



Key influencing factors of nitrate removal from pumped groundwater by using liquor as the carbon source

Y. Jiang, Y. Xia, Q. Tong, Y. Chen*

College of Environmental Science and Engineering, Guilin University of Technology, Jiangan Road 12#, Guilin, China, emails: cyd0056@vip.sina.com (Y. Chen), 2648616097@qq.com (Y. Jiang), Xiayuan82@gmail.com (Y. Xia), 416807579@qq.com (Q. Tong)

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ABSTRACT

In vast agricultural areas, nitrate-contaminated groundwater poses a threat to the drinking water security of residents. This research aims to develop a convenient approach to remove nitrate from pumped groundwater. A batch experiment was conducted to study the influencing factors including the dissolved oxygen (DO) content, carbon–nitrogen (C/N) mass ratio, water temperature, and water–sand (W/S) volume ratio under anaerobic and aerobic conditions. Liquor was innovatively used as the carbon source to enhance denitrification. The results demonstrated that liquor is a very useful carbon source for nitrate removal without the artificial cultivation of bacteria. The aerobic conditions not only left the nitrate removal efficiency unaffected but also restrained the generation of nitrite and ammonia nitrogen. The C/N ratio required for complete nitrate removal under aerobic conditions is 1.8–2.0, and a water temperature of 15°C–25°C was suitable for promoting the removal effects. The W/S volume ratio was recommended to be lower than 4:1 to provide suitable adhesion conditions for bacteria. The C/N ratio, water temperature and W/S ratio were the key influencing factors, which could be easily adjusted. This research shows that rural residents can remove nitrate from pumped groundwater by using liquor.

Keywords: Nitrate removal; Carbon source; Pump-and-treat; Influencing factor; Groundwater

* Corresponding author.