires 10/12/2021

<https://www.thailandmedical.news/news/ozone-can-be-used-to-destroy-the-new-coronavirus-and-disinfect-areas>

**Ozone gas has been proven to kill the SARS coronavirus and since the structure of the new 2019-nCoV coronavirus is almost identical to that of the SARS coronavirus, it is relatively safe to say that it will also work on the new coronavirus though it must be noted that there is no studies to date ..... with regards to this.**

**There are more than 17 scientific studies that show Ozone gas is able to destroy the SARS coronavirus.**

Ozone is a naturally occurring gas created from oxygen atoms. The oxygen molecule is made up of 2 oxygen atoms. These oxygen molecules are broken into atoms by the corona discharge during lightning storms or by UV light from the Sun. Single oxygen atoms cannot exist alone without regrouping back into di-atomic oxygen molecules. During this recombination stage some atoms will regroup into loosely bonded tri-atomic oxygen. This new molecule is called Ozone or O<sub>3</sub>.

Ozone generators are able to make ozone from normal air and are normally used as room disinfectants. **The antipathogenic effects of ozone have been substantiated for several decades. Its killing action upon bacteria, viruses, fungi, and in many species of protozoa, serve as the basis for its increasing use in disinfecting municipal water supplies in cities worldwide.**

Typically, viruses are small, independent particles, built of crystals and macromolecules. Unlike bacteria, they multiply only within the host cell. Ozone destroys viruses by diffusing through the protein coat into the nucleic acid core, resulting in damage of the viral RNA. At higher concentrations, ozone destroys the capsid or exterior protein shell by oxidation.

**Most research efforts on ozone's virucidal effects have centered upon ozone's propensity to break apart lipid molecules at sites of multiple bond configuration. Indeed, once the lipid envelope of the virus is fragmented, its DNA or RNA core cannot survive.**

Non-enveloped viruses (Adenoviridae, Picornaviridae, namely poliovirus, Coxsackie, Echovirus, Rhinovirus, Hepatitis A and E, and Reoviridae (Rotavirus), have also begun to be studied. Viruses that do not have an envelope are called "naked viruses." They are constituted of a nucleic acid core (made of DNA or RNA) and a nucleic acid coat, or capsid, made of protein. Ozone, however, aside from its well-recognized action upon unsaturated lipids, can also interact with certain proteins and their constituents, namely amino acids. Indeed, when ozone comes in contact with capsid proteins, protein hydroxides and protein hydroperoxides are formed. Viruses have no protections against oxidative stress.

The enveloped viruses are usually more sensitive to physico-chemical challenges than are naked virions. Although ozone's effects upon unsaturated lipids is one of its best documented biochemical action, ozone is known to interact with proteins, carbohydrates, and nucleic acids.

**The new coronavirus is an enveloped virus.**

**Typically ozone generators should only be used by trained personnel as ozone is dangerous to humans. It can destroy your cells lining your mouth, nasal pathways and your lungs.**

When using the small ozone generators for small room disinfection, make sure you have a timer and never be in the room when the machine is on.

<https://www.aeroqual.com/does-ozone-kill-coronavirus-covid-19>

#### **OZONE STERILIZATION PROVEN TO KILL SARS-COV VIRUS**

**During the SARS epidemic of 2003, ozone sterilization was successfully used to purify environments infected with the deadly Coronavirus, SARS-CoV-1, the virus which causes the SARS disease.**

**As SARS-Cov-1 is also a member of the Coronavirus family, it is highly likely that ozone sterilization would be effective at killing SARS-CoV-2, the Coronavirus which causes the COVID-19 disease.**

**Put simply, exposing Coronaviruses to sufficient ozone dose (ppm x time) can result in them being 99% damaged or destroyed.**

**The ozone sterilization process is simple. Firstly, vacate the environment to be sterilized, roll in an ozone sterilization product, set it to add the appropriate quantity of ozone to the environment. After which it is vital that you monitor when it is safe to re-enter the space.**

#### **WHAT ARE THE RISKS OF OZONE STERILIZATION?**

**Breathing even small amounts of ozone can be harmful.**

Governments, Industry and Citizens are united in trying to slow the spread of COVID-19, to give health services time to prepare for the explosion in the demand for care. Sanitizing our homes, workplaces and public spaces is a key tactic in the fight against Coronavirus, to stop the spread of COVID-19. One method of sterilization is by using ozone. **Ozone sterilization is commonly used in hospitals to sanitize equipment and significantly reduce or eliminate the spread of bacteria. Hence the question being asked is – “Can ozone sterilization kill the Coronavirus which causes the COVID-19 disease?”**

#### **OZONE STERILIZATION PROVEN TO KILL SARS-COV VIRUS**

**There are currently no examples in the public domain, of ozone sterilization being used to kill the current strain of Coronavirus, SARS-CoV-2 (technical name of the Coronavirus which causes the COVID-19 disease). However, there are reasons to believe it would be effective:**

**During the SARS epidemic of 2003, ozone sterilization was successfully used to purify environments infected with the deadly Coronavirus, SARS-CoV-1, the virus which causes the SARS disease.**

**As SARS-Cov-1 is also a member of the Coronavirus family, it is highly likely that ozone sterilization would be effective at killing SARS-CoV-2, the Coronavirus which causes the COVID-19 disease.**

**HOW DOES OZONE STERILIZATION KILL CORONAVIRUSES?**

**Coronaviruses are classified as “enveloped viruses”, which are typically more susceptible to “Physico-chemical challenges”. In other words, they don’t like being exposed to ozone.**

Ozone destroys this type of virus by breaking through the outer shell into the core, resulting in damage to the viral RNA. Ozone can also damage the outer shell of the virus in a process called oxidation.

**Put simply, exposing Coronaviruses to sufficient ozone dose (ppm x time) can result in them being 99% damaged or destroyed.**

**TESTS CONCLUDE OZONE CAN KILL CORONAVIRUS**

Aeroqual partner with a number of manufacturers who produce ozone sterilization equipment. JIMCO, one of these partners and the makers of the FLO-D MINI – Mark 2, **have had this product tested, which confirmed its effectiveness at killing the coronavirus.** Dr. Brill + Dr. Steinmann from the Institute for Hygiene and Microbiology conducted this test on 5/19/2010. Here is what they found – “The conclusion can be drawn that after passing examinations with MVA [in Europe, MVA represents the official model virus for all enveloped viruses] an activity against all enveloped viruses including members of the virus family coronaviridae (like MERS-CoV, SARS-CoV-1 and SARS-CoV-2) is achieved”.

**The ozone sterilization process is simple. Firstly, vacate the environment to be sterilized, roll in an ozone sterilization product, set it to add the appropriate quantity of ozone to the environment. After which it is vital that you monitor when it is safe to re-enter the space.**

**WHAT ARE THE RISKS OF OZONE STERILIZATION?**

**Breathing even small amounts of ozone can be harmful.** Symptoms include coughing, shortness of breath, and aggravation of lung diseases like asthma. At higher concentrations you can smell ozone, but it becomes harmful even at lower doses. For that reason, many countries have set an 8-hour exposure limit of 70 ppb (parts per billion) ozone. In the EU the limit is set even lower. Ozone is one of six common pollutants limited by the United States Environmental Protection Agency and other country’s Environmental regulators. Exposure to ozone in the workplace is controlled by the Occupational Safety and Health Administration and their counterparts around the world.

<https://www.randrmagonline.com/articles/88901-ozones-efficacy-in-deactivating-coronavirus-like-pathogens>

**The focus of this article is the use of ozone as a virucide, with emphasis on the SARS-CoV-2, which, according to the International Committee on Taxonomy, is the accurate name for what is commonly referred to as the COVID-19 coronavirus**

**Ozone is very effective at inactivating viruses, especially enveloped viruses like the SARS-CoV-2.**

**Within seconds, ozone solubilizes the lipid membrane of the virus. Ozone will inactivate SARS-CoV-2, but you have to know what you're doing.**

**Ozone destroys viruses by diffusing through the protein coat into the nucleic acid core, resulting in damage of the viral RNA. At higher concentrations, ozone destroys the capsid or exterior protein shell by oxidation”**

**Considering the structure of SARS-CoV-2, and how like viruses respond to ozone exposure, it is estimated that as little as 1 ppm concentration for a matter of seconds is sufficient to achieve as much as 4 logs disinfection**

## To Summarize

**Ozone, having been proven in the lab and in the field to be an extremely effective virucide and full-spectrum antimicrobial, killing pathogenic bacteria and fungi, offers many benefits over alternative ways of disinfecting.**

**Because it is a gas, it has a penetration capacity that liquids do not possess. An ozone generator never needs to be refilled with solutions, and it doesn't need to be manually operated; simply set the timer and press the button. The machine goes to work turning the oxygen in the ambient air into powerful, oxidizing ozone. You return after the prescribed period of time, and the disinfection is complete.**

It's no secret in the cleaning and disaster restoration industry that ozone is extremely effective at removing odors through molecular oxidation. Lesser known is its efficacy as a disinfectant, for which it has been used effectively in the medical field for many years. A powerful gas capable of high levels of disinfection, ozone can be very effective at killing pathogenic bacteria and fungi, as well as for inactivating viruses. The focus of this article is the use of ozone as a virucide, with emphasis on the SARS-CoV-2, which, according to the International Committee on Taxonomy, is the accurate name for what is commonly referred to as the COVID-19 coronavirus, and is how it will be referenced in this article.

What is a virus?

Quoting the National Institute of Health: "A virus is an infectious agent that occupies a place near the boundary between the living and the nonliving. It is a particle much smaller than a bacterial cell, consisting of a small genome of either DNA or RNA surrounded by a protein coat. Viruses enter host cells and hijack the enzymes and materials of the host cells to make more copies of themselves. Viruses cause a wide variety of diseases in plants and animals, including AIDS, measles, smallpox, and polio", and of course the various strains of coronavirus, including SARS-CoV-2[1] .

Viruses can stay active on surfaces for different amounts of time, depending on the virus, the surface type, and the environment. Cold viruses can remain active on surfaces for up to a week, while flu viruses can survive for about 24 hours, and the SARS-CoV-2 virus remains active for about 72 hours.

Depending on with whom you speak, you'll hear somebody say they're "killing the virus". Other common terms are deactivating and inactivating.

Which is correct?

viruses are not living organisms in the traditional sense - they are not made of cells, they cannot reproduce without invading a host cell, they do not respond to environmental stimuli, and they have no metabolism. Because a virus is not "alive" in the first place, it therefore cannot be "killed". References to killed virus in the medical literature refer to a technique where virus are chemically or mechanically inactivated so that they can be used in the production of vaccines or used in research without the possibility of causing infection, or in our case, to disinfect a surface or space. It is in this sense that we are using the term "inactivating", where we are using ozone to chemically treat a virus so that it cannot infect living cells.

**Dr. Gérard Sunnen is a medical doctor in New York City, specializing in the uses of ozone in the medical field, ranging from cutting-edge ozone therapy to the use of ozone as a disinfectant. According to Dr. Sunnen. "Ozone has unique disinfectant properties. As a gas, it has a penetration capacity that liquids do not possess. In view of the fact that , SARS-CoV-2, MERS, and previous SARS strains persist on fomites (surfaces) for up to several days, it is suggested that ozone technology be applied to the decontamination of medical and other environments".**

Knowing that something works isn't enough; let's look at how ozone works at inactivating viruses.

"Typically, viruses are small, independent particles, built of crystals and macromolecules. Unlike bacteria, they multiply only within the host cell. **Ozone destroys viruses by diffusing through the protein coat into the nucleic acid core, resulting in damage of the viral RNA. At higher concentrations, ozone destroys the capsid or exterior protein shell by oxidation**" explains Dr. Sunnen. Further, "most research efforts on ozone's virucidal effects have centered upon ozone's propensity to break apart lipid molecules at sites of multiple bond configuration. Indeed, once the lipid envelope of the virus is fragmented, its DNA or RNA core cannot survive".

I reached out to a director for the Center for Disease Control (CDC), Dr. Paul Meechan PhD, MPH, RPB, CBSP, SM(NRCM). I asked him **his thoughts on ozone as a virucide, especially in regard to SARS-CoV-2**. He responded, “Will ozone work- you betcha! **Ozone is very effective at inactivating viruses, especially enveloped viruses like the SARS-CoV-2. Within seconds, ozone solubilizes the lipid membrane of the virus. Ozone will inactivate SARS-CoV-2, but you have to know what you're doing.** How much ozone is required to be effective?

Log reduction is a mathematical term that is used to express the relative number of living microbes or active viruses that are eliminated by disinfection, and corresponds to inactivating 90% of a target microbe with the microbe count being reduced by a factor of 10. Thus, a 2 Log reduction will see a 99% reduction, or microbe reduction by a factor of 100, and so on. The table below shows the chart of Log reduction.

Log Reduction	Reduction Factor	Percent Reduced
1	10	90%
2	100	99%
3	1,000	99.9%
4	10,000	99.99%
5	100,000	99.999%
6	1,000,000	99.9999%

Depending on the virus targeted, concentration and exposure time varies. **Considering the structure of SARS-CoV-2, and how like viruses respond to ozone exposure, it is estimated that as little as 1 ppm concentration for a matter of seconds is sufficient to achieve as much as 4 logs disinfection.** A good quality ozone generator should have no problem reaching this concentration within a short period of time. Ozone level output is key; generators are rated by the grams of ozone they generate per hour (g/hr). To test the time required to achieve 1 ppm concentration, we used RamAir’s OzoGen 16g, which has an output of 16 g/hr. Our laboratory consisted of a 1000 ft.<sup>3</sup> space, at 65° F and 14% RH (relative humidity). The generator achieved .5 ppm in 15 seconds, and 1 ppm in < 2 minutes. As ozone generators convert ambient oxygen into ozone by way of molecular fission and fusion, the rate of output slows as the concentration elevates, resulting from a continuous depletion of available O<sub>2</sub> molecules in the enclosed space. Therefore, peak ozone generation is directly dependent on the power of the ozone generator, as lesser systems would plateau at a lower ozone concentration. High power ozone generators also have the benefit of achieving effective concentrations more quickly, which allows for greater overall utility and benefit.

**To Summarize**

**Ozone, having been proven in the lab and in the field to be an extremely effective virucide and full-spectrum antimicrobial, killing pathogenic bacteria and fungi, offers many benefits over alternative ways of disinfecting.**

**Because it is a gas, it has a penetration capacity that liquids do not possess. An ozone generator never needs to be refilled with solutions, and it doesn’t need to be manually operated; simply set the timer and press the button. The machine goes to work turning the oxygen in the ambient air into powerful, oxidizing ozone. You return after the prescribed period of time, and the disinfection is complete.**

<https://www.epa.gov/coronavirus/will-ozone-generator-protect-me-and-my-family-covid-19>

## Will an Ozone Generator protect me and my family from COVID-19?

No, do not use ozone generators in occupied spaces. *When used at concentrations that do not exceed public health standards, ozone applied to indoor air does not effectively remove viruses*, bacteria, mold, *Fox Interpretation: low concentrations that do not exceed public health standards are not Effective at controlling Covid 19. The Required High Concentrations of ozone used to control Covid 19 exceed public health standards should be done by a trained technician*

<https://www.epa.gov/coronavirus/why-arent-ozone-generators-uv-lights-or-air-purifiers-list-n-can-i-use-them-kill-covid>

Why aren't ozone generators, UV lights or air purifiers on List N? Can I use them to kill the COVID-19?

**These are examples of pesticidal devices.** A pesticidal device is an instrument or other machine that is used to destroy, repel, trap or mitigate any pests, including bacteria and viruses.

Unlike chemical pesticides, **EPA does not routinely review the safety or efficacy of pesticidal devices, and therefore cannot confirm whether, or under what circumstances, such products might be effective against the spread of COVID-19.** Accordingly, List N only includes surface disinfectants registered by EPA and does not include devices.

*Fox Interpretation: EPA only recommends the use of service disinfectants identified on list N against SARS -CoV-2. Ozone generators are classified as a pesticidal device and the EPA does not regulate such devices. Pesticidal devices are regulated under the jurisdiction of FIFRA*

Pesticidal devices, while not required to be registered with EPA, are subject to certain regulatory requirements under FIFRA, including labeling and reporting requirements. Importantly, FIFRA prohibits the sale or distribution of misbranded pesticidal devices, i.e., pesticidal devices with false or misleading claims on their labeling. Selling pesticide devices with false or misleading claims about its safety or efficacy may subject the seller to penalties under FIFRA.

**EPA only recommends use of the surface disinfectants identified on List N against SARS-CoV-2.**