

Kulikowska, D., Kaczowka, E., Kuczajowska-Zadrozna, M. Nitrification of Landfill Leachate Ammonia Nitrogen in a Two-stage Moving Bed Biofilm Reactor. *Ochrona Srodowiska* 2010, Vol. 32, No. 2, pp. 49–52.

Abstract: The aim of this work was to ascertain how the loading of the two-stage moving bed biofilm reactor (MBBR) with ammonia nitrogen influences the rate, efficiency and products of the nitrification process. It was found that at a $1.1 \text{ gNH}_4^+/\text{m}^2\text{d}$ load the efficiency of ammonia nitrogen oxidation at the 1st stage totaled 93%. To achieve complete nitrification (with ammonia nitrogen concentration in the effluent lower than $1 \text{ gNH}_4^+/\text{m}^3$), it was necessary to make use of a two-stage MBBR. The increase of the MBBR load to $2.0 \text{ gNH}_4^+/\text{m}^2\text{d}$ caused the effluent concentration of ammonia nitrogen to rise to the level of $33.4 \text{ gNH}_4^+/\text{m}^3$, which is equivalent to approx. 86% efficiency of nitrification. With the MBBR load of $2.8 \text{ gNH}_4^+/\text{m}^2\text{d}$ and $3.8 \text{ gNH}_4^+/\text{m}^2\text{d}$, the efficiency of ammonia nitrogen oxidation was similar (about 70%), but the final products of the process were different. At $2.8 \text{ gNH}_4^+/\text{m}^2\text{d}$, the value of the $[\text{NO}_2^-]/([\text{NO}_2^-]+[\text{NO}_3^-])$ ratio was 0.16, and increased to 0.99 at the load of $3.8 \text{ gNH}_4^+/\text{m}^2\text{d}$. This finding indicates that with the MBBR load of $3.8 \text{ gNH}_4^+/\text{m}^2\text{d}$, phase II of nitrification was inhibited, and that the predominant product of ammonia nitrogen oxidation was nitrites. It was furthermore found that the rate of nitrification in the single-stage MBBR (1st treatment system) increased with the increase in the MBBR load (from $1.0 \text{ gNH}_4^+/\text{m}^2\text{d}$ to $2.4 \text{ gNH}_4^+/\text{m}^2\text{d}$); in the two-stage MBBR (2nd treatment system) nitrification rate was substantially lower.

Keywords: Landfill leachate, ammonia nitrogen, nitrification, Moving Bed Biofilm Reactor (MBBR).