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Characteristics of N_2O release from fluidized media type BNR processes and identification of N_2O sources

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ABSTRACT

The effects of C/N ratios and fluidized media on N_2O emissions were investigated during the conventional biological nitrogen removal (BNR) process for wastewater treatment containing high levels of nitrogen. Low concentration of N_2O emissions was maintained at around 50~100 ppm when the C/N ratio was 3. However higher amounts of N_2O (maximum rate 800 ppm) were released from denitrification, when the C/N ratio was 1.5 and 1, compared to when the ratio was 3. The influence of oxygen concentration on N_2O release as well as its sources was investigated using a nitrogen isotope (^{15}N) tracer method. Our results indicated that around 50% of the released N_2O was originated from denitrification under aerobic conditions. Under aerobic conditions, the proportion and amount of N_2O emissions from denitrification increased with a decrease in dissolved oxygen (DO). In micro-aerobic conditions, 98.6% of N_2O emission was originated from denitrification. This result implies that an anoxic zone was present even in aerobic reactors and that reactors with low DO tended to have larger anaerobic zones.

Keywords: Nitrous oxide (N_2O); Nitrification; Denitrification; ^{15}N-Isotope; C/N ratio

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