

Identification of the Microalgae Species in a Wild Mix Culture Acclimated to Landfill Leachate and Ammonia Removal Performances in a Microbubble Assisted Photobioreactor

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Abstract : Landfill leachate treatment has been attracting researchers recently for various environmental and economical reasons. Leachate discharge to receiving waterbodies without treatment causes serious detrimental effects including partial oxygen depletion due to high biological oxygen demand (BOD) and chemical oxygen demand (COD) concentrations besides toxicity of heavy metals it contains and high ammonia concentrations. In this study, it is aimed to show microalgal ammonia removal performances of a wild microalgae consortia as an alternative treatment method and determine the dominant leachate tolerant species for this consortia. For the microalgae species identification experiments a microalgal consortium which has been isolated from a local pond in Sheffield inoculated in %5 diluted raw landfill leachate and acclimated to the leachate by batch feeding for a month. In order to determine the most tolerant microalgal consortium, four different untreated landfill leachate samples have been used as diluted in four different ratios as 5%, 10%, 20%, and 40%. Microalgae cell samples have been collected from all experiment sets and have been examined by using 18S rDNA sequencing and specialised gel electrophoresis which are adapted molecular biodiversity methods. The best leachate tolerant algal consortium is being used in order to determine ammonia removal performances of the culture in a microbubble assisted photobioreactor (PBR). A porous microbubble diffuser which is supported by a fluidic oscillator is being used for dosing CO₂ and air mixture in the PBR. It is known that high mass transfer performance of microbubble technology provides a better removal efficiency and a better mixing in the photobioreactor. Ammonia concentrations and microalgal growth are being monitored for PBR currently. It is aimed to present all the results of the study in final paper submission.

Keywords : ammonia removal from leachate, landfill leachate treatment, microalgae species identification, microbubble assisted photobioreactors

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