

Accepted Manuscript

Pyrite-based autotrophic denitrification for remediation of nitrate contaminated groundwater

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PII: S0960-8524(14)01351-0
DOI: <http://dx.doi.org/10.1016/j.biortech.2014.09.092>
Reference: BITE 13982

To appear in: *Bioresource Technology*

Received Date: 7 August 2014
Revised Date: 12 September 2014
Accepted Date: 17 September 2014

Please cite this article as: Pu, J., Feng, C., Liu, Y., Li, R., Kong, Z., Chen, N., Tong, S., Hao, C., Liu, Y., Pyrite-based autotrophic denitrification for remediation of nitrate contaminated groundwater, *Bioresource Technology* (2014), doi: <http://dx.doi.org/10.1016/j.biortech.2014.09.092>

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30 12 **Abstract**

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32 13 In this study, pyrite-based denitrification using untreated pyrite (UP) and
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34 14 acid-pretreated pyrite (AP) was evaluated as an alternative to elemental sulfur based
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36 15 denitrification. Pyrite-based denitrification resulted in a favorable nitrate removal rate
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38 16 constant (0.95 d⁻¹), sulfate production of 388.00 mg/L, and a stable pH. The
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40 17 pretreatment of pyrite with acid led to a further increase in the nitrate removal rate
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42 18 constant (1.03 d⁻¹) and reduction in initial sulfate concentration (224.25±7.50 mg/L).
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44 19 By analyzing the microbial community structure using Denaturing Gradient Gel
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46 20 Electrophoresis, it was confirmed that *Sulfurimonas denitrificans* (*S. denitrificans*)
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48 21 could utilize pyrite as an electron donor. A stable pH was observed over the entire
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