

# Fermentative hydrogen production in anaerobic membrane bioreactor with integrated gas separation system

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Reactor design considerations are crucial aspects of dark fermentative hydrogen technology. During the last decades, many types of reactors have been developed and used in order to drive biohydrogen towards practicality and economical-feasibility. In general, the ultimate aim is to improve the key features, namely the H<sub>2</sub> yields and production rates. Among the various configurations the traditional, completely stirred tank reactors (CSTR) are still the most routinely employed ones [1]. However, due to their limitations, there is a progress to develop more reliable alternatives. One of the research directions points to systems combining membranes, which are called as anaerobic membrane bioreactors (AnMBR) [2]. In this paper, the aim is to summarize and highlight the recent, biohydrogen related work done on AnMBRs and moreover, to evaluate their performances and potentials in comparison with their conventional CSTR counterparts.

In this study a first ever AnMBR was constructed with two membrane separation system. First a traditional AnMBR with microfiltration membrane (KUBOTA k150) loop to retrain the active microorganism. System performance was tested with various hydraulic retention time (HRT) and also the effect of the sludge retention time (SRT) was investigated.

This AnMBR was attached into a membrane gas separation system which was able to separate the produced bio hydrogen and the by product, mostly CO<sub>2</sub>.

We have found some synergic effect of the combination of the two membrane system especially comparing the earlier AnMBRs [3].

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