UV-C light kills viruses by scrambling their genetic material (DNA or RNA), which prevents them from replicating. This process, called ultraviolet germicidal irradiation (UVGI), effectively inactivates the virus and renders it harmless. [1, 2, 3]

How UVC light damages a virus

- **Penetrates the outer shell**: UV-C light, which occupies the 200–280 nanometer wavelength range, has enough energy to penetrate the virus's outer protein coating.
- **Damages the genetic material**: Once inside, the high-energy UV-C radiation is absorbed by the genetic material. This energy causes chemical bonds to form between adjacent molecules in the DNA or RNA strand, creating a defect known as a "pyrimidine dimer".
- **Inhibits replication**: The creation of these dimers distorts the viral DNA or RNA, making it unreadable to the host cell it is trying to infect. This destroys the virus's ability to replicate, ending its life cycle and neutralizing it. [3, 4, 5, 6, 7]

Factors that influence UVC effectiveness

The effectiveness of UV-C light as a disinfectant is influenced by several factors:

- **Wavelength**: UV-C light works best at specific wavelengths. The most germicidal wavelength is around 264 nm, though the 200–280 nm range is generally effective.
- **Intensity and dose**: Disinfection is a function of both the light's intensity and the duration of exposure. Higher intensity and longer exposure times deliver a higher UV dose, resulting in greater inactivation.
- **Shadows and distance**: For UV-C to be effective, it must have a direct line of sight to the virus. Any shadow or obstruction will block the light and protect the pathogen.
- **Environmental conditions**: Dust and dirt can shield viruses and reduce the effectiveness of UV-C light. [2, 4, 5, 8, 9]

AI responses may include mistakes.

[1] https://bli.uci.edu/does-uv-light-actually-disinfect-and-kill-viruses/
[2] https://insights.regencysupply.com/can-uv-light-kill-viruses-like-covid-19
[3] https://toolklean.com/blogs/news/the-role-of-uvc-in-reducing-the-spread-of-infectious-diseases
[4] https://pmc.ncbi.nlm.nih.gov/articles/PMC8238411/
[5] https://en.wikipedia.org/wiki/Ultraviolet_germicidal_irradiation
[6] https://toolklean.com/blogs/news/the-role-of-uvc-in-reducing-the-spread-of-infectious-diseases
[7] https://www.light-sources.com/blog/uv-c-disinfection-explained-how-germicidal-light-destroys-bacteria-viruses-and-fungi/
[8] https://www.healthline.com/health/does-uv-kill-coronavirus
[9] https://natdis.eu/uvc-germicidal-effect-and-inactivation/