3.º Bio Iberoamérica

Congresso Ibero-americano de Biotecnologia

IBERO-AMERICAN CONGRESS ON BIOTECHNOLOGY

www.bioiberoamerica2022.com

TRAINING AN AGS REACTOR TO TREAT HIGH SALINITY WASTEWATER

Environmental and industrial biotechnology (Bioenergy, bioremediation)

OP - (777) - TRAINING AN AGS REACTOR TO TREAT HIGH SALINITY WASTEWATER

Paulo, Ana (Portugal)[1]; Castro, Paula (Portugal)[1]; Amorim, Catarina (Portugal)[1]

1 - Universidade Católica Portuguesa

Body

Aerobic granular sludge (AGS) is a promising technology for treating industrial wastewater, with higher biomass retention and tolerance to toxic substrates than conventional activated sludge systems. The presence of extracellular polymeric substances (EPS) in the AGS structure increases the bacterial protection and stability of the granules. Several industrial wastewaters contain high salt concentrations in their composition that often inhibit the bacteria responsible for nutrients removal. A strategy to prepare the system to high salinity is the gradual adaptation of the aerobic granules to increased salt concentrations. In this study, an AGS reactor was operated for 248 days and fed with synthetic wastewater containing ammonium, phosphate and acetate (40, 20 and 680 mg L^{-1}, respectively) in its composition. Over operation, a stepwise addition of NaCl to the wastewater from 0 to 14 g L^{-1} was performed. Carbon and ammonium removal processes were stable throughout the operation, with an average removal efficiency of ca. 90 and 100 %, respectively. Nitrification and phosphate removal processes were only affected when NaCl concentration reached 8.5 g L^{-1}, that lead to nitrite and phosphate accumulation in the outlet up to 0.7 mg NO_2^- L^{-1} and 20 mg PO_4^{3-} L^{-1}. Both processes resumed while treating wastewater containing 10 g NaCl L^{-1} and remained stable thereafter. The microbial community presented a high diversity while treating wastewater containing up to 3 g NaCl L^{-1}. Further increase up to 6 NaCl g L^{-1} caused a bacterial diversity reduction. From this point onwards, despite the salinity increase until 14 g NaCl L^{-1}, the microbial community diversity was kept similar, indicating its adaptation to the wastewater composition.

The stepwise addition of salt to the wastewater allowed the granular biomass to preserve stable carbon and nutrient removal processes. It also led to a selection of the microbial community, without causing detrimental effects on the biological removal performance. This strategy can be valuable to adapt biomass for treating high salinity wastewater as those produced in industrial settings.

Acknowledgements

This work was financed by FCT through the project project GReAT-PTDC/BTA-BTA/29970/2017 (POCI-01-0145-FEDER-029970). Authors thank the CBQF scientific collaboration under the FCT project UIDB/50016/2020.

Palavras-chave : Industrial wastewater, Salinity, Aerobic granules, Microbial community, EPS