



CSIR-CSIO



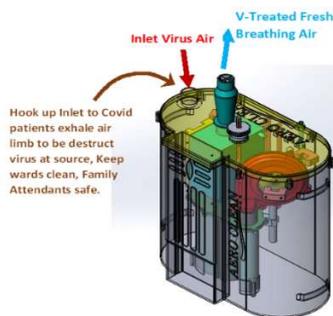
V-TREAT Breathing Air Purifier - Backpack Type

Co-Developed
by
CSIR-CSIO & IDEAMINES



HOW V-TREAT WORKS?

Four Stage Disinfection Mechanism (UVC254, Disinfectant Scrubber, PCO, UVC Backed HEPA)
+ 3 Stage Mechanical Separations (Mist Eliminator, Coalescer Filter, HEPA Filters)



Device has UVC 254 lamps, Photocatalytic filters, and HEPA 13 filters, designed to provide enough dosing to kill 99.9% of the virus in fraction of a second, and enable positive pressure positive flows which provides comfortable breathing for medics, Air staffs, and body checker Security guards, coming in close vicinity to Public. Device can be worn with N-95 or ordinary Oxygen mask. The UVC dosing and performance of device is certified from three CSIR labs in India.

FEATURES AND SPECIFICATIONS:

1. Three-stage Virus inactivation mechanism : UVC254, Photo-Catalytic and HEPA13 filters.
2. Flows: 25-75 LPM, average 50 LPM, which is 7 times more than Normal breathing air.
3. Positive pressure of just 2-3 mmWC, same as Ceiling fans
4. 2.0-liter Wearable Breathing Device, 8" X 6" X 5" backpack type
5. Weighs just 1.65 kg, 1/3rd of school bag
6. Also used as Covid patients, exhale air scavenging, inactivates virus at source, keep wards clean
7. Noise and Vibration free
8. Supplied with 20,000 mAh, Powerbank, runs 6-8 hrs

CERTIFICATIONS:

- a. Virucidal inactivation certificate from CSIR IMTEC
- b. UVC dosing certified from CSIR-CSIO
- c. UVC dosing certified from CSIR-CSIO
- d. CDESCO, CE certification and ISO -Ongoing

MANY FIRSTS-IN-WORLD

- ❖ First Virus inactivating device in world (not just filtering)
- ❖ First BA set with 3-stage disinfection UVC, PCO, and HEPA, most reliable.
- ❖ First Device that scavenges virus at source, from covid patients' exhale air.
- ❖ First wearable device for Air travelers, medical staffs & Security body checkers

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containing about 5×10^6 Vero E6/IMPRESS (ICRBI1819) cells. The plate was incubated for 1 hour with intermittent swirling to allow the virus to infect the cells.

- After 1 hour incubation virus samples were discarded from cells and cells were washed once with 200 μ l PBS. Fresh 200 μ l growth media was added and the plate was incubated for 24 hours at 37°C in a humidified chamber with an atmosphere of 5% CO₂ to allow virus infection to the cells.
- After incubation, 100 μ l culture media was harvested for RNA isolation and quantitative real time polymerase chain reaction (qRT-PCR)-based analysis.
- The RNA was isolated as per the kit protocol and diluted in 50 μ l elution buffer. The qRT-PCR was performed using 1 μ l of the diluted RNA sample as a template. The assay protocol for qRT-PCR was set up following the kit manufacturer's instructions.
- The analysis of the virus inactivation was based on quantification of viral RNA present in the culture supernatant using qRT-PCR.
- The above procedure (step 1-7) was used for the V-Treat COVID Patient's Exhale Air Scavenger Device-Wet Unit to calculate SARS-CoV-2 % deactivation w.r.t Control device.



Figure 1: V-Treat COVID Patient's Exhale Air Scavenger Device-Wet Unit (patent pending) developed by CSIR-IMTECH, Chandigarh and IDEAMINES Pvt. Ltd., Noida provided by CSIR-IMTECH for testing SARS-CoV-2 inactivation.

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Study Conclusions:

Table 1: Test results for the device

S.No.	Device	Device Description	CV value	Change in CV value w.r.t. to Control unit (S.No. 1)	Percent SARS-CoV-2 inactivation
1	V-Treat COVID Patient's Exhale Air Scavenger Device-Wet Unit Device 1	Control of UVC, Chemical Scrubber, Photo-catalytic Oxidation (PCO), and HEPA Filter	32	+11	>99.9
2	V-Treat COVID Patient's Exhale Air Scavenger Device-Wet Unit Device 2	Control of UVC, Chemical Scrubber, and Photo-catalytic Oxidation (PCO), No HEPA Filter	37	+16	>99.9
3	V-Treat COVID Patient's Exhale Air Scavenger Device-Wet Unit Device 3	Control of UVC, Chemical Scrubber, No HEPA Filter, No Filters	20.16	NA	-
4	Vero E6 Control	Uninfected cell control	31.76	-11	-

Table 2: Test results for the chemical waste

S.No.	Sample	CV value	Change in CV value w.r.t. to Control (S.No. 1)	Percent SARS-CoV-2 inactivation
1	Chemical waste from device 1	27.42	0	No viral RNA was detected compared to cell-culture control.
2	Cells only Control	27.53	-	-

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*The sample of the leftover chemical scrubber from the device was harvested and tested for the presence of viral RNA using qRT-PCR based method.

The V-Treat COVID Patient's Exhale Air Scavenger Device-Wet unit was efficacious in inactivating aerosolized human coronavirus SARS-CoV-2, achieving a reduction of >99.9% under controlled laboratory conditions. Infectious virus was not detected in the air collected after treatment. The CV values observed for both the devices (S. Nos. 1 and 2) were higher than the cell alone control, suggesting >99.9% inactivation of SARS-CoV-2.

The test report is valid for the V-Treat COVID Patient's Exhale Air Scavenger Device-Wet unit device (patent pending) developed by CSIR-IMTECH, Chandigarh and IDEAMINES Pvt. Ltd., Noida) tested in this study provided by CSIR-IMTECH.

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Study Conclusions:

S.No.	Device	Description	CV value	Change in CV with respect to Control unit (S.No. 1)	Percent SARS-CoV-2 inactivation
1	V-treat Media's Breathing Device -Dry	With UVC and Filters	33.1	+11	>99.0
2	V-treat Media's Breathing Device -Dry Unit, Control	Without UVC and Filters	20.2	-	-
3	Vero E6 cell control	Uninfected cells	31.76	-	-

The V-treat Media's Breathing device -Dry unit (S.No. 1) was efficacious in inactivating human coronavirus SARS-CoV-2, achieving a reduction of >99.0% under controlled laboratory conditions. The test report is valid for the V-treat Media's Breathing device -Dry unit model tested in this study provided by CSIR-IMTECH, Chandigarh and IDEAMINES Pvt. Ltd., Noida.

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सी एस आई आर – राष्ट्रीय भौतिक प्रयोगशाला
CSIR-NATIONAL PHYSICAL LABORATORY

संशोधन रिपोर्ट
TEST REPORT

V-Treat breathing device (Dry Unit)

रिपोर्ट दिनांक: 07/09/2021
RNL रिपोर्ट नं.: 21090530/01/04T-08
पृष्ठ: 3
पृष्ठों की संख्या: 3

Observation Table:

Position	Fals Source Closest to Measurement Position	Distance of Detector from the surface of the device source (mm)	UVC irradiance (mW/m ²)
P1	P1	2	1.28
P2	P2	2	0.97
P3	P3	2	0.97
P4	P4	2	0.96
P5	P5	10	0.60
		20	0.28

The expanded uncertainty in the UVC irradiance measurement is ± 50%.

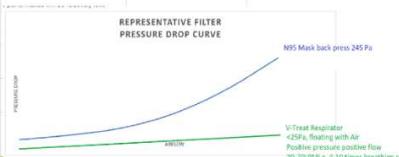
The uncertainty is at a coverage factor k=2, which corresponds to a coverage probability of approximately 95% for a normal distribution.

8. Details of Calibration: 03/09/2021

9. Remarks:

- The value of irradiance measured at different positions are sensitive to the entire geometry of the device including the characteristics of the UVC sources and their placement position.
- NPL identification number of this V-Treat breathing device (Dry Unit) for UVC irradiance measurement is 1613MPT2021.

REPRESENTATIVE FILTER PRESSURE DROP CURVE



Parameter	N95/NR95 Mask (Typical of category)	V-Treat Respirator
Virus deactivation/Filter performance	>=95%	>=99%
Flow rates	85 LPM	85 LPM
Inward leakage	<= 8%	0%
Inhalation Resistance	<343 Pa	<0 Pa (Floating with Air, No resistance at all)
Exhalation resistance	<245 Pa	<10 Pa (Floating with Air, No resistance at all)
Force Applied	<245 Pa	-10 Pa
CO2 clearance/built up	<1% (practically felt more, after some time)	<0.1, 0.25% @ 30-85LPM (Compare to N95 Mask, V-treat provides 4-10 times more Air flow, Hence, CO2 is 1/4th to 1/10th of Mask)

FAQ's

1. Is HEPA based purifiers Good?	NO. HEPA 13 only filters 0.3 micron and above aerosols, inside which 0.07 micron virus can survive for days, with HVAC or purifier flows, the aerosols dries up and as soon as aerosol size is less than 0.3 micron, it slips though HEPA with live virus into human space, and via breathing root infects victims.
2. Is Bigger the cough sputum greater the problem?	NO. Bigger the cough sputum, it falls and settles fast, and mopped using sanitizer. The most dangerous is 0.1 to 5 micron aerosols, that can stay in air for hours and days, transmitting infection.
3. Is higher the flow and bigger the device and faster the inactivation better?	NO. It is the precise dosing, and residence time that matters. The small wattage of UVC lamps, and higher flows to claim faster coverage say in 5 minutes 12'X12' room inactivated, is misleading. Secondly, the flows in rooms need to be made circular using spreaders. V-treat HVAC in-duct and standalone air purifiers comes with customized spreader. Consumer must calculate /ask dosing rates and residence time in device for proper inactivation
4. Is bigger the lamp, and larger the wattage better?	NO. Optical luminosity decreases at reverse square law, the lamp and distance need to be optimized to provide better intensity in the moving spaces for air for proper virus inactivation, a Big lamp at corner of room is no better than several smaller lamps spread uniformly and consuming less wattage.
5. Is vaccine, better than V-treat device?	V-treat is not an alternative for vaccine, but vaccine will be ineffective as it is designed for few strands which are mutating fast. While v-treat emits UVC-254 nm wavelengths that can break most virus /RNA bonds, and inactivates, so it is more reliable for broad spectrum of virus and Bacteria, and much recommended for OPD doctors, and confined spaces with high human densities like air crafts, busses, trains, banks and such public places
6. Is N95, better than V-treat device?	No. N95 causes humidity, CO2 and back pressure built up and uncomfortable to use for prolonged periods. People subconsciously create leakage path and breath inward contaminated air leaks, becoming sick. V-treat pushes clean treated air constantly and maintains 8 times more positive air flow for outward leakage, flushed out exhale air CO2, and humidity, and provides enough back pressure to breath, and hence more comfortable than N-95. However, N-95 is easy to use, while V-treat has to be back strapped like school bag while travelling, but it is 1/3 rd the weight of school bags.