

Process synthesis and analysis of the production of biochemicals from lignocellulosic biomass

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We develop an integrated strategy for the production of biochemicals from lignocellulosic biomass. Using a mixture of GVL and water as a solvent containing dilute sulfuric acid as a catalyst, biomass is first fractionated into four major components: 1) cellulose, which is converted to dissolving pulp for fiber production, 2) hemicellulose, which is converted to furfural, a valuable platform chemical, 3) lignin, which is purified to high purity lignin for the production of carbon foams, and 4) acetate, which is converted to acetic acid. Separation subsystems are designed to effectively recover GVL and water for reuse in biomass fractionation, and separate cellulose, hemicellulose, lignin, and acetate for further treatment. We perform a wide range of techno-economic analyses to identify major cost drivers.