Inactivation of *Escherichia coli* and Influenza Virus on Solid Surfaces by Ultrasonic Fogging with pH-Controlled Sodium Hypochlorite Solutions

Satoshi Fukuzaki* and Hiromi Urano

Industrial Technology Center of Okayama Prefecture, 5301 Haga, Kita-ku, Okayama 701-1296, Japan

*Corresponding author's e-mail: satoshi_fukuzaki@pref.okayama.lg.jp

Abstract: The bactericidal and virucidal efficacy of ultrasonic fogging with pH-controlled sodium hypochlorite (NaOCl) solutions was studied against *Escherichia coli* and influenza virus (Flu V) on solid surfaces in a confined space. The NaOCl solutions of pH 6 and 10 containing free available chlorine (FAC) of 2 to 1,000 mg/L were fogged at a rate of 2-3 mL/min, and fine fogged droplets (avr. 4 μm) were discharged by filtrated-compressed air at a rate of 0.01-0.05 m³/min. When the NaOCl solution of pH 10 was fogged, relatively small variations in FAC concentration and pH of the droplets were observed at the contact solid surfaces compared with the NaOCl of pH 6. As a result of direct contact with the fogged droplets of NaOCl solutions, the ratio of *E. coli* survival and Flu V infectivity on the filter decreased depending on the product of the FAC concentration in the fogged droplets and the exposure time. The rate of killing *E. coli* was found to depend on the concentration of undissociated form (HOCl) at the final pH of the droplets. This suggests that HOCl is the more potent form as the bactericidal agent. On the other hand, OCl⁻ was also effective in inactivating Flu V, perhaps due to the reduction of hemagglutination activity although HOCl was twofold active than OCl⁻. These results indicate that fogging with pH-controlled NaOCl solutions is effective in disinfecting solid surfaces with attached bacteria and viruses.

Key words: Inactivation, *Escherichia coli*, influenza virus, solid surfaces, ultrasonic fogging, sodium hypochlorite solutions.