Fast start-up of the CANON process with a SABF and the effects of pH and temperature on nitrogen removal and microbial activity

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Fast start-up of the CANON process with a SABF and the effects of pH and temperature on nitrogen removal and microbial activity

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Abstract

The long start-up time of the completely autotrophic nitrogen removal over nitrite (CANON) process is one of the main disadvantages of this system. In this paper, the CANON process with a submerged aerated biological filter (SABF) was rapidly started up within 26 days. It gave an average ammonium nitrogen removal rate (ANR) and a total nitrogen removal rate (TNR) of 94.2% and 81.3%, respectively. The phyla Proteobacteria and Planctomycetes were confirmed as the ammonia oxidizing bacteria (AOB) and anaerobic ammonium oxidation bacteria (AnAOB). The genus *Candidatus Brocadia* was the major contributor of nitrogen removal. pH and temperature affect the performance of the CANON process. This experimental results showed that the optimum pH and temperature were 8.0 and 30 °C, respectively, which gave the highest average ANR and TNR values of 94.6% and 85.1%, respectively. This research could promote the nitrogen removal ability of CANON process in the future.

Key words: CANON; SABF; nitrogen removal; microbial activity; pH; temperature.

1. Introduction

The completely autotrophic nitrogen removal over nitrite (CANON) process is developed in recent years as one of the most efficient and economical technologies for removing ammonium from wastewater without the consumption of organic carbon

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