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Pyrite-based autotrophic denitrification for remediation of nitrate contaminated groundwater

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Abstract

In this study, pyrite-based denitrification using untreated pyrite (UP) and acid-pretreated pyrite (AP) was evaluated as an alternative to elemental sulfur based denitrification. Pyrite-based denitrification resulted in a favorable nitrate removal rate constant (0.95 d^{-1})), sulfate production of 388.00 mg/L, and a stable pH. The pretreatment of pyrite with acid led to a further increase in the nitrate removal rate constant (1.03 d^{-1}) and reduction in initial sulfate concentration (224.25±7.50 mg/L). By analyzing the microbial community structure using Denaturing Gradient Gel Electrophoresis, it was confirmed that *Sulfurimonas denitrificans* (*S. denitrificans*) could utilize pyrite as an electron donor. A stable pH was observed over the entire

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