Effect of aeration rate on the performance of a novel nonwoven flat plate bioreactor

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ABSTRACT

The aim of this work was to evaluate the effect of aeration rate ($U_a$) on the performance of a novel nonwoven flat plate bioreactor. Increase in $U_a$, ranging from 0.080 to 0.129 m/s, resulted in the increase of the apparent substrate consumption rate (8.38–11.86 mg/L h) and decrease in mixing time (from 13 to 7 min), thereby positively affecting the oxygen (kLa) and external ($k_c$) mass transfer. Biofilm detachment was less than 1% despite the fact that shear stress value was 1.12 Pa at the highest airflow rate. The system could treat a superficial organic loading from 13.54 up to 50 g phenol/m² d with almost 100% phenol removal.

Keywords: Biofilm detachment, flat plate bioreactor, nonwoven fibrous support

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