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An Endress+Hauser Company

# FAQ: UVP Crosslinker CL-3000

1. **What is UVGI?**
    a. UVGI stands for "ultraviolet germicidal irradiation". Ultraviolet light is damaging to DNA/RNA molecules. A damaged DNA/RNA molecule cannot be used by the cell for normal cellular processes. A cell that cannot use its copies of DNA/RNA will not be able to function. Utilizing this fact, UVGI is popular for use as a general laboratory disinfection protocol. It is also a popular technique to eliminate DNA/RNA contamination (amplicons) in PCR experiments. UVGI uses light emitted at 254 nm, a high energy wavelength that damages these critical nucleic acids.

2. **How is UVGI used to disinfect masks?**
    a. There are numerous studies that have investigated this strategy over the past several years[1–4], which have most recently been implemented in response to the COVID-19 pandemic[5,6]. Both the CDC[7] and other groups around the country have made recommendations for N95 mask reuse and the general disinfection of services using UVGI[5,6,8]. In general, since UVC light is known to damage critical DNA/RNA molecules in microorganisms, UVGI techniques may be used on materials that aren't ideal for chemical disinfection. In this case, using alcohol or bleach on a mask isn't practical or economical and has been demonstrated to affect filtration performance. Therefore, UVC light may be used since it only requires a basic power outlet to operate.

3. **Has UVGI been used in hospitals before?**
    a. UVGI is a routine application for disinfecting hospital rooms surfaces and circulating air[9,10].

4. **How does the Analytik Jena CL-3000 cross-linker replicate the recommended protocols for mask disinfection?**
    a. The current recommendation is to deliver a 1 J/cm$^2$ dose to each side of the mask[8,11]. The Analytik Jena Crosslinker CL-3000 has a dose monitor inside the unit that determines the level of UVGI energy delivered to the mask. The unit can be set up with 10 different protocols, to deliver a range of UV doses for disinfection applications. The internal monitor considers any variations in intensity due to temperature or age of the bulbs, so the exact amount of energy is delivered each and every time.

5. **How is the UVGI generated in the cross-linker? How long do the bulbs last?**
    a. The Crosslinker CL-3000 uses a proprietary design to power six 254 nm UVGI bulbs. The bulbs have a lifetime of approximately 5000 to 6000 hours each. Replacement bulbs can be ordered from Analytik Jena, and easily installed into the CL-3000.

6. **Are there other applications for the CL-3000 UV cross-linker?**

    a. Yes, there are numerous applications outside of disinfection for the CL-3000, including the elimination of amplicons during PCR sample preparation, attaching nucleic acids to surfaces such as nylon membranes in a southern blot and developing cross-linked matrices. The CL-3000 also has applications in fabricating microarrays, working with microfluidics, cross-linking RNA and protein, and finally skin cancer research. The CL-3000 can be used in any application requiring UV light.

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## References

1. Mills, D., Harnish, D. A., Lawrence, C., Sandoval-Powers, M. & Heimbuch, B. K. Ultraviolet germicidal irradiation of influenza-contaminated N95 filtering facepiece respirators. *American Journal of Infection Control* **46**, e49–e55 (2018).

2. Lindsey, B. E., Rivero, L., Calhoun, C. S., Grotewold, E. & Brkljacic, J. Standardized Method for High-throughput Sterilization of Arabidopsis Seeds. *J Vis Exp* (2017) doi:10.3791/56587.

3. Fisher, E. M. & Shaffer, R. E. A method to determine the available UV-C dose for the decontamination of filtering facepiece respirators. *Journal of Applied Microbiology* **110**, 287–295 (2011).

4. Blachere, F. M. *et al*. Assessment of influenza virus exposure and recovery from contaminated surgical masks and N95 respirators. *Journal of Virological Methods* **260**, 98–106 (2018).

5. Lowe, J. *et al*. N95 Filtering Facemask Respirator Ultraviolet Germicidal Irradiation (UVGI) Process for Decontamination and Reuse. https://www.nebraskamed.com/sites/default/files/documents/covid-19/n-95-decon-process.pdf (2020).

6. Price, A. & Chu, L. COVID-19 Evidence Service - Addressing COVI-19 Face Mask Shortages [v1.2]. https://aim.stanford.edu/covid-19-evidence-service/ (2020).

7. CDC. Coronavirus Disease 2019 (COVID-19) - Decontamination and Reuse of filtering Facepiece Respirators. *Centers for Disease Control and Prevention* https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html (2020).

8. N95Decon. N95Decon - UV-C Fact Sheet. *N95DECON - A scientific consortium for data-driven study of N95 FFR decontamination* https://www.n95decon.org/publications.

9. Ali, S., Yui, S., Muzslay, M. & Wilson, A. P. R. Comparison of two whole-room ultraviolet irradiation systems for enhanced disinfection of contaminated hospital patient rooms. *Journal of Hospital Infection* **97**, 180–184 (2017).

10. Bedell, K., Buchaklian, A. & Perlman, S. Efficacy of an automated multi-emitter whole room UV-C disinfection system against Coronaviruses MHV and MERS-CoV. *Infect Control Hosp Epidemiol* **37**, 598–599 (2016).

11. Heimbuch, B. & Harnish, D. *Research to mitigate a shortage of respiratory protection devices during public health emergencies*. (2019).

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