Anaerobic Granular Sludge Formation Under Saline Conditions

Sub-department of Environmental Technology

Oct 2015 - 2019

Researcher	Supervisor	Promotor
Dainis Sudmalis	Dr. ir. Hardy Temmink	Prof. dr. ir. Grietje Zeeman Prof. dr. ir. Huub Rijnaarts

Motivation

Disposal of untreated wastewater streams into receiving water bodies without prior treatment can cause detrimental effects, such as eutrophication, toxicity to aquaculture and decrease in oxygen levels. Around 5% of (waste)water generated globally is saline or highly saline.

Anaerobic biological treatment of saline wastewater streams has been reported to be a cost-effective and environmentally friendly alternative compared to physical and chemical treatment, because anaerobic wastewater treatment allows to combine removal of organic matter with recovery of energy in the form of biogas.

Technological challenge

Microorganisms in conventional treatment are unable to efficiently function under high (fluctuating) salt stress conditions as they occur in the effluent streams. This forces industries to dilute their wastewater with freshwater, herewith increasing global water stress.

The most widely applied anaerobic (waste)water treatment system to remove dissolved organic matter and produce biogas is upflow anaerobic sludge blanket (UASB). A core to successful functioning of compact anaerobic bioreactors is formation of bio-aggregates (granules), because granular sludge allows for the capacity of treatment systems to deal with high organic loading rates (decouple hydraulic and sludge retention times).

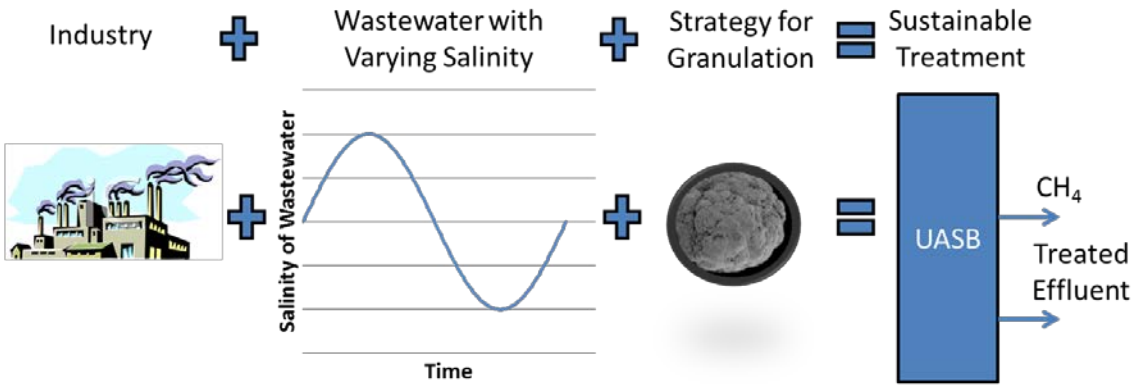
Saline wastewaters inhibit the process due to loss of microbial activity, cell lysis and disintegration of microbial granules.

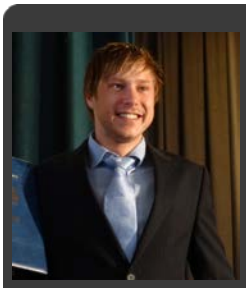
Even though several microbial strategies to deal with osmotic stress (uptake of potassium, uptake/production of osmolites) as well as conditions for successful granulation under non-saline conditions have been reported, there is no research focusing on mechanisms of granules formation under saline conditions.

Therefore the two technological challenges of this project are:

1) Development of strategies for anaerobic granular sludge formation under saline conditions;

2) Development of strategies for reactors operation under fluctuating salinity conditions





CV Researcher: Dainis Sudmalis

Graduated: Water Technology at Wetsus Academy (2015)

Hobbies; Football, skiing, beach volleyball, beer brewing

e-mail; dainis.sudmalis@wur.nl

tel; 0317-483997

WAGENINGEN UNIVERSITY