



# OZONE and its ability to sanitize against viruses including Coronavirus

White Paper 012020 by Peer Hansen, Biochemist

- **Can Ozone protect against COVID-19?**
- **If so, how does it work?**
- **What do the scientific research tell about Ozonation against viruses?**

This paper presents what the manufacturer considers the key information from the scientific community about sanitizing rooms contaminated with viruses, in particular the new Coronavirus (SARS-CoV-2) responsible for the COVID-19 pandemic.

Ozone is known to eliminate most viruses, bacteria, and fungus. Ozone is the strongest known Oxidizer in gas form, and it has been proven effective to sanitize all types of bugs including viruses in all types of environments. The conclusion is that it must be expected that Ozone is very well suited to terminate the Coronavirus.

# The challenge

- No medical event in history has made a bigger impact on global health concerns than the COVID-19. The UN health care organisation World Health Organization has labelled it a pandemic.

Governments, industry, and citizens are united in trying to slow the spread of COVID-19. It is therefore the responsibility of everybody to try and sanitize as best as possible to comply with the strategy of slowing the spread of COVID-19 disease.

Sanitizing our homes, workplaces, and public spaces is a key tactic in the fight against the Coronavirus. One method of sanitizing is using ozone. Ozone is widely used as a sanitizer in the food industry and also used in hospitals to sterilize hospital equipment (1). Furthermore, Ozone is known to significantly reduce the prevalence of insects, bacteria and fungi (2, 3), and is therefore a known sanitizer.

One of the key issues is to sanitize the surfaces where humans may have touched and left the virus, indeed there is a need for sanitation of surfaces of glass, polymer, and steel. It has been documented that viruses on such surfaces may survive for up to three days (4-6). This makes it especially important to sanitize rooms and equipment used by many people. The need is particularly evident in kindergartens, nursing homes, offices, treatment centres/facilities, leisure facilities, public transportation vehicles, and any internal spaces where there is a high level of public footfall.

Since Ozone has proven an efficient sanitizer in general, how efficient is Ozone to terminate (kill) the Coronavirus which causes the COVID-19 disease?

Below you will find reference to several examples of scientific data suggesting that Ozone is an efficient means to sterilize and terminate Coronavirus. However, you must bear in mind that the Coronavirus (SARS-CoV-2) was first discovered in December 2019, and therefore it is a new virus. The scientific community normally takes a long time to examine new species of viruses because tests must be designed carefully, and findings confirmed by different researchers. This process normally takes years and needs time to be published in scientific magazines. Therefore, the scientific data available specifically about new Coronavirus (SARS-CoV-2) is limited at this point.

However, the new Coronavirus (SARS-CoV-2) belongs to a well-known group of viruses, Coronavirus is similar to the MERS (MERS-CoV) and the SARS virus (SARS-CoV-1), known from the SARS disease during 2003-2006. As the effect of Ozone is well known on both MERS (MERS-CoV) and more specifically on SARS virus (SARS-CoV-1), it must be expected that there is a similar effect of Ozone on the new Coronavirus (SARS-CoV-2). The scientific literature suggests that Ozone is indeed an efficient agent towards the elimination (inactivation) of all Coronaviruses.

# Effectiveness of Ozone against viruses

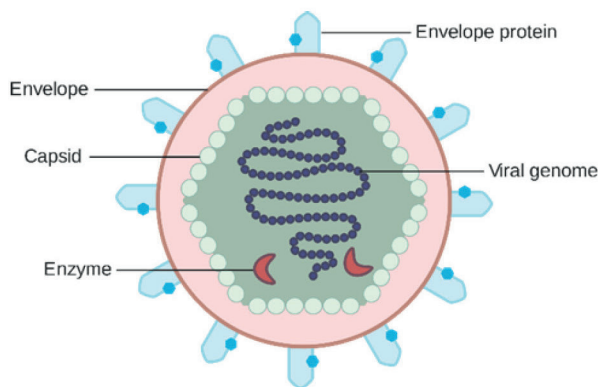
- Ozone is known to have a strong effect on viruses in general (7-11), and it is known to sanitize the SARS-virus that is very similar to the new Coronavirus. The only real difference between the SARS virus (SARS-CoV-1) and the new Coronavirus (SARS-CoV-2) is the genome, and even those are quite similar.

History of scientific literature shows that Ozone has been successfully used to treat several viral diseases such as MERS (SARS-CoV), Ebola, HIV and Hepatitis in the past (12).

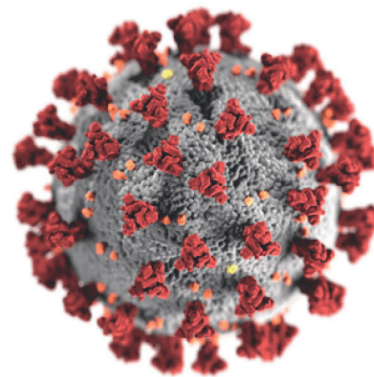
When the SARS (SARS-CoV-1) epidemic was present, Ozone was successfully used to sanitize this virus, which is more deadly than the Coronavirus (SARS-CoV-2) (13). Since the SARS virus (SARS-CoV-1) and the new Coronavirus (SARS-CoV-2) are two very similar Coronaviruses, it is fair to assume that they will be similarly affected by Ozone, especially as, it is proven that Ozone is efficient in eliminating all types of viruses.

## How does Ozone eliminate viruses?

- Viruses are very small entities, with a structure that can be illustrated as follows (From Wikipedia):



**General Coronavirus structure**



**SARS-CoV-2 virus incl. spike proteins**

Ozone “attacks” viruses in various ways with Oxidative stress (Ozone). This includes oxidative degradation of the unsaturated lipids and the proteins in the “Envelope” and the spikes. This alone may destroy viruses. Molecular modelling has further showed that Ozone also attacks the N-glycopeptides of the spike protein subunits which will also inactivate the virus (12, 14). Furthermore, the Genome (in the case of SARS-CoV-2), the RNA strand is destroyed by the Ozone, because, it is highly sensitive to Oxidative Stress. Research has repeatedly documented the sensitivity of viruses including Coronaviruses towards the Oxidative Stress that Ozone induces (5, 7, 8, 12, 14, 15).

It is therefore reasonable to conclude that Ozone is a very efficient and important safety precaution towards the spread of COVID-19.

● This paper refers to 13 studies from well renowned scientific magazines and have all been peer reviewed. The evidence that Ozone is effective against viruses in general is very solid. More information can be provided and obtained by studying the scientific references.

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