
Abstract:

This study investigates the properties of electrolyzed oxidizing (EO) water for the inactivation of pathogen and to evaluate the chemically modified solutions possessing properties similar to EO water in killing *Escherichia coli* O157:H7. A five-strain cocktail (10^{10} CFU/ml) of *E. coli* O157:H7 was subjected to deionized water (control), EO water with 10 mg/liter residual chlorine (J.A.W-EO water), EO water with 56 mg/liter residual chlorine (ROX-EO water), and chemically modified solutions. Inactivation (8.88 log_{10} CFU/ml reduction) of *E. coli* O157:H7 occurred within 30 s after application of EO water and chemically modified solutions containing chlorine and 1% bromine. Iron was added to EO or chemically modified solutions to reduce oxidation–reduction potential (ORP) readings and neutralizing buffer was added to neutralize chlorine. J.A.W-EO water with 100 mg/liter iron, acetic acid solution, and chemically modified solutions containing neutralizing buffer or 100 mg/liter iron were ineffective in reducing the bacteria population. ROX-EO water with 100 mg/liter iron was the only solution still effective in inactivation of *E. coli* O157:H7 and having high ORP readings regardless of residual chlorine. These results suggest that it is possible to simulate EO water by chemically modifying deionized water and ORP of the solution may be the primary factor affecting microbial inactivation.