

Halophilic denitrifying bacteria for high-rate denitrification of saline industrial wastewater

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Summary

A denitrification system for saline wastewater utilizing halophilic denitrifying bacteria has not been developed so far. In this study, denitrification performance and microbial community under various saline conditions were investigated using denitrifying sludge acclimated under low-salinity condition for a few years as seed sludge. A continuous denitrification experiment showed that denitrification performance at 10 % salinity was higher than that at 1 % salinity. The microbial community in the denitrification system of saline wastewater was monitored by terminal-restriction fragment length polymorphisms (T-RFLP) analysis during acclimation to high-salinity condition. T-RFLP profiles and clone analysis based on 16S rRNA encoding gene in the sludge of the denitrification system with 10 % salinity indicated that *γ-Proteobacteria*, particularly *Halomonas* spp., were predominant species, suggesting that these bacterial members showed a high denitrification activity under high-salinity condition. Furthermore, the investigation of denitrification performance under various saline conditions revealed that 4-10 % salinity result in the highest denitrification rate, indicating that this salinity was optimal for predominant bacterial species to exhibit denitrification ability. These results indicate the possibility that an appropriate denitrification system for saline wastewater can be designed using acclimated sludge with a halophilic community.