

Performance and microbial diversity of an upflow anaerobic sludge blanket reactor in fluorescent whitening agent wastewater treatment

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ABSTRACT

Reducing the treatment cost of fluorescent whitening agent wastewater (FWW) is a challenge. In this study, an upflow anaerobic sludge blanket (UASB) reactor was used in the pretreatment process of FWW. The treatment performance was analyzed, and 16S rRNA analysis was employed to characterize the changes in microbial populations in the anaerobic sludge. The results show that an average chemical oxygen demand (COD) removal rate of 76.2% was achieved with an organic loading rate of 2.8–3.3 kg COD/m³/d, and the average removal rate of aniline was 30%. Using an UASB reactor for pretreatment can reduce operation costs because fewer chemical reagents are required. At the end of the experimental period, the bacterial diversity and dominant bacterial strains differed markedly. The dominant bacteria in the sludge were *Chlorobium* sp. (21.8%), *Desulfomicrobium* sp. (40.4%), and *Halothiobacillaceae* bacterium (26.6%). *Chlorobium* sp. might have been involved in the degradation of aniline in this study. Finally, this method was applied to a full-scale industrial plant, replacing the existing physicochemical treatment, which reduced the chemical usage by 40%–50% and operation costs by 20%–30%. These results indicate that the biological treatment using cultured bacteria is an effective and low-cost method that can be used to treat FWW.

Keywords: Anaerobic; Aniline; Pretreatment; Running cost

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