Influence of Ozone bubbling activity and reaction Kinetics in Ozone-Wastewater disinfection system

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Abstract

The study was carried out in a secondary wastewater effluent to investigate the effects of different sizes of ozone bubbles on the solubility of ozone, its utilization and disinfection of microorganisms in a continuous flow system. The effects of flotation agents, such as sodium lauryl sulfate and tide, on ozone utilization and disinfection were also studied. A mathematical model was developed based upon the experimental data to determine the reaction kinetics and mass transfer of ozone.

The investigation revealed that for a given gas flow rate and input of gaseous ozone, the ozone utilization decreases while the level of disinfection and solubility of ozone increases with a decrease in the size of ozone bubble. It was also found that the use of flotation agents resulted in an increase in the level of disinfection for any given ozone residual. Moreover, employing flotation agents resulted in lesser ozone utilization for any given level of disinfection.

The mathematical model developed in this study was used to predict the amount of ozone input required for a given ozone residual and COD in a ozone-wastewater system. This information about the amount of ozone needed as input to obtain a specific ozone concentration in the wastewater could prevent wastage of ozone and conserve energy.