Maximizing Bio-oil Recovery from Food Waste
Hydrothermal Liquefaction
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Introduction
Around 67 million tons of food waste are generated yearly in the United States. Hydrothermal Liquefaction (HTL), a hydrolyzation process of macromolecules of wet biomass, gives us the opportunity to turn that waste into bio-oil.

HTL produces four main products
Char Aqueous Oil Gas

Goal: Maximize energy recovery and oil yield using acidic catalysts, basic catalysts, as well as liquid-liquid extractions of the aqueous phase.

HTL Method
A high temperature, high pressure reaction at 3000 psi, 300°C, and 1 hour reaction time

Hot Addition Acidic HTL Reaction Results
Homogeneous acid results in decreased oil yield and increased char yield!

Acidic HTL Reaction Results

Hot Addition Acidic HTL Reaction Results

Acid-Base Reactions

• Adding base to the reaction slightly increases oil yield.
• Having acid or base at the start of the reaction increases char yield.

Toluene Decreases Carbon-Containing Compounds in the Aqueous Phase

Toluene Separation Process

Conclusions and Next Steps

References

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