

Effects of Hydrothermal Pretreatment Temperature on Product Properties and Biogas Producing Potential using Lignocellulosic Biomass

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ABSTRACT

Coir medium, which widely used for mushroom cultivation, is made of coconut fruit hard shell by adding nutrient supplements. Cultivating mushroom using coir medium lead to involve large amounts of spent coir medium generation, and high lignocellulosic component concentrations in base material of spent medium could lower resource recovery and recycling potential. Various pretreatment methods have been recommended to improve availability of lignocellulosic biomass. Since hydrothermal process does not need to employ additional wet removal step and is operated under mild temperature range, the hydrothermal process is known as an energy efficient pretreatment method for high moisture containing biomass. The solid and liquid phase of products after hydrothermal process could be used for diverse purposes. Especially, liquid phase of hydrothermal process product could be used as substrate for biogas production by linking additional process (e.g., anaerobic digestion) due to presence of solubilized organic material in liquid product. In this study, effects of hydrothermal pretreatment temperature on physico-chemical properties of product (including solubilized organic matter concentration) with the pretreatment temperature range of 180-300°C. After pretreatment, the solid and liquid phases of products were separated by centrifugation and filtration (GFC, 0.45 μm) sequentially. Finally, the obtained liquid phase of product was anaerobically digested under mesophilic condition and was converted into biogas. From the results, biogas producing potential from solubilized organic fraction of hydrothermal pretreatment process for spent coir mushroom medium was investigated. And the feasibility of using recovered biogas as source for clean hydrogen energy was also evaluated.

Keyword: Anaerobic digestion/ Biogas/ Hydrothermal pretreatment/ Lignocellulosic biomass/ Treatment

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