Modeling the Behaviors of Adsorption and Biodegradation of Biological Activated Carbon Filters. 2007 (SCI;Impact factor=2.459)

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摘要.

Abstract

This investigation developed a non-steady-state numerical model to differentiate the adsorption and biodegradation quantities of a biological activated carbon (BAC) column. The mechanisms considered in this model are adsorption, biodegradation, convection and diffusion. Simulations were performed to evaluate the effects of the major parameters, the packing media size and the superficial velocity, on the adsorption and biodegradation performances for the removal of dissolved organic carbon based on dimensionless analysis.

The model predictions are in agreement with the experimental data by adjusting the liquid-film mass transfer coefficient (kbf), which has high correlation with the Stanton number. The Freundlich isotherm constant (NF), together with the maximum specific substrate utilization rate (kf) and the diffusion coefficient (Df), is the most sensitive variable

affecting the performance of the BAC. Decreasing the particle size results in more substrate

diffusing across the biofilm, and increases the ratio of adsorption rather than biodegradation.