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ABSTRACT

EFFECTS OF EXOGENOUS ACYLATED HOMOSERINE LACTONES FOR BIOFILM FORMATION IN BIOFILTERS

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Biofilm formation are key process for the operating performance and large-scale applications of the biofilters, and quorum sensing (QS) is closely related to it. In this work, the optimal concentrations of exogenous AHLs was obtained by single factor tests and response surface analysis in sequencing batch system. The regulating effects of the optimized AHLs for biofilm formation and performance for toluene removal were investigated in two biofilters (named BF1 and BF2). The toluene removal efficiency, microbial growth, EPS production were increased significantly in BF2 after optimized acylated homoserine lactones (AHLs) was added in nutrient solution at day1 for the first time, compared to BF1 no exogenous AHLs added, indicating that optimized exogenous AHLs can promoted significantly the toluene removal efficiency and biofilm formation of biofilters at initial startup phase. The removal efficiency and microbial viability were decreased significantly in BF2 with the adding of the optimized AHLs for the second time at day 8 also showed that some negative effects may be caused by the excessively addition of the exogenous AHLs. In addition, the application potentials of the QS regulation strategies in biofilters were highlighted by the increasing of removal efficiency, CO2 production and microbial adhesive strength in steady operation phase with no addition of optimized exogenous AHLs in BF2.

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