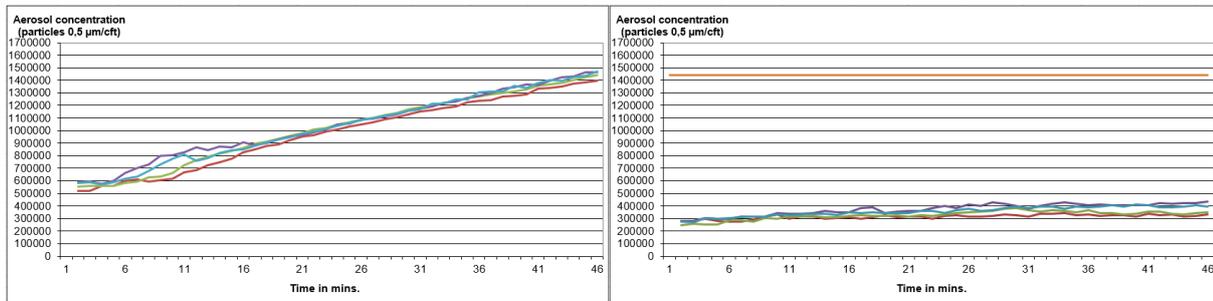


Checking the efficacy of air purifiers

Under the prevailing pandemic conditions, measures are being taken in many places which have not yet been proven to be effective. In enclosed spaces, the risk of transmission of COVID-19 is particularly great. One such measure is the use of air purifiers to reduce virus concentrations and hence reduce the risk of contagion. The efficacy of air purifiers using HEPA filtration can be evaluated using the following test setup. In this case, Miele's PAC 1080 AirControl air purifier was used.

To furnish proof of efficiency, aerosol concentrations were determined continuously at various pre-defined points throughout the room. In order to simulate real-life conditions, six persons were represented by heated dummies. These each included an aerosol outlet to simulate the spread of aerosols by mouth. Wherever the air purifier was used, it was set to 65%, achieving a 6-fold air displacement rate. The following scenarios were simulated using an 0.5 µm aerosol.

Aerosol concentration with windows closed and with and without air purifier



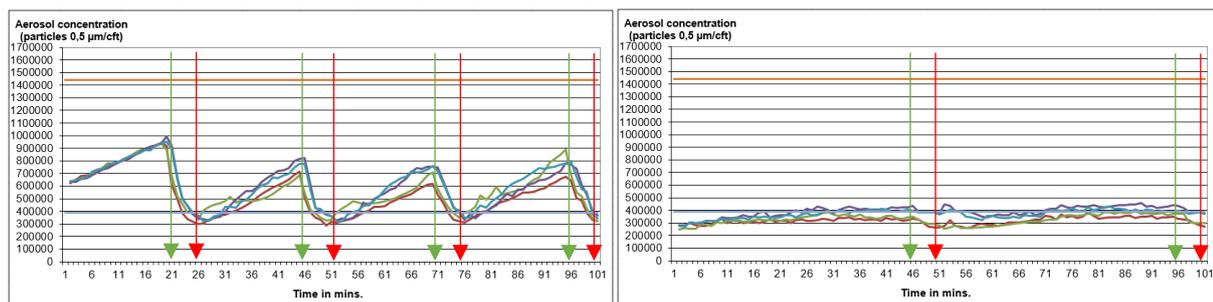
Aerosol concentration without air purifier

Aerosol concentration with air purifier

The charts show aerosol concentrations with steady-state aerosol discharge, measured at four points throughout the room. Data was recorded over a period of 45 minutes. On the left: Aerosol concentration with windows closed and without air purifier. Readings recorded a 2.5-fold increase in the aerosol concentration within 45 minutes.

The chart on the right shows the readings at the same locations with the air purifier running. The horizontal orange line shows maximum values (across all test points) without the air purifier (measurement taken after 45 minutes of aerosol discharge). In the case of the values recorded with the air purifier running, only a mean increase of around 120,000 particles across all test points was determined over 45 minutes. The aerosol load with windows closed is therefore reduced by a factor of approx. 3.6 through the use of an air purifier.

Aerosol concentration with windows open for ventilation with and without air purifier



Aerosol concentration without air purifier

Aerosol concentration with air purifier

The charts show aerosol concentrations with steady-state aerosol discharge, measured at four points throughout the room. Data was recorded over a period of 100 minutes. On the left: Aerosol concentration without air purifier. Every 20 minutes, windows were opened for 5 minutes (green arrow → Window opened, red arrow → Window closed), resulting in the saw-tooth pattern.

On the right-hand side is the aerosol concentration after opening the window twice (after 45 and 95 minutes) with the air purifier running. This results in a considerably lower increase in aerosol concentration.

Summary

In both scenarios, the air purifier reduces the aerosol concentration. Both after room ventilation and, above all, when it is not possible to ventilate, the data recorded show that a reduction in the potentially infectious aerosol load in the room can be presumed. Similarly, the intervals between ventilation phases in cold winter months could be extended without increasing aerosol concentrations. Completely dispensing with ventilation is, however, not advisable. Air purifiers above all complement ventilation as the combination of airing a room and the use of an air purifier was able to achieve the lowest aerosol concentrations in the test.

Accordingly, air purifiers can make an important contribution towards containing the pandemic. Alongside hygiene, masks, social distancing and ventilation, they can be considered a further component in the battle against Corona.