

CERTIFICATE OF VIRUCIDAL EFFICACY TEST

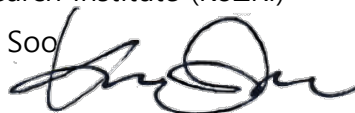
Assignment Number	200100475	Ordering Company	PURE O2 Inc.
Assignment Subject	Efficacy assessment for SARS-CoV-2(causes Corona 19) by gas-generating composition type disinfectant and spray type disinfectant.		
Assignment Term	2020-04-20 ~ 2020-10-20	Total research budget	
Host Organization	Name	Location	Representative
	Cheonbuk National University Industry-University Cooperation Foundation	Jeonju	Cho, Jae Young
Host Research Director	Name	Department	Position/Major
	Lyoo, Kwang Soo	Cheonbuk National University/ Korea Zoonosis Research Institute (KoZRI)	Veterinary Research Director/Veterinary Virology
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	Total 3 people		

The result report of the 2020 research project is submitted as attached

July 15,2020

Cheonbuk National University / Korea Zoonosis Research Institute (KoZRI)

Principle Investigation Lyoo, Kwang Soo



Applicant: PURE O2 Inc.

Manufacturer: PURE O2 Inc.

Model name: EasyStick (Gas-generating Compositions)

1. Test Objective

Virus inactivation efficacy for substances developed by PURE O2 was evaluated by in-vitro.

2. Test Method

① Test virus

- SARS-CoV-2(causes COVID-19)

② Cultured cells

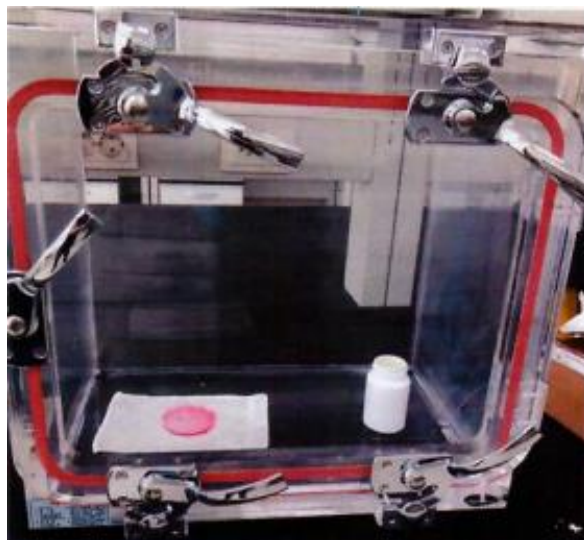
- Vero E6 cell

③ Candidate Substance

- 1 type of raw material for gas-generating compositions provided by PURE O2

④ Experiment method

- SARS-CoV-2 is placed in the chamber as shown in the figure below, and the gas-generating compositions provided by PURE O2 Inc. is placed for 2, 4 hours each to allow the virus to contact with the generated gas.
- As a control virus, apply SARS-CoV-2 to the chamber under the same conditions without disinfectants left for 2, 4 hours each



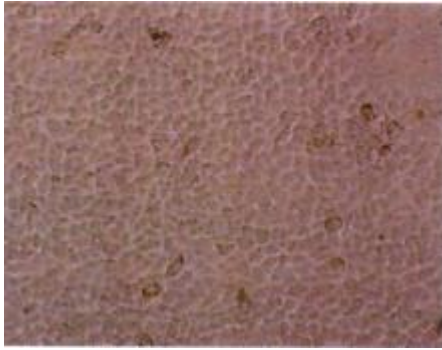
⑤ Virus quantitative analysis

- Dilute the gas-generating composition reacted virus and controlled virus to 10^1 , 10^2 , 10^3 , 10^4 , 10^5 using DMEM.
- Inoculate diluted virus after culturing 60—70% Vero cell per a well of 96-well plate
- Daily observation of the cytopathic effect of SARS-CoV-2 every day for 4 days

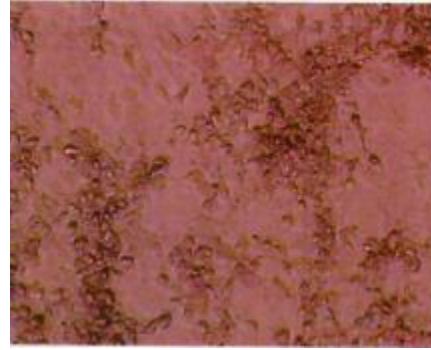
3. Research Results

A. Virus removal efficiency confirmation test result

1) Effect of cell denaturalization by SARS-CoV-2 in Vero E6 cells



Normal cell



cytopathic effect of cells by viral infection

2) SARS-CoV-2 inactivation efficacy

- 1st test

Reaction time	$\log_{10}\text{TCID}_{50}/\text{ml}$	Virus inactivation efficacy(%)
2-hour reaction	1.83	>99.99
4-hour reaction	<1.5	>99.99
Control	6.5	
Average		>99.99

- 2nd test

Reaction time	$\log_{10}\text{TCID}_{50}/\text{ml}$	Virus inactivation efficacy(%)
2-hour reaction	2.00	>99.99
4-hour reaction	<1.5	>99.99
Control	6.5	
Average		>99.99

- 3rd test

Reaction time	$\log_{10}\text{TCID}_{50}/\text{ml}$	Virus inactivation efficacy(%)
2-hour reaction	1.67	>99.99
4-hour reaction	<1.5	>99.99
Control	6.5	
Average		>99.99

※ We confirmed that the inactivation efficacy performance test using SARS-CoV-2 and 3 times repeated tests for the candidate substance developed by PURE O2. resulted 99.99% virus inactivation efficacy against the virus.

This research project was carried out in Cheonbuk National University biosafety level 3(BL-3) facility.