Effect of phosphate rock on denitrification in a nitrate-polluted groundwater remediation system

Jianmei Zhang\textsuperscript{a}, Chunbo Hao\textsuperscript{b}, Chuanping Feng\textsuperscript{b,*}, Huiling Hao\textsuperscript{b}, Baogang Zhang\textsuperscript{b}, Zhongfang Lei\textsuperscript{c}

\textsuperscript{a}School of Earth Environment and Water Resources, Yangtze University, Wuhan 430100, China
\textsuperscript{b}Key Laboratory of Groundwater Circulation and Evolution, China University of Geosciences, Ministry of Education, Beijing 100083, China
\textsuperscript{c}Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba 3058572, Japan

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ABSTRACT

This study was conducted to evaluate the performance of phosphate rock for the promotion of denitrification in groundwater remediation. The results showed that phosphate rock can release phosphorus in the leaching experiment and thus has potential to provide phosphorus for denitrifying bacteria growth. In column experiments, the nitrate removal efficiency of columns containing 1,500 and 750 g of phosphate rock was over 97\% at 20 ± 2\°C, and the nitrite concentrations were lower than 0.5 mg NO\textsubscript{2}-N/L. However, the nitrate removal efficiency in columns containing 500 and 0 g of phosphate rock was lower than 90\%, and nitrite accumulation was observed. Additionally, the nitrate concentration in effluent increased evidently when the influent flow rate was increased from 2.6 to 3.6 mL/min. Nevertheless, nitrate removal efficiency of columns containing 1,500 and 750 g of phosphate rock was higher than that of columns containing 500 and 0 g of phosphate rock. These findings indicated that phosphate rock was applicable as a phosphorus source for nitrate-polluted groundwater remediation.

Keywords: Groundwater; Nitrate; Biological denitrification; Phosphate rock

*Corresponding author.