



CONFIRMATION OF THE EFFECTIVENESS OF THE OZONATED WATER PRODUCED BY THE OZONE GENERATOR USED IN THE SG-OzPAK IN DEACTIVATING THE CORONAVIRUS SARS-CoV-2

Tested at Nara Medical University, Level3 Biohazard Lab October 2020

A study conducted at the Nara Medical University, by Professor Hisakazu YANO, Associate Professor Ryuichi NAKANO, Department of Microbiology and Infectious Diseases, confirmed the novel coronavirus SARS-CoV-2 inactivation effect of low-concentration ozone water generated by the Professional Use Ozone Generator used in ProMedUSA's SG-OzPAK.

The study confirmed the inactivation effect on the novel coronavirus of approx. 0.2 mg/l of low- concentration ozone water (hereafter referred to as "the ozone water") generated using an actual production model of the equipment to infuse tap water with ozone gas from a nozzle directly connected to the faucet.

The test and confirmation of effectiveness in the study were implemented under proper pathogen containment measures ex situ at bio-safety level 3 (BSL3), and do not constitute proof of effectiveness in an actual-use environment using the equipment.

TEST VIRUS USED: NOVEL CORONAVIRUS (SARS-CoV-2)

METHODOLOGY:

A total of 190 µl of the ozonated water produced by the SG-OzPAK's Ozone Generator and 10 µl of virus fluid were mixed and allowed to react with each other for a fixed time. As a control group, the same amount of phosphate-buffered saline (PBS) and virus fluid were mixed and allowed to react in the same way.

After reaction, 800 µl of culture medium containing 10 mM of sodium thiosulfate was added to each fluid to stop the reaction, the fluid was collected, and the amount of virus was then calculated using the plaque assay technique. The test was conducted twice for each fluid.

The virus reduction rate was calculated using a logarithmic decrease value and the following formula:

$$\text{Reduction rate [\%]} = (1 - 1/10^{\text{logarithmic decrease value}}) \times 100$$



Ozonated Water Generator, and the mixing of the SARS-Cov-2 Virus

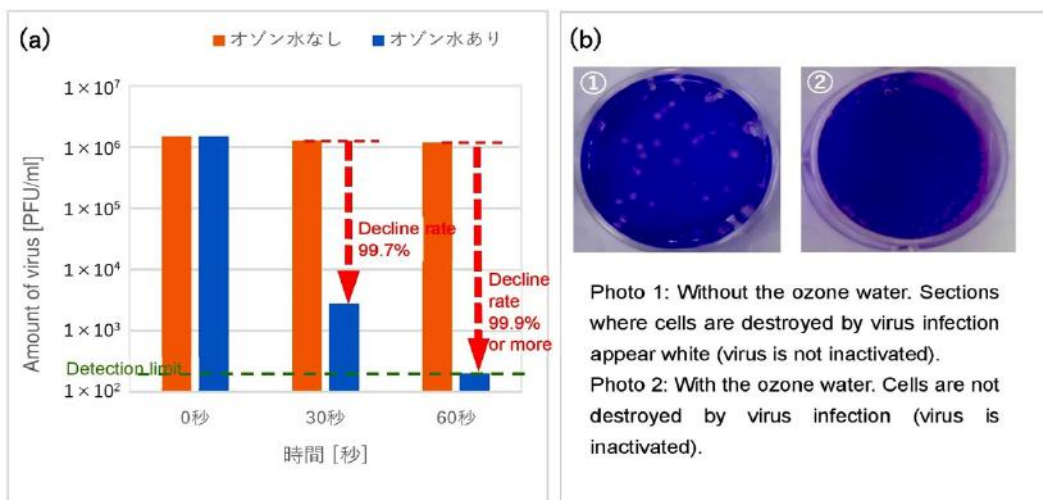
TEST RESULTS:

After mixing the ozone water with the virus fluid, a virus amount of 1.49×10^6 PFU/ml decreased to 2.75×10^3 PFU/ml in 30 seconds, then decreased to within the detection limit of 2.00×10^2 PFU/ml in 60 seconds. **The virus reduction rate at this time was 99.7% and at least 99.9% respectively.** These values are the average values of two tests.

	0 seconds	30 seconds	60 seconds
Without the ozone water	1.49×10^6	1.28×10^6	1.17×10^6
With the ozone water	1.49×10^6	2.75×10^3	$< 2.00 \times 10^2$
Decline rate (%)	-	99.7 %	> 99.9 %

* Detection limit value: $< 2.00 \times 10^2$; decline rate (%) is rounded down to two decimal places.

Changes in amount of virus due to the ozone water (units: PFU/ml)



Orange Without ozone water, Blue: With ozone water. Time in seconds: 0, 30, 60

Examples of change of the virus amount by this ozone water (a) and virus infection evaluation result (b)

The test results confirmed that the ozone water renders the novel coronavirus SARS-CoV-2 inactive at a rate greater than 99.9%. This confirms that cleaning with the ozone water may be effective for preventing contact infection via substances infected with the novel coronavirus.

SUMMARY

Confirmation of the effects of high concentrations (10 mg/l)^{*3} and low concentrations (2 to 0.4 mg/l)^{*4} of ozone water on the novel coronavirus have already been reported.

Generation of ozone water is broadly classified into generation by electrolysis or by generation by mixing ozone gas into water using the venturi injector which is the process used in the SG-OzPAK. With the venturi injector methodology as used in the SG-OzPAK, the dissolved ozone concentration in the water is lower.

In this study, the effect of a relatively low-concentration (0.2 mg/l) of dissolved ozone in the test water generated by an actual production model of the SG-OzPAK's ozone generator verifies the effectiveness of the SG-OzPAK against the actual coronavirus SARS-CoV-2 (Covid-19) in achieving a rapid 99.9% deactivation (or destruction) of the virus.

This validates that ozone water need not be limited to high-concentration use for medical equipment, etc., and that low-concentration ozone water may be sufficiently and widely utilized for general public sanitation use with regard to the novel coronavirus SARS-CoV-2.

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