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Project Title: Catalyst Design for Two Reactions: Turning Carbon Dioxide and Biomass into Renewable Fuel

Carbon dioxide (CO_2) is a green house gas that is emitted from most power plants. Instead of letting $CO2_2$ be released into the atmosphere it can be used as a new source of energy. Using calcium oxide as an adsorbent on aluminum oxide, CO_2 can be captured in order to create synthetic natural gas (methane). The Thermogravimmetric Analysis was used to determine the amount of CO_2 that was adsorbed on to the calcium oxide. The efficiency for the adsorption of CO_2 on calcium oxide was 48.8%.

Biomass (Phragmites) is an invasive species that grows all over America. Through the use of copper:zinc:iron on mole sieve and copper on mole sieve as adsorbents, hydrogen can be adsorbed and desorbed. The optimal catalyst is the catalyst that requires the least hydrogen adsorption and desorption energy, which is measured in the Differential Scanning Calorimetry. As a result, the energy required to convert biomass into biofuel will be lower and the percent of conversion will be greater. The total energy required to convert biomass using copper:zinc:iron on mole sieve was – 129.69 μV, and the total energy required by copper on mole sieve was -239.22μV. In conclusion, the copper:zinc:iron on mole sieve is a better catalyst to convert biomass into biofuel.