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APPLICATION OF ALCALIGENES FAECALIS NO. 4 FOR TREATMENT OF HIGH-STRENGTH AMMONIUM WASTEWATER

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Abstract

Biological ammonium removal from wastewater requires coupling of nitrification and denitrification processes in respective aerobic and anaerobic conditions. This difference in environmental requirements pose a big challenge in the design of systems intended to effect both nitrification and denitrification processes. Alcaligenes faecalis strain No. 4, however, has both heterotrophic nitrification and aerobic denitrification abilities in aerobic conditions, eliminating the need to provide anaerobic conditions for denitrification. Batch and continuous experiments in a mixed culture of A. faecalis No. 4 and activated sludge were performed to examine ammonium removal and microbial stability of No. 4 in aerobic reactors. At an inflow ammonium load of 500 mg L-1 d-1 in continuous experiment, the ammonium removal rate (21 mg L-1 h-1), under No. 4, was approximately 2 times higher than that of the control (without No. 4), and the denitrification ratio was approximately 66%. The proportion of intracellular nitrogen converted from removed ammonium in the continuous mixed culture was reduced, compared to control batch and continuous cultures. These results demonstrated stable growth as well as the heterotrophic nitrification-aerobic denitrification abilities of No. 4 in activated sludge systems.

Key words: activated sludge, aerobic denitrification, ammonia removal, heterotrophic nitrification, nitrogen balance

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