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Effect of dissolved oxygen on nitrogen removal and the microbial community of the completely autotrophic nitrogen removal over nitrite process in a submerged aerated biological filter

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Abstract

Dissolved oxygen (DO) is a crucial parameter of the completely autotrophic nitrogen removal over nitrite (CANON) process. This study determined the nitrogen removal performance and microbial community of the CANON process in a laboratory-scale submerged aerated biological filter (SABF) over a DO concentration range from 0 to 1.2 mg·L⁻¹. The results showed that the optimum DO (0.2-0.3 mg·L⁻¹) corresponded to an average ammonium nitrogen removal efficiency of 93.4% and a total nitrogen removal efficiency of 81.0%. A 16S rRNA gene high-throughput sequencing technology confirmed that the phyla Proteobacteria and Nitrospirae enriched, whereas the phylum Planctomycetes was inhibited with increasing DO concentration. At the genus level, the increase of DO concentration resulted in the enrichment of genera *Dok59* and *Nitrospira*, but restrained the genus *Candidatus Brocadia*. This research can be used to improve the nitrogen removal ability of the CANON process in an SABF in the future.

Key word: Completely autotrophic nitrogen removal over nitrite; Submerged aerated biological filter; Nitrogen removal; Microbial community; Dissolved oxygen.

1. Introduction

Completely autotrophic nitrogen removal over nitrite (CANON) is a novel

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