Title: ENZYMATIC HYDROLYSIS AND SIMULTANEOUS FERMENTATION FOR PRODUCTION SECOND GENERATION ETHANOL FROM SWEET SORGHUM

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Abstract:

The sweet sorghum is a raw material that can be used for first generation ethanol and second generation ethanol (2G), and can now be considered an alternative to complement the culture of sugar cane, to present some similarities for example, sugars that the storage is located in the stem. The 2G ethanol is a fuel produced from lignocellulosic biomass waste composition and has numerous advantages, such as contributing to the reduction of carbon dioxide emission in atmospheric air. This study aimed to evaluate the production of 2G ethanol from sweet sorghum, using enzymatic hydrolysis followed by simultaneous fermentation (SSF) compared with the simple fermentation (SHF). The enzymatic hydrolysis was carried out using the enzyme complex Accellerase 1500 ® cellulase; used for the fermentation is the yeast *Saccharomyces cerevisiae* (Fleischmann®). Initially, biomass was milled with the aid of a knife mill, and then performed a pretreatment with 100 g of bagasse NaOH solution in 2 L of 2% (w / v) in an explosion by steam at 133 ° C and 2 atm, in order to remove the lignin and hemicellulose by exposing the cellulose to enzymatic hydrolysis. Then for the enzymatic hydrolysis the pH is measured (4.8) were added 3.5 ml of enzyme biomass, followed by incubation at 50 ° C under constant agitation (150 rpm) for 25 (T1) 50 (T2) and 100 (T3) hours. The simple fermentation occurred from addition of 2% (w / v) of yeast, hydrolyzate biomass, again followed by incubation at 50 ° C under the same conditions T1, T2 and T3. The simultaneous fermentation occurs simultaneously with the enzymatic hydrolysis, by performing the same experimental procedure applied to simple hydrolysis, but adding 2% (W / V) yeast together with 3.5 ml of the enzyme, followed by incubation at 50 ° C under constant agitation (150 rpm) for 25, 50 and 100 hours. After fermentation the material was distilled off and quantified from the dichromate oxidation method, and potassium back titration with sodium thiosulphate solution using automatic titrator Metrom Tritando 852. It was found that the yield of ethanol by using the sweet sorghum was 96%, being possible to verify that a simple fermentation resulted in lower ethanol content as compared to simultaneous fermentation, 26.8 g /L and 46.6 g /L respectively. Thus it was concluded that the sweet sorghum bagasse is very promising for obtaining second generation ethanol using simultaneous fermentation.

Keywords: sweet sorghum, second generation ethanol, biomass, enzymatic hydrolysis, biofuel

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