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Comparison of in-situ sludge reduction in a sequencing batch biofilm reactor (SBBR) under different carriers: operation parameter optimizations

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ABSTRACT

Two SBBR systems, designated $_{FSC}$SBBR (floating spherical carrier) and $_{SC}$SBBR (multi-faceted polyethylene suspension carrier), were constructed for in-situ sludge reduction. The effects of the operating temperature (*T*), hydraulic retention time (HRT) and dissolved oxygen (DO) concentration on in-situ sludge reduction in the two SBBR systems were investigated, and the optimum carrier and operating parameters were determined. The results showed that an FSC carrier exhibited a better in-situ sludge reduction efficiency and contaminant removal efficiency than an SC carrier. The optimal operating parameters were a temperature of 25°C, HRT of 12 h and DO concentration of 4–5 mg/L, and the observed sludge yield was 0.21 ± 0.10 g MLSS/g COD. The analysis of biofilm samples showed that $_{FSC}$SBBR biofilms were richer in microbial species and exhibited higher diversity than $_{SC}$SBBR biofilms. Biofilm sludge hydrolysis and cytolysis promoted in-situ sludge reduction.

Keywords: In-situ sludge reduction; SBBR; Operating parameter; Biotic community

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