SIMULTANEOUS NITRIFICATION/DENITRIFICATION OF A METHANOGENIC EFFLUENT IN A SBR

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Key words: nitrification, denitrification, SBR.

Introduction. Liquid effluents produced during composting of biodegradable wastes contain high chemical oxygen demand (COD) and ammonium (NH_4^+) concentration (1). The methanogenic treatment diminished significantly the amount of COD, however NH_4^+ remained in the effluent (2) and should be treated to avoid further environmental contamination. The simultaneous nitrification/denitrification process at different COD/N ratios for NH_4^+ removal have been studied (3).
The aim of this work was to evaluate the simultaneous nitrificant/denitrifican activity of a bacterial consortium in a SBR fed with a synthetic medium and a methanogenic effluent as a postreatment option.

Methods. A nitrifying and a denitrifying consortia previously activated were put together in a SBR. The nitrification/denitrification activity was evaluated feeding a mineral medium and afterwards a methanogenic effluent, in an oxic/anoxic cycle of: 210 min feeding/stirring/aeration, 120 min stirring without aeration, 20 min settling and 10 min draining. The O_2 concentration attained was of 2.0 mg/L. Consortia performance was followed through NH_4^+, nitrite (NO_2^-), nitrate (NO_3^-) and soluble COD evolution.

Results. When synthetic medium was fed, COD and NH_4^+ were quickly oxidized in the oxic phase, reaching 152 mg/L of NO_3^--N as final product, which was reduced in the anoxic phase together with the residual COD from the previous phase (Fig. 1a). Mean removal efficiency was 98.7% for COD and 66.6% for NH_4^+. However, when the methanogenic effluent was essayed, low removal efficiencies were registered, 3.21% for COD and 21% for NH_4^+, and the scant nitrate production, limited the denitrifying anoxic phase (Fig. 1b), suggesting that the consortium required an available source of organic matter to accomplish the process.

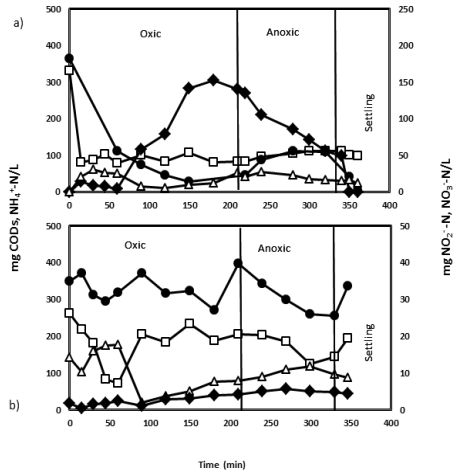

Figure 1. Profile concentration of the different compounds during an operational cycle with a) synthetic medium and b) methanogenic effluent. CODs (●), NH_4^+-N (□), NO_3^- (♦), NO_2^- (Δ).

The methanogenic effluent feeding was then supplemented with effluent from an acidogenic anaerobic reactor, leading to an improvement in ammonium conversion to nitrate and its removal during the anoxic stage, reached a removal efficiency of 84 % for NH_4^+ and 69% for COD.

Conclusions. A mineral feeding to the simultaneous nitrification/denitrification process attained high efficiencies. The addition of organic matter to the methanogenic effluent improved nitrogen removal in the SBR

Acknowledgements. To SCYTDF for the financing to the project PICSO11-55 and to PROMEP for financing to the project PROMEP/103.5/12/8210.

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