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Particle Boards Created from Modified Lignin

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Intro

Found in the cells of vascular plants, lignin is what allows water to rise in plants and keeps them rigid. Industrially, lignin is isolated from black liquor, a by-product from the paper pulping industry. In this work, lignin from black liquor was modified using two methods, (1) acrylation; (2) transesterification with tung oil. Currently, tung oil-modified lignin is being investigated as a binder for particle boards.

Methods

The tung oil modification involves mixing 10g of lignin, 15.65g of tung oil, and 0.04g of NaOH in a beaker then placing the beaker in a 50-60°C water bath under mechanical stirring for two hours. The product was then washed with acetone and dried in a vacuum oven at 70°C overnight.

The modified lignin was then put through a co-polymerisation process. The procedure involved 0.05g of benzoyl peroxide, 0.5g of lignin, and 0.5g of divinylbenzene (DVB) mixed in a beaker and placed in a 60.0 mm × 10.0 mm × 0.5 mm (length × width × thickness) aluminum mould. The mixture was compression molded at 1,500 psi., at 150°C, for 1.5 hours.

Results

- The removal of the co-polymerized lignin from the mold has proven to be difficult.
- The product is exceedingly brittle.
- Modifications to help demoulding have been made by adding aluminum foil with a layer of film release.
- Another modification of the project was to add different variations of DVB and tung oil with a total weight of 0.5g.

Conclusions

Extraction of the product from the mould is still underway. Current modifications include using various compositions of DVB and tung oil to make extraction possible without destroying the product.

Future Work

Analysis of the strength of the product will be made. Grounded woodchips will be added to the co-polymerisation process in a larger mould to create a particle board that will be tested for its thermo-mechanical properties.