

# OFFICIAL ABSTRACT and CERTIFICATION

## Antiviral Capabilities of a DABCO-hydrocarbon molecules

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For many, getting sick after a long flight appears to be inevitable. As the cabin air is being repeatedly circulated throughout the plane, airborne viruses, such as Influenza, can spread and infect many passengers. Although several air filtration systems attempt to eliminate the transmission of these viral particles, the methods are not completely effective. A method to surpass the transmission and infectious activity of viruses is the usage of a DABCO-hydrocarbon chain (diazabicyclo-octane) attached to a cloth. DABCO is a nitrogen-based molecule that can be covalently bound to other molecules. The extra bond in the middle of the molecule helps to attach the two nitrogen molecules into a three dimensional formation to make the molecule positively charged. T4 bacteriophage, a virus that specifically infects the bacteria E.coli by using its tail fibers, which are negatively charged. The experiment was specifically conducted to observe which length of hydrocarbon chains on the DABCO molecule would be most effective at reducing viral infectivity. Longer hydrocarbon chains, such as C9, create a further distance between DABCO molecules. Chains such as C3, on the other hand, have a much shorter distance that results in minimizing the strength of the charge because it feels like one charge. The experiment was then conducted using free floating DABCO molecules (no cloth attachment). Overall, the results indicated that the diDABCO-C6 cloth was most effective at reducing viral plaque formation. However, in the powders without the cloth, the shorter chains of both C3 molecules appeared to be more effective. The results indicated that the relationship between DABCO and the T4 bacteriophage may be due to steric effects. The shorter distance in the cloth may seem to be one charge, attracting less of the negative tail fibers of the bacteria whereas in the powder form, likely because the smaller chains can float freely and orient themselves to fit closely and attach to attach to more tail fibers as opposed to longer chained molecules. Ultimately, the novel DABCO molecule can be used by the army for biological warfare protection or bandage material as well as a future pharmaceutical against viruses. Most importantly, the DABCO cloth can be implemented in airplane air filtration systems to reduce the transmission of infectious viruses on a flight.

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