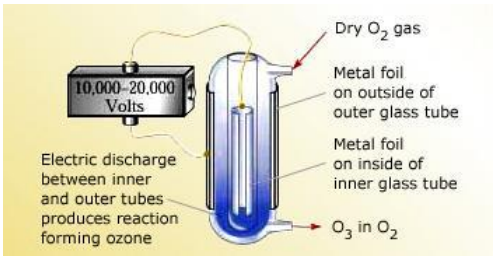
Why Ozone Disinfection?

Effective Way to Disinfect

What is Ozone and how is it produced?

Ozone is a unique antimicrobial agent. In fact, it is the most aggressive oxidating (sic) antimicrobial agent known to man. Ozone is formed by applying electrical energy to the oxygen molecule, which splits some portion of those oxygen molecules in half, into singlets of O. Those single O atoms attach to O2 for a very short time period, becoming O3, which has a half-life in its natural state of about 22 minutes before, on its own, it converts back to oxygen by releasing its singlet of O. During that active phase as ozone, it reacts to any organic compound by oxidizing double carbon bonds.



How Ozone Sterilization Works

An ozone sterilizer is able to harness the unique powers of ozone by producing it inside the sterilizer from oxygen, which is commonly available in hospitals (as explained above, by applying electrical energy to combine O2 with O to form O3). Ozone has exciting potential as a sterilizing agent in the world of low-temperature sterilization. This capability is well-suited for sterilizing delicate medical devices, like endoscopes, that cannot withstand the high heat and humidity of standard steam

autoclaving. Unlike a lot of other disinfection sterilization technologies, in the act of literally taking a cell membrane apart, in destroying the cell, it converts itself back to oxygen which is a very benign waste product. If you look at water that has been disinfected with a chlorinated compound versus ozone, you'll see dead microorganisms in the chlorinated water. If the water has been treated correctly with ozone you should literally see nothing because it should break it down to just its basic elements which are hydrogen and carbondioxide.

Ozone was approved by the FDA in 2003 as a new sterilization process for low-temperature sterilization, its microbial efficacy has been proven with a variety of microorganisms.(2)

After all, it has been used for many years to disinfect drinking water, food, and air. Now that the infection control industry has figured out how to maximize its germicidal

Otank Endüstri Enerji İnşaat Ltd. Şti. Tuzla / Istanbul T: +902163040633 info@otank.com.tr

properties inside a sterilizer, we expect to see more ozone sterilizers in hospital CSSD/SPD rooms. It's relatively safe and its cost-effectivity will ultimately prove to be a selling point over the more dangerous alternatives, such as formaldehyde,hydrogen Peroxide, ethylene oxide.

Novel applications of Ozone Sterilization

Room and Environmental cleaning:
Experimental data shows that ozone is effective in reducing airborne bacteria of unoccupied room. Over 90% of airborne bacteria could be reduced after ozonation. As viruses are generally more susceptible to ozone than bacteria, it could assume that all

viruses are killed if large percentage of airborne bacteria are removed.
A gaseous ozone generator was investigated for decontamination of rooms used to house patients colonized with MRSA. The results demonstrated that the device tested would be inadequate for the decontamination of a hospital room.

Some viruses are more susceptible to ozone's action than others. It has been found that lipid-enveloped viruses are the most sensitive. This makes intuitive sense, since enveloped viruses are designed to blend into the dynamically constant milieu of their mammalian hosts. This group includes, hepatitis B and C, herpes 1 and 2, Cytomegalus (Epstein-Barr), HIV 1 and 2,

Influenza A and B, West Nile virus, Togaviridae, Eastern and Western equine encephalitis, rabies, and Filiviridae (Ebola, Marburg), among others. (4)

Many viruses require reduced sulfhydryl groups for cell fusion and entry. Corona viruses, including SARS-CoV-2 (the cause of the condition now named coronavirus disease 2019 or **COVID-19**), are rich in cysteine, which residues must be intact for viral activity. Sulfhydryl groups are vulnerable to oxidation. Ozone therapy, a very inexpensive and safe modality may safely exploit this critical vulnerability in many viruses, inclusive of **COVID-19**. In order to successfully penetrate cells, many viruses require membrane glycoproteins

(R-S-H) to be in the reduced form rather than oxidized (R-S-S-R)". Ozone oxides this protein inactivates many viruses directly.
Coronaviruses have abundant cysteine in their spike proteins that may be easily and safely exploited with ozone. Cysteine residues are also abundant in viral membrane proteins and must be "conserved" for viral cell entry. (5) Ozone therapy and disinfection may be a novel treatment for slowing growth of **COVID-19** by destroying spike proteins.