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移动床生物膜反应器净化模拟水产养殖废水的研究 

Aquaculture wastewater treatment using a moving bed biofilm reactor (MBBR)

关键词: [移动床生物膜反应器](#) [水产养殖废水](#) [氨氮](#) [同步硝化反硝化](#)

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摘要: 采用移动床生物膜反应器(MBBR)净化模拟水产养殖废水.结果表明, MBBR净化模拟水产养殖废水效果良好.在水力停留时间(HRT)为8 h, DO为2.0~3.0 mg·L⁻¹的条件下, 反应器启动迅速、运行稳定, 能使COD和氨氮去除率均达到80%以上, TP去除率达到50%左右; 有机负荷为(0.76±0.03) kg·m⁻³·d⁻¹时, TN及氨氮去除效果最好, 去除率分别达到71.73%及98.42%.为达到良好的TN去除效果, 有机负荷不宜低于0.5 kg·m⁻³·d⁻¹; DO为(3.00±0.25) mg·L⁻¹时, TN去除效果最好, 最有利于同步硝化反硝化; 为保持较高的氨氮去除效率, 并减少亚硝态氮积累, DO浓度不应低于2.0 mg·L⁻¹; HRT过短会使氨氮去除效率降低, 且可能出现亚硝态氮积累; 采用序批式进水运行方式, 对TP的去除效果优于连续进水方式, 但运行周期后半段会出现亚硝态氮积累, 对鱼类产生危害.

Abstract: This paper used a moving bed biofilm reactor (MBBR) to test and analyze aquaculture wastewater treatment. Results indicated that reactor started-up quickly and operated stably in the process of simulated wastewater treatment using MBBR. The removal efficiency for both chemical oxygen demand (COD) and ammonia nitrogen was over 80%, and it reached 50% for total phosphorous (TP), when hydraulic retention time (HRT) was 8 h and DO remained 2.0~3.0 mg·L⁻¹. Under the condition of organic loading at (0.76±0.03) kg·m⁻³·d⁻¹, the average removal efficiency of total nitrogen (TN) and ammonia was 71.73% and 98.42%, respectively, representing the best removal results among all operation periods. To achieve better TN removal rate, organic loading should keep no lower than 0.5 kg·m⁻³·d⁻¹. TN removal efficiency reached the maximum when dissolved oxygen (DO) was at (3.00±0.25) mg·L⁻¹, which was the most suitable to both nitrification and denitrification reactions. To maintain the high removal efficiency of ammonia nitrogen and reduce the nitrite accumulation, DO should keep no less than 2.0 mg·L⁻¹ in the reactor. Shorter HRT decreased the ammonia removal efficiency and could cause nitrite accumulation. When MBBR was operated in sequencing mode, the removal efficiency of TP was better than that in continuous operation mode. However, nitrite content increased and accumulated at the end of the operation cycle and would be harmful to fish culture.

Key words: [moving bed biofilm reactor](#) [aquaculture wastewater](#) [ammonia nitrogen](#) [nitrification and denitrification](#)

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