

## **TITLE: THE EFFECTS OF GRADUAL SALT INCREASE ON NITRIFICATION AND ON THE MICROBIAL DIVERSITY OF AEROBIC GRANULAR SLUDGE**

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### **ABSTRACT**

Effluent aerobic granular biotreatment are able to withstand high organic loads and are less vulnerable to toxic loads. Due to their size and greater limitations in the dissolved oxygen diffusion, biogranules have aerobic and anaerobic zones, which contribute to the presence of a diversity of microorganisms that can simultaneously develop various biological processes. The efficiency of nitrification in an aerobic granular sludge of an effluent that was gradually enriched with NaCl was investigated. Also, the microbial diversity in the aerobic granules under these conditions was studied. Two sequential batch biological reactors were operated aiming at the formation of aerobic granular sludge. The reactors were fed with synthetic effluent, which was enriched with NaCl, with a concentration of 5 g L<sup>-1</sup> NaCl per week. It was observed that as the salt concentration increased, the granules decreased in size until they have fully disintegrated. However, the removal of ammonia remained high in all salinities. There was no accumulation of nitrite or nitrate in the treated effluent and the removal of both increased with the addition of NaCl. This observation could be corroborated by the access and analysis of the microbial community structure by massive sequencing by the Ilumina platform. It was verified the presence of several aerobic denitrification (*Paracoccus* sp., *Bacillus* sp., *Pseudomonas* sp., *Acinetobacter* sp., *Alcaligenes* sp. e *Aeromonas* sp.), besides those involved in the nitrification (*Nitrosomonas*, *Nitrosovibrio*, *Nitrospira*, *Nitrobacter*) and conventional denitrification (*Denitromonas*, *Paracoccus*, *Bacillus*, *Klebsiella*, *Pseudomonas*, *Nitratireductor*, *Achromobacter*, *Thiobacillus*, *Thauera*, *Alcaligenes*, *Hypomicrobium*, *Rhodopseudomonas* e *Micrococcus*) and ANAMMOX (*Candidatus kuenenia*) processes. The Shannon index showed that the diversity of species belonging to the Bacteria and Archaea Domains increased with the addition of NaCl.

**Palavras chave:** Aerobic granular sludge, nitrification, salinity, 16S rRNA gene sequences.