Application of catalytic iron for microbial nitrate removal from wastewater

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ABSTRACT

The present study investigated the application of catalytic iron as electron donor for nitrogen removal from effluent of a wastewater treatment plant by biological denitrification in anoxic sequencing batch reactor (AnSBR).When iron is immersed in water, it produces hydrogen gas through the reduction of protons, which can be utilized by denitrifying populations. The results showed that the TN removal efficiency was around 30% in the AnSBR with catalytic iron (AnSBR-Fu-Cu), while it was only 12% in the control reactor (AnSBR-C). Heterotrophic denitrification and autotrophic denitrification were the main nitrogen removal pathways in AnSBR-Fe-Cu. Higher effluent COD was observed in AnSBR-Fe-Cu compared to AnSBR-C, which was consistent with the GC-MS analysis. GC-MS analysis also showed that not all the organic species were degraded. Furthermore, 3D-EEM and UHPLC-QTOF were used to characterize the organics in the wastewater, which showed that the addition of catalytic iron affected the degradation of organics during the biological denitrification process.

Keywords: Nitrate removal; Catalytic iron; Biological denitrification

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