Effects of important factors on hydrogen-based autotrophic denitrification in a bioreactor

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ABSTRACT

Effects of biomass, pH, temperature, nitrate loading, C/N on autohydrogenotrophic denitrification were investigated in a lab-scale bioreactor. Nitrate degradation rate increased as biomass increased. When OD₆₀₀ was 0.173, NO₃⁻-N was rapidly reduced down to zero in 3.0 h. The optimum pH for the reactor was 6.0–7.0, high pH values caused accumulated nitrite and decrease of denitrification rate. The average nitrate reduction rate increased from 4.50 to 17.15 mg NO₃⁻-N L⁻¹ h⁻¹ as temperature increased from 20 to 35°C. However, there was a slight decline in denitrification rate at temperature of 40°C. High nitrate loading of 155 mg NO₃⁻-N L⁻¹ aroused decrease of denitrification rate. Although C/N value was not directly influence the nitrate reduction rate, it could contribute to increase pH value in order to inhibit the reductase’s activity to hinder the denitrification process.

Keywords: Effects; Autohydrogenotrophic denitrification; Nitrate degradation rate; Accumulated nitrite

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