Ozone Mass Transfer Analysis of an Injector with a Flash-Mix Reactor

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Abstract

Ozone treatment is among the most advanced treatment processes applied for water and wastewater treatment. In order to achieve higher level of treatment, ozone gas must be dissolved effectively and rapidly into the liquid phase. Therefore, advancements in the area of ozone contacting technology are needed. A joint University of Alberta/Mazzei Injector Corporation (MIC) experimental study was conducted to investigate the ozone mass transfer efficiency in the GDT™ process. In this process, a Flash-Mix Reactor following a Mazzei® injector was used for ozone dissolution. Ozone mass transfer efficiency was obtained for: the injector, the flash-mix reactor, as well as for the overall system under a wide range of operating conditions. Liquid flow rates ranged from 1.6 x 10^{-4} to 6.3 x10^{-4} m^3/s with the gas-to-liquid ratio in the range of 0.01 to 0.20. The backpressure on the system was varied from 3.5 to 18.0 psig. High ozone mass transfer efficiency was achieved in the GDT™ process. A comparison between the performance of this ozone dissolving process and other existing processes is presented. Mechanistic models were developed and tested for predicting the performance of the ozone mass transfer process in the Flash-Mix Reactor and the overall GDT™ system. There was good agreement between the experimental observations and the values of dissolved ozone concentrations predicted by the model.