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Ozone initiated inactivation of *Escherichia coli* and *Staphylococcus aureus* in water: Influence of selected organic solvents prevalent in wastewaters

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Ozone absorption, stability, and reactivity in water are critical distinguishing factors for efficiency in either micropollutants abatement or microbial inactivation. These are also largely, a function of the nature of the dissolved organic matter in the water matrix. In the present study, the influence of four water-soluble organic solvents commonly discharged from industrial lines into wastewater systems viz; ethanol, methanol, ethyl acetate and dimethyl sulfoxide (DMSO) on the ozone facilitated inactivation of *Escherichia coli* (ATCC 25218) and *Staphylococcus aureus* (29213) in water was explored. An ozone bubbling-time dependent absorption (up to 12min) and decomposition rate monitored spectrophotometrically in the presence of 2.5% and 5% concentrations of each organic solvent with their consequent effect on bacteria inactivation were determined. The inactivation kinetics were described by the Efficiency Factor Home model. Relatively, higher residual concentrations of absorbed ozone per unit bubbling time were obtained for the solutions of ethyl acetate and DMSO in comparison to methanol and ethanol. Ozone stability was significantly enhanced in solutions containing DMSO or ethyl acetate which was characterized by a lower pseudo- first order decomposition rate constant in DMSO (k_d=3.381x10^{-2}M^{-1}s^{-1}) and ethyl acetate (k_d=4.45 x10^{-2}M^{-1}s^{-1}) solutions and in contrast with methanol (k_d=1.13 x10^{-1}M^{-1}s^{-1}), where the rate of decomposition was rather accelerated. The faster absorption and stability of ozone in ethyl acetate and DMSO corresponded with an observed increase in the log inactivation of *E. coli* and *S. aureus* by approximately 2-folds in relation to methanol at comparable conditions. These findings are significant to the determination or prediction of the lifetime of ozone for efficient disinfection or pollutants oxidation in industrial wastewater treatment systems.

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