**Extraction and Recovery of Value-Added Co-Products and Process Design Comparison for the Recovery and Conversion of Hemi-Cellulose from Pulping**

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The recovery of value-added products is one way to improve the economic feasibility of the emerging biorefinery. How much value is added is a question that is not always sufficiently answered. Additional research is needed to determine the actual value of possible co-products. The first step in the exploration of co-products is extraction and recovery. My PhD research looked at the use of pressurized hot water to extract saponins from ginseng, which were then purified and quantified using centrifugal partition chromatography. The second step is to design the recovery equipment and determine the capital and operational cost of the process. My postdoctoral research examined three pathways to convert a hemi-cellulose rich pre-pulping extract stream into long chain alcohols. The three pathways were designed using AspenPlus and the resulting material and energy balances were used to determine the capital and operating costs for each pathway. These costs were compared to determine which path was the most economical. For a future research program, these two research efforts will be combined and will be used to determine how much value a co-product could add to the biorefinery. The area of value-added co-products is very broad and if society is to transition to a bio-energy based lifestyle then the best economic option is to use a variety of regionally-based biomass sources to make fuels and chemicals. This opens the door to many possibilities for co-products. Experimentally, the best extraction or recovery method of a value-added co-product will be determined and then a process model will be created in order to determine if, and, or how these products will contribute to the economic feasibility of biomass utilization.