

曝停比对两级SBBR处理猪场废水厌氧消化液的影响

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Effect of Aeration/Non-Aeration Ratio on Anaerobically Digested Pig Farm Wastewater Treated in Two-stage Sequencing Batch Biofilm Reactor

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摘要

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摘要 采用两级串联序批式生物膜法(SBBR)处理猪场废水厌氧消化液,设置运行模式a、b和c,其曝停比分别为1.5 h:0.5 h(1级反应器)—2 h:1 h(2级反应器)、1 h:1 h—1.5 h:0.5 h和1 h:1 h—2 h:1 h,总曝气时间分别为9.5、9.5和8.0 h,考察不同模式对废水处理效果和同步硝化反硝化等氮素转化情况的影响。结果表明,在温度为24~27℃、曝气阶段 $p(\text{DO})$ 控制在2.5~3.0 mg·L⁻¹、进水 $p(\text{COD})$ 和 $p(\text{NH}_3\text{-N})$ 分别为700~800和90~100 mg·L⁻¹条件下,各反应器均具有一定的脱氮能力,其中模式a效果最好,TN和NH₃-N去除率分别为58.5%和68.2%。说明在两级串联SBBR反应器中,高曝停比—低曝停比的串联方式更有利于猪场废水厌氧消化液污染物的去除。通过调节每级曝气时间可将反应控制在同步硝化反硝化阶段,适当延长1级反应的曝气时间以及在2级反应初期设置1 h厌氧阶段可明显提高废水处理效果。

关键词: 两级串联序批式生物膜法(SBBR) 厌氧消化液 曝停比 同步硝化反硝化

Abstract: Two-stage Sequencing Batch Biofilm Reactors were used to process anaerobically digested pig farm wastewater. The installation was designed to have 3 operation modes, a, b and c, that is, in Mode a, the aeration/non-aeration ratio 1.5 h:0.5 h for the first stage reactor and 2 h:1 h for the second stage reactor, and the total aeration time 9.5 h; in Model b, 1 h:1 h and 1.5 h:0.5 h, and 9.5 h, and in Model c, 1 h:1 h and 2 h:1 h, and 8.0 h, to investigate effect of aeration/non-aeration ratio on treatment of wastewater and simultaneous nitrification and denitrification of nitrogen. Results show that when the operation had the temperature controlled in the range of 24-27℃, $p(\text{DO})$ at 2.5-3.0 mg·L⁻¹ during the aeration period, $p(\text{COD})$ and $p(\text{NH}_3\text{-N})$ at 700-800 mg·L⁻¹ and 90-100 mg·L⁻¹, respectively in the influent, Model a was the highest in efficiency with TN and NH₃-N removal rate being 58.5% and 68.2%, respectively, indicating that the combination of high aeration/non-aeration ratio with low aeration/non-aeration is more conducive to removal of pollutants in anaerobically digesting pig farm wastewater.

Keywords: two-stage SBBR digested piggy wastewater aeration/non-aeration ratio synchronous nitrification and denitrification

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