

Results of study on the inactivation of air-born viruses with Soluva Air M10

The above-named study was conducted with Hygiene Institut biotec GmbH. This is essentially a summary of the original study, as some technical details are non-disclosable.

Project description:

Soluva® Air M10 by Heraeus Noblelight GmbH is a UV-C air-disinfection system. In this study the inactivation of RNA surrogate viruses was analyzed by means of a one-time passage through the system. The used virus surrogate is an ssRNA virus with a 4kB genom. In comparison, the pandemic causing SARS-CoV-2 virus is also an encapsulated ssRNA virus. Regarding the inactivation of the virus in air the following D90 values (dose that is necessary for a 90% inactivation) are known from literature:

Coronavirus 3 J/m²

Surrogatvirus 3 – 61 J/m².

The research on SARS-CoV-2 is still ongoing and factors such as humidity and temperature can influence the inactivation, but, nevertheless, the reaction of the pathogen to UV-C radiation is comparable with that of the surrogate.

Material and Methods:

Initially, a lysate of the surrogate virus of a high concentration is cultivated. To enable a controlled environment to effuse the virus, Soluva® Air M10 was placed in a fully closed plastic tent structure. The quantified lysate was then effused with fumigation. The absolute number of virus was determined with differential measurement of weight and a recalculation of the applied titer.

The air sampling was conducted with a membrane filter including an air sampler at 6m³/h for 10 minutes. The used membranes were then dissolved in buffer and the amount of collected viruses was analyzed with a serial dilution and an agar-assay. To quantify the inactivation rate of the surrogate virus due to UV-C radiation with Soluva® Air M10 the experiment was conducted with and without active UV-C in the system to exclude additional factors such as ventilation effects.

Results:

To confirm the inactivation of surrogate viruses with Soluva® Air M10, an experiment was conducted in which surrogate viruses were spread as an aerosol with a fumigator and the radiation-exposed viruses were collected after a one-time passage through the system. For the collection after the one-time passage, membrane filters were applied and processed afterwards. In this experiment series a lysate of 1,0x10¹¹PFU/ml was effused. After the one-time passage of Soluva® Air M10 without active UV-C 4,00x10⁰⁶ PFU/m³ were measured. After a one-time passage of Soluva® Air M10 with active UV-C no active viruses could be detected. Considering a detection threshold of 50PFU/m³ a reduction of actives viruses in ≥4,9log scale was achieved. Therefore, the conclusive inactivation rate is ≥ 99,99875%.

Assessment:

Soluva® Air M10 is a system to inactivate air-borne microorganisms. The system is mounted on the ceiling and decontaminates the circulating air continuously. The performed experiments showed a very high inactivation rate of the applied surrogate virus. A reduction ≥ 4,9 log was confirmed which equals an inactivation rate of 99,99875%.