Efficiency of a hybrid granular bed-contact oxidation biofilm baffled reactor for treating molasses wastewater

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ABSTRACT

A hybrid granular bed-contact oxidation biofilm baffled reactor (GBCOBBR) was studied with molasses wastewater for combined carbon and nitrogen removal. The GBCOBBR was operated at various organic loading rates ranged from 1.5 to 7 kg chemical oxygen demand (COD) $m^{-3}d^{-1}$ and ammonia nitrogen loading rates ranged from 0.05 to 0.204 kg NH_4^--N $m^{-3}d^{-1}$. Carbonaceous matter and nitrogen were removed simultaneously in the GBCOBBR at different recycle to influent ratios ranged from 1.5 to 2.5. The results demonstrated that when the loading rates of COD and ammonia were 3 kg COD $m^{-3}d^{-1}$ and 0.085 kg NH_4^--N $m^{-3}d^{-1}$, COD removal efficiencies of 90.2–91.5% were observed in the anaerobic unit, and over 92% by the two-stage treatment configuration (anaerobic and aerobic units) at all recycle to influent ratios. At all the recycle to influent ratios studied, almost all ammonia was converted to nitrate nitrogen with only small traces of nitrite nitrogen in the nitrification unit and total nitrogen removal efficiencies of 80.5–82% were observed.

Keywords: Anaerobic baffled reactor; Combination filler; Granular bed; Contact oxidation biofilm; Molasses wastewater; Nitrogen removal

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