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A novel aerated surface flow constructed wetland using exhaust gas from biological wastewater treatment: performance and mechanisms

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Abstract

In this study, a novel aerated surface flow constructed wetland (SFCW) using exhaust gas from biological wastewater treatment was investigated. Compared with un-aerated SFCW, the introduction of exhaust gas into SFCW significantly improved $\text{NH}_4^+\text{-N}$, TN and COD removal efficiencies by $68.30 \pm 2.06\%$, $24.92 \pm 1.13\%$ and $73.92 \pm 2.36\%$, respectively. The pollutants removal mechanism was related to the microbial abundance and the highest microbial abundance was observed in the SFCW with exhaust gas because of the introduction of exhaust gas from sequencing batch reactor (SBR), and thereby optimizing nitrogen transformation processes. Moreover, SFCW would significantly mitigate the risk of exhaust gas pollution. SFCW removed $20.00 \pm 1.23\%$, $34.78 \pm 1.39\%$, and $59.50 \pm 2.33\%$ of H_2S , NH_3 and N_2O in the exhaust gas, respectively. And $31.32 \pm 2.23\%$ and $32.02 \pm 2.86\%$ of bacterial and fungal aerosols in exhaust gas were also removed through passing SFCW,

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