

Acid Pre-Treatment on Cellulose Compound as Sole Carbon Source for Ethanol Production

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Structured Abstract

Background: In this study, the bioethanol production process used lignocellulosic biomass as its raw material. The significant of study in this project was how well bioethanol produced using cellulose as a carbon source. The strong bonds of lignocellulosic in cellulose chain due to the lignin presence make it very difficult to breakdown into simplest sugars. Whatman qualitative filter paper, which was made from raw materials that be sources of fermentable sugar, was used in these projects.

Methods: To breakdown the lignocellulosic in cellulose, which is the main source in filter paper, the acidic pre-treatment was used to breakdown the chain and enhance the glucose liberation as a fermentable sugar for bioethanol production during the fermentation. The production of bioethanol from pre-treated carbon sources was carried out through submerged fermentation. In pre-treated experiments, three different sulfuric acid concentrations underwent a 24-hour room temperature pre-treatment with sulfuric acid.

Results: When compared to the non-pre-treatment filter paper, which is only 10.79%, the sulfuric acid pre-treatment has increased sugar availability by approximately 19.65%, 31.74%, and 47.09% for the increasing concentration of sulfuric acid used in the pre-treatment at 1.0, 1.5 and 2.0 % (v/v) concentration respectively. For bioethanol production, batch fermentation will be carried out for 48 hours at an agitation speed of 150rpm. In comparison to filter paper that had not been pretreated, the highest sulfuric acid from the pre-treatment which hydrolysed glucose and was fermented by *Saccharomyces cerevisiae* produced the highest percentage of ethanol yield in 28 hours of fermentation, or 31.99%.

Conclusion: As conclusion, increased sulfuric acid pre-treatment shows great potential for improving hydrolysed glucose production for effective ethanol production. With these results, future research can concentrate on optimizing the production of sugar by raising the pre-treatment temperature and taking filter paper debris into account during the fermentation process, which will maximize the production of ethanol.

Keywords: Bioethanol Production, Acidic Pre-treatment, *Saccharomyces cerevisiae*, lignocellulosic biomass

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