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Strengthening the reactivity of Fe^0/(Fe/Cu) by premagnetization: implications for nitrate reduction rate and selectivity

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Abstract: In order to develop a better Fe^0 based system, premagnetization was used to enhance the reactivity of Fe^0 particles and Fe/Cu bimetallic particles micro-electrolysis (Fe^0/(Fe/Cu)) system for nitrate wastewater treatment. In this study, the significant parameters (i.e., initial pH, premagnetization time and intensity of magnetic field) were optimized firstly. Under the optimal conditions, the premagnetization Fe^0/(Fe/Cu) system could obtain a high rate (k_{obs}=0.732 min^{-1}) and better selectivity ([TN removal]/[NO_3^--N removal] ratio=54.3%) for nitrate reduction, which were much superior to the 7 control experiments (i.e., Fe^0/(Fe/Cu) system, premagnetization Fe^0 particles and Cu^0 particles micro-electrolysis (premagnetization Fe^0/Cu^0) system, Fe^0/Cu^0 system, premagnetization Fe^0 system, Fe^0 system, premagnetization Fe/Cu system and Fe/Cu system). Meanwhile, it was confirmed that the prepared Fe^0/(Fe/Cu) could keep the high reactivity even after vacuum drying and longtime storage. Furthermore, the operational life of premagnetization Fe^0/(Fe/Cu) system is better than that of Fe^0/(Fe/Cu) system (for more than 12.6 L wastewater

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