

N95 REUSE Q&A's:

Q1: Can the masks be sterilized by heat treatment?

A: Yes, it is reported that COVID-19 cannot survive at 65C for 30 minutes. Therefore, it is safe to sterilize the masks in hot air at 70C for 30 minutes and this process can be repeated multiple times to reuse the masks without a noticeable loss of efficiency. But be sure to suspend the masks in the hot air in the oven **without contacting or putting the masks too close to a metal surface**. The respirator can be hung in the oven using a wood or a plastic clip on its edge of non-breathing zone or put on a wood grill at least 6" away from a metal surface. Similarly, hold the edge of non-breathing zone when doffing the mask. Don't touch the inside part of the mask because your hands might be contaminated at this time if the mask was. Wash your hands thoroughly using soap with water for at least 20 seconds according to CDC after donning the masks.

Q2: Can the masks be sterilized using alcohol?

A: No, face masks cannot be sterilized using alcohol because the charges will be erased by either alcohol liquid or its vapor as described in a previous section.

Q3: Can the masks be sterilized using radiation or UV?

A: It depends on the intensity and the exposure time. Radioactive such as gamma rays or UV light are commonly used for the sterilization of material but they have potential to decompose the PP material by the attacking of the lone pair electrons pairs in its CH₃ side group on its backbone of the molecular chains leading to the dissipation of the charges. However, the degree of PP decomposition depends on the radiation and UV intensity as well as the exposure time. For example, the PP will be totally degraded and become brittle under sunshine in summer for three months. Someone needs to do the experiment to expose the masks to the UV or the radioactive intensity for the time that can kill COVID-19 and then measure the mask filtration efficiency to know.

Q4: Can the masks be reused after drying?

A: According to a study published in New England Journal of Medicine (NEJM), The COVID-19 can survive in the air for three hours, four hours on a copper surface, 24 hours on a cardboard, two-three days on a stainless or a plastic surface. It is reported from CDC that the possibility of infection from a package being shipped for a few days from China is very slim, which is a

similar result as in the NEJM. PP is a hydrophobic plastic material with zero moisture content. The virus needs a host – a cell – to survive. A respirator can get dry in less than two-three days in a dry air environment. **Based on the above reports, respirators can be numbered, let them get dry in a paper bag for 3 days.**

Q5: Can the masks be sterilized using steam?

A: Yes, investigation showed that the charge loss on the electret is unnoticeable by sterilization using 125oC steam for three minutes.

Q6: Can the respirator be sterilized by boiling water?

A: Yes, our investigation showed that the charge loss on the media is unnoticeable in boiling water for three minutes but stirring on the mask is not recommended to avoid its physical damage.

Q7: Can the respirator be in contact with water?

A: Yes, the charges of an electret, embed deep inside the fibers, are quasi-permanent. Different from the surface charges encountered in our daily life, they will not dissipate in the air or in contact with water. Our investigation showed that this electret had little charge decay after being immersed in water for three days. However, laundering should be avoided for its action will physically damage the masks.

In **Q5, Q6** and **Q7**, to be sure that the inner or the outer veil of the mask is not made of paper-like tissues – paper pulp or nonwovens bond by water soluble binder, which will either dissolve in water resulting in loose fibers in the veil or the loss of its strength after exposing to water.