289m An Efficient Approach for Saccharification of Cellulose from Biomass for Ethanol Production

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The production of sugars from lignocellulosic biomass is, at present, not cost competitive with the corn starch-based approach due to the difficulty associated with hydrolyzing the cellulose fraction to glucose. Cellulose, a highly complex carbohydrate exists in a number of crystalline and amorphous forms. Insolubility and heterogeneity due to highly organized hydrogen bonding makes native cellulose a recalcitrant substrate for present enzymatic hydrolysis. The alternative acid hydrolysis is accompanied by undesirable side products. This study intends to overcome these limitations and enhance the rate of cellulose hydrolysis and improve the saccharification kinetics by using solvents capable of dissolving cellulose. Various solvents capable of dissolving cellulose are ionic liquids, aqueous non derivatizing solvents, and non aqueous non-derivatizing solvents. As a first step in this direction, the dissolution and hydrolysis kinetics of cellobiose (an oligomer of cellulose) is reported. Work is in progress for cellulose hydrolysis in various solvents and development of different solvents and enzyme mimics. A systematic approach combining and optimizing all these processes can lead to an efficient saccharification of cellulosic biomass.