Anaerobic conversion of proteins under acidifying and methanogenic conditions

2016 - 2020

Researcher	Supervisor	Promotor
Duong Thu Hang	Dr.ir. Hardy Temmink, Dr.ir. Miriam van Eekert, Dr.ir. Tran Thi Viet Nga.	Prof. dr. ir. Grietje Zeeman

Motivation

Wastewaters and wastes generated by the food industry typically contain high concentrations of biodegradable organic materials such as carbohydrates, lipids and appreciable quantities of proteins.

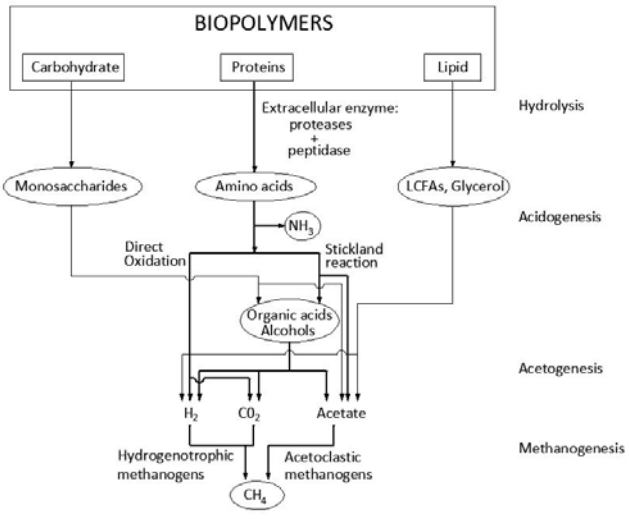
Anaerobic digestion has been widely used for the treatment of wastewater since it combines pollution control and energy recovery (as biogas). The tropical climate in Vietnam especially favors anaerobic treatment, which makes this project very relevant for sustainable development in Vietnam and other high temperature developing countries in general.

Technological challenge

Serious problems in the anaerobic treatment of wastewaters containing proteins are reported, resulting in low organic removal rates, low methane production, foaming, sludge flotation, a deteriorating effluent quality and biomass washout. Nevertheless, anaerobic degradation of proteins only has been investigated in a few studies, and in particular the effect of the presence of other biopolymers such as carbohydrates and lipids on protein hydrolysis is largely unknown. More knowledge can give directions on how to solve the problems associated with insufficient protein degradation. Moreover, research will give more insight in the necessary design for optimal treatment of protein containing wastewaters.

The objective of this study is to investigate anaerobic conversion of proteins under acidifying and methanogenic conditions at mesophilic temperatures (30-35°C) and the interactions that occur with carbohydrate degradation pathways and bacteria. We aim to provide deeper insight into the hydrolysis rate of proteins, the formation and activity of the proteolytic enzymes and the biochemical reaction pathways involved in the transformation of proteins in the presence and absence of carbohydrates. Also, the composition of the microbial community in relation to the protein degradation in anaerobic reactors will be assessed.

The results of the research will be used to propose and test technical solutions to overcome difficulties in anaerobic treatment of rich protein wastewaters.



CV Researcher: Duong Thu Hang
Graduated: Ghent University (Belgium), MSc Environmental Sanitation (2009)
e-mail: thuhang.duong@wur.nl, hangdt@nuce.edu.vn
tel: 0084 936 486 399
website: www.wur.nl, vnwater.org

WAGENINGEN UNIVERSITY & RESEARCH