



“Gheorghe Asachi” Technical University of Iasi, Romania



MODELING HEAD LOSSES IN BIOLOGICAL AERATED FILTERS INCLUDING ACTIVE BIOMASS, INERT BIOMASS AND EXTRACELLULAR POLYMERIC SUBSTANCES

Dongsu Bi¹, Chengda He^{2*}, Jun Wu²

¹*Environmental Research Institute of Shanghai Institute of Technology, 100 Haiquan Road, Fengxian district, Shanghai 200235, China*

²*Yangzhou University, School of Environmental Engineering and science, 196 West Huayang Road, Yangzhou, Jiangsu, 225000, China*

Abstract

A deep understanding of the relationship between the solids deposition and head losses is vital to optimize the backwashing in biological aerated filters (BAFs). In this article, the deposition solids were classified into four types: heterotrophic biomass, autotrophic biomass, inert biomass and extracellular polymeric substances (EPS). A concept model was developed to simulate the solid deposition and the head loss development. The temporal and spatial distributions of the four types of solids mass were modeled based on the Monod-type activated sludge model. The solid mass was converted into biofilm volume by using the concept of space occupancy parameters. The filtration resistance and head loss were then calculated based on the Kozeny–Carman equation. The model prediction was shown to be in reasonable agreement with experimental results. This suggests that the modeling approach in this paper is valid in predicting the head loss development.

Key words: backwashing, biological aerated filter, head loss, modeling, space occupancy

Received: January, 2013; Revised final: August, 2013; Accepted: August, 2013

* Author to whom all correspondence should be addressed: E-mail: hcd@yzu.edu.cn, bidongsu@126.com; Phone: +86-514-87971389; Fax: +86-514-87978626