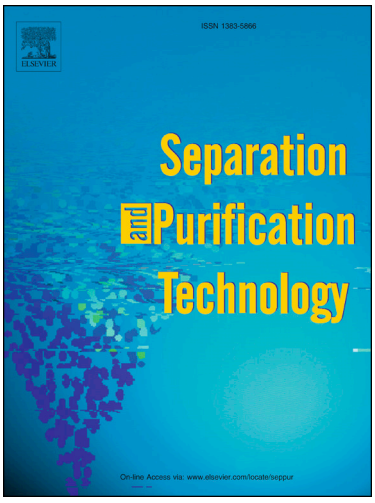

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PII: S1383-5866(17)32795-8
DOI: https://doi.org/10.1016/j.seppur.2017.11.074
Reference: SEPPUR 14230

To appear in: *Separation and Purification Technology*

Received Date: 28 August 2017
Revised Date: 17 November 2017
Accepted Date: 29 November 2017

Please cite this article as: R. Campo, S. Fabio Corsino, M. Torregrossa, G. Di Bella, The role of extracellular polymeric substances on aerobic granulation with stepwise increase of salinity, *Separation and Purification Technology* (2017), doi: https://doi.org/10.1016/j.seppur.2017.11.074

THE ROLE OF EXTRACELLULAR POLYMERIC SUBSTANCES ON AEROBIC GRANULATION WITH STEPWISE INCREASE OF SALINITY

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ABSTRACT

A granular sequencing batch reactor (GSBR) worked for 164 days to study the effect of salinity on aerobic granulation. The feeding had an organic loading rate (OLR) of 1.6 kg $COD \cdot m^{-3} \cdot d^{-1}$ and a gradual increase of salinity (from 0.30 to 38 g $NaCl^{-} \cdot L^{-1}$) to promote a biological salt-adaptation. First aggregates (average diameter ≈ 0.4 mm) appeared after 14 days. Extracellular polymeric substances (EPSs) analyses revealed that proteins were mainly higher than polysaccharides, and microorganisms metabolized EPSs as additional carbon source, mostly in feast phase, to face the energy demand for salinity adaptation. No significant worsening of organic matter removal was observed. The initial decrease of nitrification (from 58% to 15%) and the subsequent increase (up to 25%), confirmed the acclimation of AOBs to saline environment, while the accumulation of nitrites suggested NOBs inhibition. The nitrogen removal initially decreased from 58% to 15%, due to the inhibitory effect of salinity, and subsequently increased up to 29% denoting a simultaneous nitrification-denitrification. The dimensions of mature granules (higher than 1 mm) probably involved PAOs growth in the inner anaerobic layers. Nitrites caused a temporary deterioration of phosphorous removal (from 60% to almost zero), that increased up to 25% when nitrites were depleted.