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## Influence of Carbon Source on Biological Nitrogen Removal by Immobilised Bacteria

PDF (Size: 1049KB) PP. 527-531 DOI: 10.4236/jwarp.2010.26059

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### ABSTRACT

Acetate, ethanol, and hydrolysed rice were used as external carbon sources in an ammonium removal process employing immobilised bacteria. The influence of the carbon source on the occurrence of free cells and total nitrogen removal efficiency was examined at C/N ratios of 1.5 (low), 2.5 (medium), and 3.5 (high). At the low C/N ratio, no free cells were found in the reactors and the use of acetate as the carbon source resulted in the highest total nitrogen removal efficiency, followed by ethanol and hydrolysed rice. The occurrence of free cells in reactors fed with acetate and ethanol led to a negligible increase in the total nitrogen removal efficiency with increasing C/N ratio. The results suggest that acetate is the most appropriate carbon source for nitrogen removal and that the number of free cells should be minimized to achieve the highest efficiency during long-term operation.

### KEYWORDS

Nitrogen Removal, Nitrification and Denitrification, Carbon Sources

### Cite this paper

W. Khanitchaidecha, T. Sumino and F. Kazama, "Influence of Carbon Source on Biological Nitrogen Removal by Immobilised Bacteria," *Journal of Water Resource and Protection*, Vol. 2 No. 6, 2010, pp. 527-531. doi: 10.4236/jwarp.2010.26059.

### References

- [1] Y. Mokhayeri, R. Riffat, I. Takacs, P. Dold, C. Bott, J. Hinojosa, W. Bailey and S. Murthy, "Characterizing Denitrification Kinetics at Cold Temperature Using Various Carbon Sources in Lab-Scale Sequencing Batch Reactors," *Water Science and Technology*, Vol. 58, No. 1, January 2008, pp. 233-238.
- [2] T. Osaka, K. Shirotani, S. Yoshie and S. Tsuneda, "Effects of Carbon Source on Denitrification Efficiency and Microbial Community Structure in A Saline Wastewater Treatment Process," *Water Research*, Vol. 42, No. 2, June 2008, pp. 3709-3718.
- [3] Y. Otani, K. Hasegawa and K. Hanaki, "Comparison of Aerobic Denitrifying Activity among Three Cultural Species with Various Carbon Source," *Water Science and Technology*, Vol. 50, No. 8, April 2004, pp. 15-22.
- [4] M. P. Ginige, J. C. Bowyer, L. Foley, J. Keller and Z. Yuan, "A Comparative Study of Methanol as a Supplementary Carbon Source for Enhancing Denitrification in Primary and Secondary Anoxic Zones," *Biodegradation*, Vol. 20, No. 2, September 2009, pp. 221-234.
- [5] J. C. Akuna, C. Bizeau and R. Moletta, "Nitrate and Nitrite Reductions with Anaerobic Sludge Using Various Carbon Sources: Glucose, Glycerol, Acetic Acid, Lactic Acid and Methanol," *Water Research*, Vol. 27, No. 2, April 1993, pp. 1303-1312.
- [6] Z. Quan, Y. Jin, C. Yin, J. J. Lee and S. Lee, "Hydrolyzed Molasses as an External Carbon Source in Biological Nitrogen Removal," *Bioresource Technology*, Vol. 96, No. 15, February 2005, pp. 1690-1695.

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- [7] Z. Xu, L. Shao, H. Yin, H. Chu and Y. Yao, " Biological Denitrification Using Corncoobs as a Carbon Source and Biofilm Carrier," *Water Environment Research*, Vol. 81, No. 3, March 2009, pp. 242-247.
- [8] V. Aravinthan, T. Mino, S. Takizawa, H. Satoh and T. Matsuo, " Sludge Hydrolysate as a Carbon Source for Denitrification," *Water Science and Technology*, Vol. 43, No. 1, January 2001, pp. 191-199.
- [9] H. Constantin and M. Fick, " Influence of C-Sources on the Denitrification Rate of a High-Nitrate Concentrated Industrial Wastewater," *Water Research*, Vol. 31, No. 3, February 1997, pp. 583-589.
- [10] A. Mohseni-Bandpi and D. J. Elliott, " Groundwater Denitrification with Alternative Carbon Sources," *Water Science and Technology*, Vol. 38, No. 6, March 1998, pp. 237-243.
- [11] K. Heylen, B. Vanparys, L. Wittebolle, W. Verstraete, N. Boon and P. de Vos, " Cultivation of Denitrifying Bacteria: Optimization of Isolation Conditions and Diversity Study," *Applied and Environmental Microbiology*, Vol. 72, No. 4, April 2006, pp. 2637-2643.
- [12] American Public Health Association, " Standard Methods for the Examination of Water and Wastewater," 19th Edition, APHA, AWWA, WEF, Am Public Health Assoc Byrd Progress, Springfield, New York, 1995.
- [13] B. Jun, K. Miyayaga, Y. Tanji and H. Unno. " Removal of Nitrogenous and Carbonaceous Substrates by a Porous Carrier - Membrane Hybrid Process for Wastewater Treatment," *Biochemical*