Synthesis, Selection, and Optimization of Doped Zeolite Catalyst for the Non-biological Production of Lactic Acid Derivatives from Biomass Derived Carbohydrates

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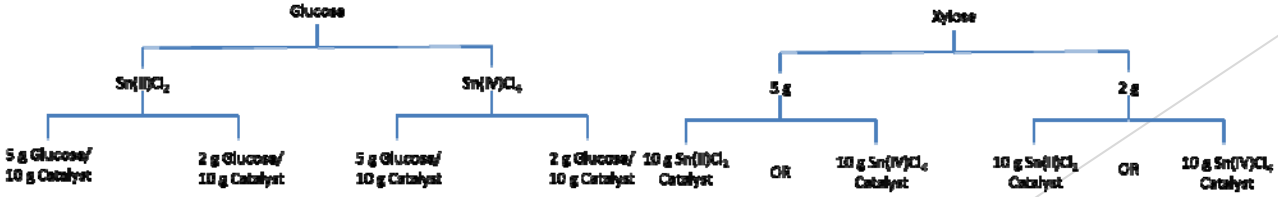
Batch reactor used for all experimentation

Objective: Chemically synthesize lactic acid and its derivatives from biomass-derived carbohydrates and experimentally determine the significant factors of glucose decomposition by way of a design of experiments. The effects of time and temperature should also be examined on the overall conversion of the reaction. Additionally, test the determined ideal conditions for the production of lactic acid, levulinic acid, and formic acid. Finally, transition the ideal conditions to the decomposition of xylose for the synthesise of lactic acid and its derivatives.

Research Project

To examine the ideal conditions which were determined throughout the dissertation work of Clancy Kadrmas of glucose decomposition to produce lactic, levulinic and formic acids. A design of experiments, time study, and temperature study were performed previously to experimentally conclude the ideal conditions of the decomposition. Reactions performed in a high temperature and high pressure batch reaction form the highest yield of products under the conditions of 200 °C, 300 PSI, with 400 RPM of continuous stirring, and a 20 hour residence time. The conditions which were to be varied were the valence state of the tin (Sn+2 or Sn+4) in the beta zeolite doped catalyst and the amount of glucose in each reaction (2 g or 5 g). The ideal valence state of the tin in the catalyst for each amount of glucose in the reaction will be transitioned to the decomposition of xylose.

Diagrams below indicate the experimental plan for the experiments to be performed for glucose and xylose. All performed experiments were completed in triplicate.



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