Biomass Program

Direct Causticization for Black Liquor Gasification

Direct causticization (DC) is one of several possible processes that can be used to recover the pulping chemicals in black liquor. It has been shown that DC has several advantages to conventional lime-based recovery processes, including higher production of electricity, and a smaller amount of non-active chemicals in the white liquor which is recycled back to the digester or pulping stage. However, the chemical composition of the white liquor produced via DC differs from that of the lime-based processes and could impact the pulping yield and pulp quality.

This project is evaluating advanced pulping technologies which fully utilize the white liquors produced by the combined technology of steam reforming and direct causticization of black liquor. It is also demonstrating that inclusion of direct causticization by TiO_2 in the MTCI/ThermoChem steam reformer can reduce or completely eliminate the energy-intensive lime cycle for black liquor gasification.

R&D Pathway

Researchers are conducting laboratory pulping studies to study the effects of sulfidity as well as the addition of different sulfide compounds on pulp yield and quality are being studied.

A process development unit has been designed, built, and for use in the DC study. The process development unit is being used to validate the laboratory-scale pulping experiments. Results will be analyzed to evaluate system design, performance, economics, and emissions of the DC process.

Researchers are determining the kinetics of DC by TiO_2 and subsequent leaching reactions to recover the pulping chemicals. The removal of non-process elements (Ca, Mn, Mg, Fe, Al) is also being studied.

Thermochemical R&D

Benefits

- **Improve the energy, environmental, and economic benefits of black liquor gasification**

Applications

Direct causticization offers the forest products industry an alternative to lime-based recovery processes, with the potential to save energy, reduce costs, and minimize environmental impacts.

Project Partners

Manufacturing and Technology Conversion International, Inc.
North Carolina State University
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Project Period

FY 2003 – FY 2006

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