

An interesting method to remove nitrate from pumped groundwater with rice wine as the carbon source

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As a common pollutant in groundwater, nitrate poses a significant threat to drinking water safety, especially in rural areas. A feasible solution to this problem must be established. In this study, a simple sand bucket was designed to investigate the capability of denitrification with liquor as the carbon source to remove nitrate from pumped groundwater, and to understand the feasibility of the pump-and-treat method. Results showed that addition of a proper amount of liquor enhanced the growth and metabolism of denitrifying bacteria, efficiently reduced the nitrate content in pumped groundwater, and restricted the accumulation of intermediate products. The removal rate of nitrate exceeded 99% when the carbon-to-nitrogen (C/N) ratio was higher than 0.8. The accumulated concentration of nitrite as an intermediate was less than 1.0 mg/L when the C/N ratio was higher than 1.5. However, acetate accumulation was significant. Considering the accumulation of intermediates, the appropriate range of the C/N ratio should be 1.5–1.8. In addition, onset and maintenance of denitrification were not significantly influenced by dissolved oxygen (DO) and pH. The pump-and-treat method can provide a convenient and practical channel for household or collective removal of nitrate from pumped groundwater in rural areas, because liquor as a household drink is frequently accessible and inexpensive in many areas.

Key words: Nitrate removal, liquor, pump-and-treat, denitrification, groundwater.

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