

Household Low Temperature MS2 (ATCC15597-B1) Virus Inactivation Using a Hot Bubble Column Evaporator

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Abstract : The MS2 (ATCC15597-B1) virus was used as a surrogate to estimate the inactivation rates for enteric viruses when using a hot air bubble column evaporator (HBCE) system in the treatment of household wastewater. In this study, we have combined MS2 virus surface charging properties with thermal inactivation rates, using an improved double layer plaque assay technique, in order to assess the efficiency of the HBCE process for virus removal in water. When bubbling a continuous flow of dry air, at 200°C, only heats the aqueous solution in the bubble column to about 50°C. Viruses are not inactivated by this solution temperature, as confirmed separately from water bath heating experiments. Hence, the efficiency of the HBCE process for virus removal in water appeared to be caused entirely by collisions between the hot air bubbles and the virus organisms. This new energy efficient treatment for water reuse applications can reduce the thermal energy required to only 25% (about 113.7 kJ/L) of that required for boiling (about 450 kJ/L).

Keywords : MS2 virus inactivation, water reuse, hot bubble column evaporator, water treatment

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