XVI Congreso Nacional de Biotecnología y Bioingeniería
21 al 26 de Junio de 2015 Guadalajara, Jalisco, México.
Guadalajara

KINETIC CHARACTERIZATION OF ENZYMATIC HYDROLYSIS OF CELLULOSE FROM CORN COB THERMOCHEMICAL PRETREATED WITH DILUTE SULFURIC ACID.

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Keywords: Thermochemical pretreatment, Corn cob, enzymatic hydrolysis,

Introduction. Corn cob is a low value-added byproduct of corn industrialization in México, mainly used for cattle feed and in some cases in tortilla elaboration. Due to the enriched fraction of available polysaccharides, it has the potential to serve as feedstock for cellulosic-biofuels production under the biorefinery concept. In order to obtain the carbohydrates suitable for ethanol production a thermochemical pretreatment and with a subsequent enzymatic hydrolysis must carry out [1]. The main purpose of this work was to study the enzymatic hydrolysis of thermochemical pretreated solids of corn cob using Accellerase 1500 by Dupont.

Methods. Dry corn cob was milled with a hammer mill to pass through a #19 mesh in a vibratory sieve. Solids were pretreated according to the method proposed by *Saha et al* [2] with modifications proposed by *Rojas-Rejón* [1]. The thermochemical pretreated solids were conditioned for suitable enzymatic hydrolysis by Accellerase 1500 at several enzyme dosages (0.10, 0.50, 0.75, 1.00 mL $_{of\ enzyme}$ / g $_{corn\ cob}$) and several substrate concentrations (0.1, 0.5, 5, 10 g $_{corn\ cob}$ / 100 mL $_{diluent}$). The enzymatic hydrolysis of pretreated solids were carried out for 48 h from time to time samples were taken for further analysis.

Result and discussion. The dilute acid pretreatment was effective to break down the blocking components such as hemicelluloses and lignin and to disrupt the cellulose intensifying enzyme accessibility during hydrolysis. Constant rates of substrate affinity and overall reaction were calculated by linear regression of data using Lineweaver-Burk, being higher the substrate affinity constant at 1.00 mL $_{of\ enzyme}$ / g $_{corn\ cob}$.

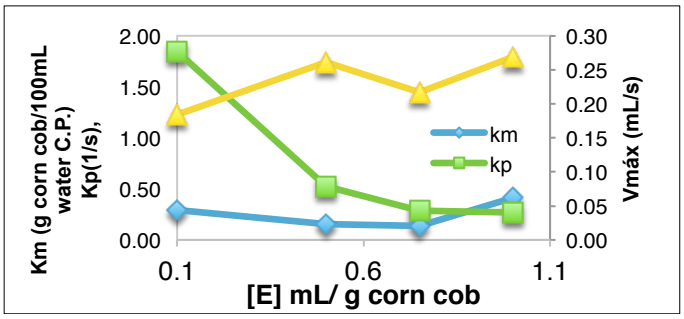

Fig. 1. Kinetic constants rates.

As shown in figure. 1. The overall reaction rate has an effect inversely proportional to enzyme concentration. Although the overall reaction rate was extremely higher at 0.10 mL $_{of\ enzyme}$ than at any other concentration; it was inferred that enzyme inhibition was the cause presumably by spatial obstacle.

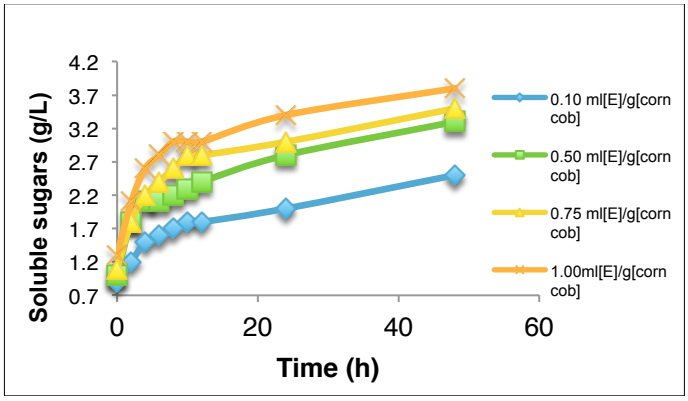

Fig. 2. Kinetics of enzyme hydrolysis at several dosage.

The data in figure. 2 indicates the time course of sugars obtained at several enzyme dosage. It's seemed that high enzyme dosage increased sugar concentration at least at 1 mL/g.

Conclusion. An improve of thermochemical pretreatment must carried in order to maximize sugar recovery from corn cob, it is important to study enzyme dosage at several stages of enzymatic hydrolysis in order to avoid spatial inhibition.

References.

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