

Response to SARS-CoV-2 / COVID-19: Low-Cost Decontamination of N95 Respirators



EXTENDING USE OF CRITICAL PERSONAL PROTECTIVE EQUIPMENT

Reducing person-to-person spread of SARS-CoV-2 virus is a key way to reduce the impact of COVID-19 in the absence of an effective treatment. Transmission is believed to occur primarily through respiratory droplets produced by talking, coughing, and sneezing, though contact with contaminated surfaces and objects may also contribute to spread. Respiratory protection, including N95 filtering facepiece respirators (FFRs), is an effective means of reducing exposure, but FFRs are in limited supply because of demand. The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) is executing high-impact projects to help answer critical questions about the SARS-CoV-2 virus and support the national response, including the development of low-cost and easily accessible methods for FFR decontamination for reuse.

EFFORTS TO ANSWER VITAL QUESTIONS

S&T has evaluated common household (low technology) devices to test at-home treatments with moist heat, one of three methods recommended by the CDC¹, as an effective means to decontaminate FFRs.

CURRENT DATA

S&T identified programmable multicookers with a sous vide function, or equivalent setting, as a suitable means to treat FFRs with moist heat. Moist heat treatment is achieved by placing the mask(s) in a paper bag and then treating them with steam at 149°F (65 °C) for 30 minutes, consistent with guidance given by the CDC.¹ S&T has verified that these conditions inactivate SARS-CoV-2 below detectable limits for the 3M 1860, 3M 8210, 3M 8511 and Northern Safety 7210 FFRs. These results were confirmed when SARS-CoV-2 was present in culture media and simulated saliva. In addition, S&T has confirmed that virus is inactivated when up to three (3) masks are nested in the same paper bag for treatment. Furthermore, all four of these masks models still meet performance specifications after five treatments at these

conditions. Manufacturer guidance should be consulted for other models. (Note, 3M has shown that moist heat treatment can be done up to 10 times for the 1860, 8210, 1804, and 1870+)²

Table 1. SARS-CoV-2 inactivation results when masks are placed in a paper bag and treated at 149°F (65°C) for 30 minutes with steam.

Mask	Inactivation below Detection for	
	Virus in Media	Virus in Simulated Saliva
3M 1860	Yes	Yes
3M 8210	Yes	Yes
3M 8511	Yes	Yes
NS 7210	Yes	Yes

Table 2. FFR Performance after five Decontamination Cycles.

Mask	Acceptable Performance after 5 Decontamination Cycles for		
	Filtration Efficiency	Breathing Resistance	Visual Inspection
3M 1860	Yes	Yes	Yes
3M 8210	Yes	Yes	Yes
3M 8511	Yes	Yes	Yes
NS 7210	Yes	Yes	Yes

NEXT STEPS

S&T will continue laboratory research to refine and expand results. Anticipated advancements include:

- Verification that SARS-CoV-2 in simulated lung fluid placed on a mask is still inactivated by moist heat
- Complete verification that moist heat treatment does not degrade FFR performance after 10 treatments
- Finalize instructional guidance document of how to appropriately decontaminate a personal FFR.

DISCLAIMER:

Individuals assume all responsibility and risk for the use of these instructions for the best practices to decontaminate previously worn FFRs. DHS does not assume any liability for the instructions for best practices contained herein nor do such instructions for best practices create any warranty. Reliance on such instructions for best practices is solely at your own risk. Further, it is important to note that there are multiple steps and variables which may create risk depending upon how the user implements the instructions for best practices

¹ <https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html>

² <https://multimedia.3m.com/mws/media/18248690/decontamination-methods-for-3m-filtering-facepiece-respirators-technical-bulletin.pdf>

