

# Viruses

## (MS2 Bacteriophage)

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Viruses are extremely tiny pathogens that are only capable of reproduction by infecting the cells of a living organism. Viruses take over their host's biological machinery and force them to create a multitude of genetically identical copies. Their reproduction cycles are commonly detrimental to the host and are responsible for a wide host of diseases. Viral infections are the scourge of plants, animals, bacteria, and all known forms of life.

In humans, specific viruses are known to cause diseases such as influenza, HIV, Ebola, hepatitis, chicken pox, the common cold, and many others.

Viruses spread by entering a cell when the host comes into contact with an individual virus particle. This can occur via contact with a surface where the particle has settled or by exposure to air contaminated with virus particles.

Air purification can potentially remove viruses from the airstream before they can infect. Testing individual filters and purifiers on their efficiency of virus destruction is vital to understanding how well they can protect against infection.



# Molekule Air Pro RX Successfully Destroys Viruses Captured from the Air in a Scientific Testing Environment

## PURPOSE

This research tested the efficiency of the catalytic Photo Electrochemical Oxidation (PECO) filters used in the Molekule Air Pro RX to capture and destroy virus particles.

## SET-UP

The PECO filters used in the Molekule Air Pro RX were compared against filters that lacked any mechanism to physically destroy virus particles. Both types of filters were placed in a custom-built air flow system that is designed to aerosolize viruses into the airstream. The virus species chosen was the MS2 bacteriophage, a common proxy for human pathogens such as influenza and SARS-CoV-2. After collecting the viruses, any viable particles were extracted from the filters and counted to measure destruction efficiency. The PECO filters were examined for the presence of viruses after one hour and after twenty-four hours of catalytic activation and compared to the standard filters.

## RESULT

A large degree of viable viruses were present on the standard filters, but few viruses were present after one hour of activation. Practically no viruses could be recovered from the photocatalytic filters twenty-four hours of activation.

FILTER TYPE	AVERAGE NUMBER OF VIRUS PARTICLES PRESENT	DESTRUCTION EFFICIENCY
Standard filter	6,500,000	0%
PECO Filter 1 hour	3,400	99.9477%
PECO Filter 24 hours	Less than 40*	Greater than 99.9994%*

\*Below the limit of detection. Zero viruses were recovered from the PECO filter that was activated for 24 hours. However, total count is based on the number of viruses released into the system and recoverable from the standard filter. Not all viruses released into the system could be recovered even from the standard filter.



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Laboratories Report on Molekule Air  
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