Simultaneous Saccharification and Fermentation (SSF) of ethanol from potato starch

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Conventional ethanol production from starch materials requires pretreatment by gelatinization and liquefaction, followed by enzymic saccharification to glucose and subsequent conversion of glucose to ethanol by fermentation. This two step process (Separate Hydrolysis and Fermentation, SHF) involving consecutive enzymatic hydrolysis and fermentation makes it economically unattractive. The bioconversion of carbohydrate materials to ethanol can be made much more effective by coupling the enzymatic hydrolysis of starch and microbial fermentation of the glucose into a single step which is simultaneous saccharification and fermentation (SSF). The direct benefit of the SSF is a decrease in the inhibition caused by glucose accumulation, leading to increasing the hydrolysis rate and productivity, reducing reactor volume and capital costs. A disadvantage of SSF is the difference in cultivation conditions. The low pH and high temperature may be favourable for enzymatic hydrolysis, whereas the low pH can inhabit the ethanol production and high temperature may affect the fungal cell growth. Therefore, the purpose of this study was to identify the microbial and biochemical kinetics and to determine the optimal process conditions.