Low Temperature Extraction of Hydrogen From Biomass

A method of using sawdust as a renewable source of hydrocarbons for hydrogen production

Georgia Tech inventors have developed a method of using sawdust as a renewable source of hydrocarbons for hydrogen production. Through an aqueous-phase reforming (APR) of the biomass, the polymeric lignocellulosic components of the biomass are broken down and the formation of hydrogen is achieved at temperatures much lower (230 °C) than those currently used in gasification and pyrolysis processes. Increasing acid concentration hastens the breakdown of these components. Addition of a reforming catalyst, such as platinum aluminum oxide (Pt/Al2O3), facilitates the formation of more hydrogen in the reaction product gas.

Comparisons between APR of various feeds (biomass, glucose, ethylene glycol, and wastepaper) showed effectively no difference in the amount of hydrogen produced per gram of feed. However, the hydrogen yields per gram of carbohydrate were different, with biomass giving the highest yield. Hydrogen yields may be further increased through the use of a continuous flow process over batch processing.

Summary Bullets

- **Lower processing cost** — Lower temperature processing makes biomass a viable feed source.
- **Sustainable** — This technology utilizes readily available, low-cost waste product.
- **Adaptable** — The process can be used with various source materials, including trees, shrubs, sawdust, and paper.

Solution Advantages

- **Lower processing cost** — Lower temperature processing makes biomass a viable feed source.
- **Sustainable** — This technology utilizes readily available, low-cost waste product.
- **Adaptable** — The process can be used with various source materials, including trees, shrubs, sawdust, and paper.

Potential Commercial Applications

- Reuse of lumber production waste

- Hydrogen generation
- Renewable energy

Background and More Information

Biomass is a renewable, readily available, and carbon-neutral source of energy that has been largely untapped for energy production. Hydrogen can be extracted from biomass via pyrolysis and reforming of the bio-oil or via gasification; however, both of these processes require very high temperatures (400–825 °C), even with the use of catalysts. As a result, biomass energy derivation has not been an economically viable alternative to fossil fuels.

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IP Status

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Publications

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