UVC radiation and Ozone as disinfection methods against a viral surrogate of SARS-CoV-2.

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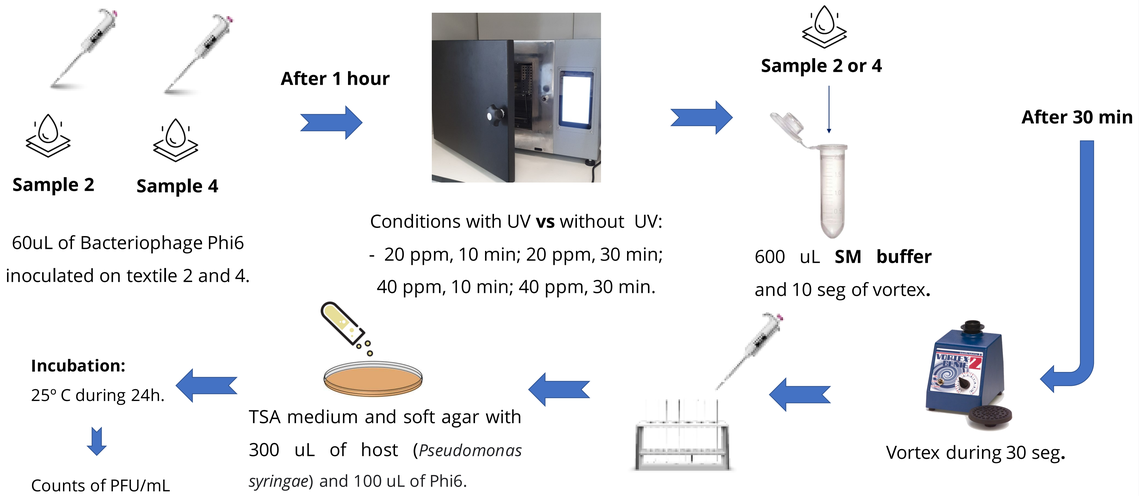
Introduction and Objectives

Coronavirus disease 2019 (COVID-19), caused by SARS-CoV-2, emerged from Hubei Province, China (late 2019), and spread rapidly around the world. It is widely accepted that this corona virus can remain for several hours or even days on surfaces, such as plastic, cotton, fur, polyester, among others. This raised awareness on the possible transmission of SARS-CoV-2 via cloths and the urgent need for effective disinfection strategies to be used in clothing stores. In this project we investigated the efficiency of the MTEX PHYS Sterilizer, a prototype developed by MTEX Solutions S.A. combining ultraviolet irradiation (UVC) and ozone (O_3), on the elimination of SARS-CoV-2 on fabrics using bacteriophage Phi6 as a surrogate of SARS-CoV-2 (1). Phi6 (family *Cystoviridae*) have been used as surrogates for human coronaviruses given similar size, composition, and morphology (2). Thus, tis study aimed to evaluate different approaches namely disinfection by application of ozone O_3 and combination of UVC with O_3 in two types of fabrics were used: 100% linen (sample 2) and 100% wool (sample 4).

Methods



Reference

1. Silverman, A. I., & Boehm, A. B. (2020). Environmental Science & Technology Letters, 7(8), 544-553.

2. Poranen, M. M., & Mäntynen, S. (2017). Journal of General Virology, 98(10), 2423-2424.

Results and Conclusion

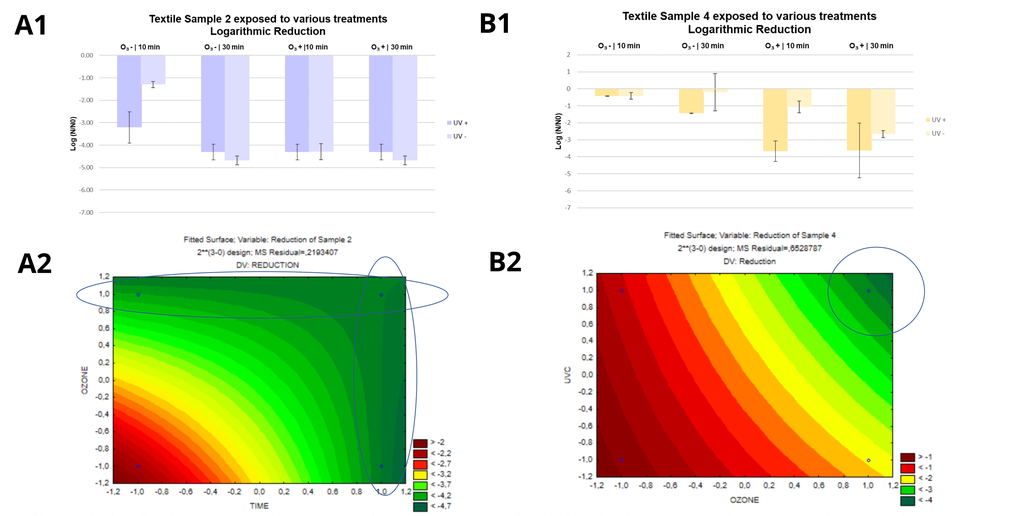


Figure 1. A - Textile sample 2 inoculated with bacteriophage Phi6 . **B -** Textile sample 4 inoculated with bacteriophage Phi6. **A2-B2 –** Contour plot analysed by Statistica software.

Exposure of contaminated sample 2 to variable time, ozone or combination of time and ozone resulted in a significant reduction of Phi6 (Fig.1-A2). However, the longer the exposure time to ozone with low or high ppm, the reduction of Phi6 is greater than 4 log cycle. 20 ppm of O_3 during 30 minutes resulted in a reduction of Phi6 of 4.30 ± 0.36 log cycles (Fig.1-A1). On sample 4, Phi6 was a significant reduction when exposure to high ozone with the presence of UVC (Fig.1-B2). Phi6 was only reduced by 2.67 ± 0.20 log cycles during exposure to 40 ppm for 30 minutes. When exposed to O_3 (40 ppm, 30 min) with UVC, a log reduction of 3.63 ± 1.61 was observed (Fig.1-B1). Since the tissue does not absorb the inoculum, UVC ends up playing an important role in disinfection. Although this study requires more trials and validation using fabrics contaminated with SARS-CoV-2, it was demonstrated that 1) the prototype investigated is a potential solution for the inactivation of this virus and that 2) the effectiveness depends on the type of fabric being treated.

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