284. Targeting Aerobic Granular Sludge Microbiome Salt Adaptation

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Saline wastewaters can result from different economical activities, such as food and chemical industries. The need to overcome water shortage is also producing more saline wastewater, especially in coastal cities where seawater is used for cleaning processes. This is leading to the need of biological wastewater treatment technologies able to tolerate high salt concentrations.

Aerobic granular sludge (AGS) has been appointed as the best aerobic treatment process for saline wastewater, mainly due to the high bacterial aggregation and self-protection level that granules offer. Due to the existence of different microbial metabolic layers within the granules, AGS technology is used for removing organic carbon as well as nitrogen and phosphorous from wastewater.

In this study, AGS biomass was acclimated to saline wastewater, by performing a stepwise salt addition over a period of 250 days, from 0 to 14 g NaCl L^{-1}. A high bacterial diversity existed while treating wastewater up to 3 g NaCl L^{-1}. However, the salinity increase up to 6 g NaCl L^{-1} led to a relevant microbial diversity reduction. Salt increase led to the dominance of *Proteobacteria*, namely of *Lysobacter* and *Rhodocyclus* bacterial genera, both associated to carbon-nitrogen removal and EPS production in AGS processes, respectively. Despite this bacterial selection, carbon and nutrients removal processes were kept stable, even when salinity was increased to 14 g NaCl L^{-1}, which was corroborated by the identification of bacteria responsible for such processes (e.g., PAO, AOB and NOB) throughout reactor operation. Hence, the AGS process was able to adapt to salt by preserving the metabolic diversity required for performing different biological removal processes, showing the microbial selection and plasticity occurring in AGS processes, an issue of great relevance for upgrading wastewater treatment.

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