

能源和环境工程

ANAMMOX与反硝化协同脱氮反应器启动及有机负荷对其运行性能的影响

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摘要

控制已稳定运行的UASB-ANAMMOX反应器进水TN容积负荷为 $0.26 \text{ kg} \cdot \text{m}^{-3} \cdot \text{d}^{-1}$, 通过连续添加有机物(葡萄糖), 在进水有机负荷与TN负荷比值为1的情况下, 仅用35 d就成功启动了ANAMMOX与反硝化协同脱氮反应器, 稳定阶段反应器对氨氮、亚硝氮、TN和COD的去除率分别高达95.3%、99.1%、94.0%和93.2%, 三氮比即去除的氨氮:去除的亚硝氮:生成的硝氮为1:1.34:0.03。研究了有机负荷冲击对ANAMMOX与反硝化协同脱氮反应器运行性能的影响。结果表明, 进水有机负荷的突降对反应器的运行性能影响不大;有机负荷的突增会显著影响反应器脱除氨氮的能力, 经驯化后仍能实现协同脱氮作用, 但会恶化反应器的出水水质, 大幅降低进水有机负荷可显著改善出水水质。协同脱氮反应器对有机负荷冲击有较强的抵抗力。

关键词

[厌氧氨氧化](#) [反硝化](#) [协同脱氮](#) [有机负荷](#) [运行性能](#)

分类号

Start-up of ANAMMOX-denitrification reactor and effect of organic loading on its performance of synergistic interaction

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Abstract

Continuous addition of organic matter (glucose), at an organic loading to total nitrogen (TN) ratio of 1, was conducted after the UASB-ANAMMOX reactor had reached the stable operation phase. The ANAMMOX-denitrification reactor was successfully started within 35 d under the condition of influent nitrogen loading stably at $0.26 \text{ kg} \cdot \text{m}^{-3} \cdot \text{d}^{-1}$. The removal efficiencies of ammonia, nitrite, TN and COD were up to 95.3%, 99.1%, 94.0% and 93.2%, respectively. The average ratio of removed ammonia, removed nitrite and generated nitrate was 1:1.34:0.03 at the stable phase. The effect of organic loading shock on the ANAMMOX-denitrification reactor was also investigated. The results demonstrated that the sharp decrease in organic loading had little effect on the reactor, while the sharp increase in organic loading posed notable influence on the reactor. Stable nitrogen removal was achieved after acclimatization, although the effluent quality deteriorated. The effluent quality could be improved by substantially reducing the influent organic loading. The ANAMMOX-denitrification reactor had strong organic loading-resistance.

Key words

[anaerobic ammonium oxidation](#) [denitrification](#) [synergistic interaction](#) [organic loading](#) [performance](#)

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