

能源和环境工程

## 曝气量对不同填料CANON反应器运行效率的影响

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**摘要** 为避免曝气对Anammox菌产生破坏,造成TN去除效果的降低,以海绵块与改性聚乙烯为填料两个反应器进行了曝气量对CANON工艺的影响试验。试验结果表明:CANON工艺的运行效果与曝气量密切相关,曝气的混合作用大大提高了CANON工艺的去氮能力。对于海绵块反应器而言,填料的结构保护了Anammox菌免受溶解氧的破坏,保证了CANON工艺的稳定运行;使污泥容易持留在海绵块内部,避免了污泥的流失;限制了基质的传质效果,导致曝气量较大。在曝气量为 $35.8 \text{ m}^3 \cdot \text{m}^{-3} \cdot \text{h}^{-1}$ 时, TN去除率达到79.48%, TN去除负荷为 $2.32 \text{ kg} \cdot \text{m}^{-3} \cdot \text{d}^{-1}$ 。对改性聚乙烯反应器而言,改性聚乙烯填料不能持留大量污泥,且过量曝气容易破坏CANON工艺的运行,但基质传质能力强,所需曝气量较小。当曝气量为 $6.3 \text{ m}^3 \cdot \text{m}^{-3} \cdot \text{h}^{-1}$ 时, TN去除率达到77.6%, TN去除负荷达到 $1.01 \text{ kg} \cdot \text{m}^{-3} \cdot \text{d}^{-1}$ 。但当曝气量达到 $7.0 \text{ m}^3 \cdot \text{m}^{-3} \cdot \text{h}^{-1}$ 时,会因溶解氧抑制Anammox菌活性而使TN去除能力恶化。

**关键词**

[CANON工艺](#) [曝气量](#) [厌氧氨氧化](#) [海绵块](#) [改性聚乙烯](#)

分类号

## Effect of aeration rate on CANON reactors with different carriers

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### Abstract

The effect of aeration rate on the efficiency of CANON (completely autotrophic nitrogen-removal over nitrite) process was studied to improve total nitrogen removal of ammonium-rich wastewater. With simulated wastewater as influent, two kinds of CANON reactors, which used sponge and modified polyethylene as carriers respectively, were studied in tests. The results showed that total nitrogen removal efficiency and removal load were closely related to aeration rate, the increase of aeration rate would improve total nitrogen removal of CANON reactor when aeration rate was less than the limiting aeration rate. For the CANON reactor which used sponge as carrier, when aeration rate was  $35.8 \text{ m}^3 \cdot \text{m}^{-3} \cdot \text{h}^{-1}$ , the total nitrogen removal efficiency reached the maximum value of 79.48%, and total nitrogen removal load was  $2.32 \text{ kg} \cdot \text{m}^{-3} \cdot \text{d}^{-1}$ . When aeration rate was more than the limiting aeration rate, the effect on total nitrogen removal remained stable, because the structure of sponge protected the Anammox bacteria from inhibition by dissolved oxygen. With sponge as carrier, more biomass could be retained in the CANON reactor, especially for Anammox bacteria, which guaranteed the stable operation of the CANON reactor. For the CANON reactor which used modified polyethylene as carrier, when aeration rate was  $6.3 \text{ m}^3 \cdot \text{m}^{-3} \cdot \text{h}^{-1}$ , the total nitrogen removal efficiency reached the maximum value of 77.6%, and total nitrogen removal load was  $1.01 \text{ kg} \cdot \text{m}^{-3} \cdot \text{d}^{-1}$ . When aeration rate was more than the limiting aeration rate, the effect on total nitrogen removal deteriorated because Anammox bacteria were inhibited by dissolved oxygen. Less biomass could be retained, so the reactor was less stable.

### Key words

[CANON process](#) [aeration rate](#) [Anammox](#) [sponge](#) [modified polyethylene](#)

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