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FAQ

(ARCHIVED) COVID-19: Electrostatic Spray Disinfection Systems

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Questions and Answers

Electrostatic Spray Disinfection Systems

Q1: How do electrostatic spray disinfection systems work?

Electrostatic spray disinfection systems turn disinfectant liquid (e.g., quaternary ammonium compounds) into aerosols and then apply a charge to each droplet so that they are attracted to surfaces through electrostatic forces which are greater than gravity.[1-2] Manufacturers state that they could be used in a variety of facility types such as healthcare, nursing, schools, offices, sports facilities for surface disinfection.

Effectiveness of Disinfection

Q2: Are electrostatic sprayers that use disinfectants effective against COVID-19?

Disinfectant products are approved by Health Canada and assigned a Drug Identification Number (DIN). Health Canada provides a list of disinfectants specifically approved for COVID-19.[3-4] All items/surfaces to be disinfected are to be cleaned with soap/detergent and water before disinfectant application.[5]

There are some disinfectants specifically for use in electrostatic spray disinfection systems that have been approved by Health Canada for COVID-19.[3] The manufacturers of these disinfectants would have to provide evidence of disinfection efficacy while using the electrostatic spraying system to obtain approval.[4] Electrostatic sprayer systems should be used with disinfectant solutions that have been approved by Health Canada for COVID-19 and that are intended to be used with a specific electrostatic sprayer model.

Q3: How do electrostatic sprayers compare to other disinfection methods?

It is not clear whether electrostatic spraying is more effective than conventional surface disinfection methods for COVID-19. The US Environmental Protection Agency evaluated the effectiveness of electrostatic sprayers in decontaminating PPE for first responders in a hypothetical situation of responding to a bioterror event.[6] Electrostatic sprayers were compared to traditional backpack sprayers for removing or inactivating spores of *Bacillus atrophaeus var. globigii* (Bg), a surrogate for *Bacillus anthracis*, from different types of personal protective equipment (PPE) materials, using a standardized solution of 10% Clorox® Concentrated Germicidal Bleach. After a 5 minute contact time, electrostatic sprayers performed on par with (or depending on the surface tested, better than) backpack sprayers, with a surface log reduction (LR) of greater than or equal to 6. In addition, electrostatic sprayers produced 75 times less waste (from runoff post-aerosolization) than backpack sprayers. Given that anthrax spores are much more resistant to disinfection than coronaviruses,[7] it is likely that application of this bleach product by this method would also disinfect coronaviruses.

Another lab-based study compared three different surface disinfection methods (hydraulic spraying, electrostatic spraying, and surface wiping) using three different disinfectant solutions (2% sodium dodecyl sulfate [SDS]/5% levulinic acid [LA], 200ppm chlorine, Alpet D2 – a solution of 58.6% isopropyl alcohol containing quaternary ammonium compounds) for each method on stainless steel surfaces contaminated with mouse norovirus (a human norovirus surrogate).[8] Greater log reductions in mouse norovirus were found with surface wiping and hydraulic spraying than with electrostatic spraying. The authors hypothesized that hydraulic spraying may provide more pressure than electrostatic spraying which wets the target surface but with minimal physical force of impact; and that the mechanical action of wipe application likely helped to dislodge viruses from the surface. There were also greater reductions in mouse norovirus when using either 2% SDS/5%LA or 200 ppm chlorine solution with electrostatic spraying. Alpet D2 with electrostatic spraying did not reduce mouse norovirus viral load any greater than sterile tap water; the authors stated that it was the only non-aqueous-based sanitizer liquid used in the study and that the electric conductivity was lower than ideal for the induction charging process used in electrostatic sprayers. The authors concluded that electrostatic spray application methods were best suited for pre-cleaned surfaces where there is no soil to dislodge or when accessing backsides or crevices of otherwise unreachable targets.

The Fate of Disinfectant Aerosols

Q4. Does the disinfectant stay aerosolized within a room?

Some electrostatic disinfectant spray manufacturers state that their product would be considered a misting device as the disinfectant is aerosolized. However, they also state that the disinfectant product does not stay in the air as happens during disinfectant fogging because the electrostatic charge makes droplets adhere to surfaces. Product instructions may state that re-occupancy can happen immediately after application as air concentrations are below acceptable levels. We did not find any published literature on air concentrations of disinfectants in a room over time after electrostatic spray application.

Q5. Can disinfectant applied using an electrostatic disinfectant sprayer system move through a facility via the HVAC system and does this pose a risk?

The premise behind this technology suggests that any disinfectant that gets into the ventilation system would likely deposit on the ducting due to the electrostatic charge. However, we did not find any literature on this.

Health and Safety Considerations

Q6. What are important health and safety considerations regarding the use of electrostatic sprayers for disinfection?

It is important to follow manufacturers' instructions for safe use of both the sprayer system and the specific disinfection solution. For example, staff applying the spray need to wear appropriate PPE as per the sprayer system and the disinfectant manufacturers' instructions; staff need to ensure that other individuals are cleared from the area during spraying;[9] additional guidance from the Safety Data Sheet (SDS) need to be followed for the disinfectant. As electrostatic sprayer systems can produce sparks, care needs to be taken when using these systems near flammable gases, liquids, and dusts.[10]

While electrostatic spraying differs from fogging, another mist-like application, one of the reasons the US Centers for Disease Control and Prevention guidance (2008) recommends against fogging disinfection of environmental surfaces or air in patient rooms is based on concerns about adverse effects on healthcare workers and others in facilities where these methods were utilized.[11]

Q7. Are there occupational exposure limits for the disinfectant solutions used with these sprayer systems?

The Ontario Ministry of Labour, Training and Skills Development (MLTSD) lists Occupational Exposure Limits (OELs) for over 725 substances.[12] Any exposure limits listed would be for components in the disinfectant solution, which would be found in the Safety Data Sheets (SDS). For disinfectant substances not listed, the MLTSD Health and Safety Contact Centre can be reached for further guidance.

Regarding Specific Electrostatic Spray Disinfectant Systems

Q8. Where would I find information for questions specific to a particular brand or model of electrostatic sprayer or disinfection product?

Questions specific to a make/model of electrostatic sprayer system should be addressed by the manufacturer as in most cases they will have technical staff familiar with the device to provide additional information not found in Safety Data Sheets (SDS) or online.

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