Evaluation of N-ammonium removal efficiency and bacterial communities established in two different Anammox reactors.

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The anaerobic ammonium oxidation (Anammox) is catalyzed by anaerobic, chemolithoattotrophic bacteria and is the last discovered microbial pathway in the biological nitrogen cycle. This process has been widely studied as alternative in the removal of ammonium nitrogen from wastewater due to its efficiency, lower operating costs and environmental sustainability. This study evaluates the impact of type inoculum and operating conditions on the performance of the Anammox process and microbial structure developed in reactors . Two reactors up flow fixed bed biofilm contínuos were used . Two types of inoculum were applied: (CePTS and REGAP / Petrobras. These sludges were previously selected for positive PCR results presented for the detection of Anammox bacteria. The diversity of Anammox bacteria inoculum was assessed by cloning technique. Results reactors monitoring showed that it was possible to develop Anammox activity and biomass from selected after a year of cultured. The average ammonium and nitrite removal efficiencies of 97% were obtained after one year of operation, based on the influent NH_4^+-N and NO_2^--N concentrations of 110 and 145mg L^{-1} for both reactors respectively. By the real time PCR, revealed a percentage of 60% Anammox bacteria in relation to total bacteria number to occur at 510 days of operation. The analysis of the microbial diversity of samples collected in the reactors and , after 440 days of operation, obtained by pyrosequencing technique, demonstrated that the enriched community in the reactors showed different composition, despite similar operating conditions. But the predominant groups were similar. The dominant phyla detected in both reactors were *Proteobacteria, Chloroflexi, Planctomycetes* and *Acidobacteria*. However, the phyla *Acidobacteria and GN04* were first observed in Anammox reactors. Regarding the Anammox community developed after 440 days of operation of the reactors, was concluded that similar operating conditions used in enrichment, selected the same Anammox population, belonging to the genus *Ca. Brocadia* in both reactors, despite the differences observed in the initial inoculum. Therefore, the selected sludge were able to develop the active Anammox biomass in the reactors after cultivation .It was also observed that operating conditions applied play an important role in the selection of Anammox bacteria community.

Keywords: anaerobic ammonium oxidation (anammox); bactéria diversity pyrosequencing, bioreactors, N-amonnium

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