Anaerobic Membrane Bioreactor under Extreme Conditions

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Introduction

Membrane bioreactors ensure biomass retention by the application of micro or ultrafiltration processes. This allows operation at high sludge concentrations [1]. Previous studies have shown that the application of anaerobic membrane bioreactors is an efficient way to retain specialist microorganisms for the treatment of different wastewaters, including a wide variety of streams such as wastewater from coke industry [2,3], azo dye [4], kraft evaporator condensate [5,6], hydrogen production [7], sewage [8]. However, little research has been found into the use of membrane bioreactors for anaerobic treatment of wastewater under extreme conditions [9,10]. The latter would enable their application to a wide range of industrial processes with the potential purpose of water recycling. The challenge for future research is finding the optimum operational conditions to control maximised bioconversion under extreme conditions such as high salinity and high temperatures, without being limited by reduced membrane fluxes.

Research Outline

The Netherlands – universities and private companies – has a strong position in waste water treatment, in particular granular sludge technologies. At extreme conditions maintaining stable granules can no longer be guaranteed, and alternative technology is required. Anaerobic MBR is a potential option that needs to be considered under those conditions. The aim of the study is to understand the bioconversion of model organic compounds existing in industrial wastewaters under extreme conditions. The research will focus on the most suitable technology for this purpose (i.e. anaerobic membrane bioreactors) to encourage reclamation of process waters for reuse. Attention will be paid to the bioaugmentation of specific microbial communities and its growth dynamics in highly filterable sludge. A control online strategy will be proposed for the mitigation of membrane fouling within a long term operation of the AnMBR.

References