

Increased Sterility Efficiency by Fenton Reaction and Increased Sterility by Increased OH Radicals upon UV Irradiation to Hydrogen Peroxide

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Fenton reaction produces OH radicals from hydrogen peroxide with the catalyst of Fe^{2+} or Cu^+ . The sterilization mechanism of hydrogen peroxide can be explained from OH radicals. If so using Fenton reaction, OH radical from hydrogen peroxide may increase and increased result of sterilization can be attained. Fe^{2+} was inoculated onto the sterilization pack and by contacting hydrogen peroxide with Fe^{2+} , Fenton reaction occurred. Production of OH radicals from hydrogen peroxide was increased and increased sterility efficiency can be confirmed from the comparison of D value to the control. The D values of hydrogen peroxide with Fe^{2+} and without Fe^{2+} were 5s and 30s, respectively, indicating OH radical formed greater by Fenton reaction. In addition, we studied the production of OH radicals from the UV exposure at 254 nm to hydrogen peroxide. The result of D values was compared with UV 254 nm exposure and without UV 254 nm exposure, the D value of the former was 1.7 s and the latter was 3.3s,

respectively, indicating UV exposure supplied increased OH radicals. Furthermore sterility efficiency of Fenton reaction and UV254nm exposure was compared. Fenton reaction was inferior to UV 254nm exposure due to the greater D value. The former was 5-10s and the latter was 1.7s. However, this comparison has a problem that primary package was absence and presence. UV exposure was absence and Fenton reaction was presence. Primary package present an obstacle to penetrate OH radicals into the interior of BI. As an conclusion, Fenton reaction was not always inferior to UV 254 nm exposure.

It was no doubt that Fenton reaction and UV 254 nm exposure was increased OH radical formation compared with control and UV-C exposure including 254 nm maybe superior to UV-B exposure on OH radical formation. This is due to shorter wavelength and shorter wavelength produced more energy by the equation of $E=h\nu$.

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