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Study Summary Article

Efficacy of the CerroZone Air Purifier in Various UV Intensity Configurations Against Aerosolized MS2 Virus

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Article Info

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· *CerroZone Device*
· *Bioaerosol Reduction*

FDA Compliance:

This study was conducted in compliance with FDA Good Laboratory Practices (GLP) as defined in 21 CFR, Part 58.

Testing Lab:

Aerosol Research and Engineering Laboratories, Inc.
Project #: 10880.60

Conflict of Interest:

Aerosol Research and Engineering Laboratories, Inc. have no affiliations with, or involvement in any capacity, with CerroZone LLC financial interests such as; membership, employment, stock ownership, or other equity interest.

ABSTRACT

Background: Due to the high rate of infectious disease transmission through aerosol exposure to pathogens, devices designed to reduce the levels of airborne pathogens have been attracting significant attention. This study characterizes the efficacy of the CerroZone device against MS2. The CerroZone is a mobile air purification system which inactivates pathogens by producing ozone using ultraviolet light within the device. Testing was performed with six (6) configurations of the device in triplicate trials: filter only, 1 ballast in operation, 2 ballasts in operation, 4 ballasts in operation, 7 ballast in operation, and 14 ballasts in operation. All trials were performed with the device flow rate at 220 cubic feet per minute (CFM). The species selected for the bioaerosol testing is recognized as a surrogate for more dangerous pathogenic organisms. In this study, the virus species MS2, a non-enveloped single-stranded RNA (ssRNA) virus was used. It is a common surrogate for influenza viruses and for SARS-CoV-2.

Methods: The MS2 virus was aerosolized into a sealed 16 m^3 test chamber, containing the CerroZone device, using a Collison 24-jet nebulizer. The bioaerosol had a mass median aerodynamic diameter (MMAD) of approximately 0.7 µm. Bioaerosol samples were taken at multiple time points throughout each trial in order to quantify the reduction rate of the air purification device. Impinger samples were serially diluted, plated, incubated, and enumerated in triplicate to yield viable bioaerosol concentrations for each sampling point. Chamber control trial losses, or natural decay, were subtracted from the device trial data to yield the net log reduction for each of the bioaerosol trials.

Results: The CerroZone device was operated on select settings provided by the manufacturer. The device achieved a net log of 4.0 (equivalent to 99.99%) or greater in 25 minutes.

Conclusions: The CerroZone device is effective at inactivating viable bioaerosols in air. At a range of settings, the CerroZone device achieved 99.99% percent reduction of aerosolized MS2 bacteriophage from the test chamber. With a reduction of 99.99% the device is effective at reducing pathogens.

Introduction

This study was conducted to evaluate the efficacy of the CerroZone device's ability to eliminate viable pathogens from ambient air. The CerroZone is a mobile air purifier designed to reduce the viability of pathogens in medical facilities, classrooms, and other indoor spaces.

The test plan incorporated challenging the CerroZone device in a sealed test chamber in order to determine the rate and extent of reduction of one aerosolized virus. A picture of the CerroZone device is shown in **Figure 1**.

Study Overview

The effectiveness of the CerroZone device was evaluated against MS2, a single-stranded RNA virus. Testing was conducted to characterize how much a single CerroZone device reduced the viral aerosol concentration. All testing was performed when operating at the manufacturer's provided settings.