



Experimental and Numerical Investigation of the Hydrodynamics of Microfiltration Processes Using a Multi-Scale Approach

By Steffen Bütehorn

Shaker Verlag Mai 2011, 2011. Buch. Book Condition: Neu. Neuware - Submerged membrane bioreactor (MBR) processes for treating municipal or industrial wastewater are one of the most promising applications of microfiltration membranes. Previous studies were spread over various fields of research including water science, microbiology, chemical engineering, material science and process control. All of the above research societies contributed comprehensively to a further improvement of the technology. Nevertheless, it is known that higher operational expenses compared to conventional water treatment strategies weaken the competitiveness of MBRs. More precisely, recent energy efficiency analyses identified the coarse bubble aeration of the membrane unit to consume the biggest proportion of the overall energy input. Therefore, hydrodynamic conditions in submerged microfiltration processes were investigated experimentally and numerically on three different scales in the framework of this study. The overall objective was to evaluate the impact of operating parameters, feed characteristics and module design features on the efficiency of air bubbling to control cake layer formation. On a micro-scale, local phenomena such as permeate flow, particle deposition and cake removal were non-invasively visualised with nuclear magnetic resonance (NMR) imaging. Complementary filtration experiments were conducted by applying a number of test facilities equipped

Reviews

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