589a Separation of Protein from Switchgrass Using Aqueous Ammonia during Biomass Refining

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Proteins can be an important co-product in the production of biofuels, significantly reducing the cost of ethanol production. In particular, switchgrass (*Panicum virgatum*), considered a potential source of biofuel due to its hardiness and high yield, contains approximately 10-15% protein if harvested in the spring. Under these conditions, switchgrass will provide a protein yield per acre higher than that of soybeans. Our research focuses on recovering proteins from switchgrass by solid-liquid extraction using aqueous ammonia solutions. The optimal pH, temperature, residence time, ammonia concentrations and volume of aqueous ammonia solution required are determined as well as the effect of various pretreatment options on protein extraction yields.

The effect of protein extraction on the enzymatic hydrolysis of pretreated switchgrass, particularly using the ammonia fiber explosion (AFEX) pretreatment process, are also studied to ensure that the protein extraction process does not decrease resulting sugar yields. Extraction yields are also compared to yields of proteins extracted using sodium hydroxide under similar conditions to determine the relative effectiveness of using ammonia as the alkali source in this process. Finally, we describe preliminary experiments using ultrafiltration and other membrane separation approaches to purify and concentrate these protein extracts.