

研 究 主 論 文 抄 録

論文題目 APPLICATION OF COMBINED PARTIAL NITRITATION AND ANAMMOX
PROCESS TO THE TREATMENT OF LIVESTOCK MANURE DIGESTER LIQUOR
(部分亜硝酸化とアナモックスの組合せ法の畜産糞尿脱離液処理への適用)

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主論文要旨
《本文》

Recently, partial nitrification (PN)-anammox process has attracted much attention as an alternative nitrogen removal process. In this study, combined PN and anammox process was applied to the treatment of livestock manure digester liquor. PN was achieved under the nitrogen loading rate (NLR) of 1.9 kg-N/m³/day with operational temperature between 15 °C and 30 °C. However, the nitrite production rate (NPR) was deteriorated under temperature below 15 °C. In addition, PN was maintained stably under the NLR of 1.0 kg-N/m³/day for 120 days without acclimatization of nitrite oxidizing bacteria to the inhibitory compounds (free ammonia and free nitric acid). The conversion efficiencies of NH₄-N to NO₂-N and to NO₃-N were determined to be around 58 % and < 5 %, respectively. The anammox reactor using non-woven as biomass carrier was maintained at the NLR of 0.4 kg-N/m³/day with the nitrogen removal rate (NRR) of 0.2 kg-N/m³/day. On the other hand, the anammox reactor using granular anammox sludge was successfully applied and the NRR of 2.5 kg-N/m³/day was obtained. The anammox reaction ratio of NH₄-N: NO₂-N: NO₃-N was determined to 1:1.25:0.28, which closely corresponds with reported anammox reaction equation. Effluent from coagulant pretreatment using polyacrylamide was used the influent of PN treatment. Effluent from PN reactor was then subjected to UASB type anammox reactor. PN was maintained for 32 days under 1.6 kg-N/m³/d of NLR with an average conversion efficiency of 51 %, and maximum NPR of 1.7 kg-N/m³/d was obtained under NLR of 2.6 kg-N/m³/d. 16S rRNA analysis of PN sludge showed that 15% of total clones were identified as belonging to *Nitrosomonas* and were dominant in the PN reactor. The NRR of 2.0 kg-N/m³/d was achieved under a NLR of 2.2 kg-N/m³/d for anammox treatment. 16S rRNA analysis of anammox sludge showed that 59 % of total clones were identified as belonging to KSU-1 (anammox bacteria), which were dominant in the anammox reactor. The results of this study showed that combined PN and anammox process has a big possibility of

application for the ammonium removal of livestock manure digester liquor.