

## Evaluating the efficiency of UVC radiation on HEPA filters to remove airborne microorganisms

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### Abstract

**Introduction:** Nowadays, HEPA filters is used in hospitals, clean rooms, microbiology hoods, ventilation of surgery rooms, and Pharmacy for removing microorganisms and reduce health hazard. The aim of this study is to increase the efficiency of HEPA filters with UVC radiation to reduce the density of airborne microorganisms.

**Material and Method:** The closed-loop chamber was made to evaluate *Staphylococcus epidermidis*, *Bacillus subtilis* bacteria and *Aspergillus Niger*, *Penicillium* fungi. The concentration of fungi and bacteria suspension Respectively was 106, 107 CFU/ml. After the suspension was prepared, it was sprayed into the closed loop chamber by nebulizer. Sampling was done with UVC radiation (1.8 mW/cm<sup>2</sup> Illuminance) and no radiation (dark) that included time periods 60, 90 and 120 minutes. Microorganisms density was determined in term of CFU/m<sup>3</sup>.

**Result:** The result showed that there was a significant difference between UVC radiation and dark section for all the microorganisms (*epidermidis*, *subtilis*, *Niger* and *Penicillium*) at each time periods (P value < 0.05). This indicates that concentration of four microorganisms were decreased at all the time periods. UVC radiation could change the essential molecular substances for cellular factor. UVC can penetrate the cell walls of microorganisms. thus nucleic acids and other cellular vital material affected and will cause the destruction or inactivation of microorganisms.

**Conclusion:** UVC radiation is effectiveness to decrease concentration of four microorganisms. because UVC radiation could remove both bacteria and fungi. While the other studies in other countries, UVA radiation is only effective in reducing bacteria. Therefore, achieved greater efficiencies of HEPA filters, using HEPA filters with UVC will have a significant effect on reducing the density of microorganisms.

**Key words:** High Efficiency Particulate Air (HEPA) Filter; UVC, *Aspergillus*, *Penicillium*, *Epidermidis*, *Subtilis*

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