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**Isolating valuable compounds from complex mixtures of lignin products**

The ability to collect individual useful chemicals may increase the value derived from biomass processing.



*Centrifugal partition chromatography provides an effective strategy to separate valuable aromatic products obtained from lignin depolymerization mixtures.*

**The Science**

Current methods used to convert plant sugars into biofuels leaves behind the complex polymer lignin as a waste product. Extensive efforts are underway to convert lignin into valuable compounds that could be used in the food, pharmaceutical, or chemical industries. Lignin processing yields a complex mixture of products with little direct market value. In a new study, a team from the Great Lakes Bioenergy Research Center (GLBRC) describes a multi-solvent extraction process that can isolate five major products obtained from poplar lignin.

**The Impact**

Methods to isolate individual aromatic monomers from a complex product stream, such as that produced by breaking down lignin, will increase the potential value of biofuel crops. Previous purification efforts have typically focused on isolating a single compound, such as vanillin. The method introduced in the new study separates five individual compounds, requires only a few steps, uses no expensive added chemicals, and can be adapted to large-scale use.

**Summary**

The researchers used a liquid-liquid extraction process called centrifugal partition chromatography, which separates individual monomers from a mixed solution based on the different solubility of each compound in two non-mixing solvents.

The GLBRC team started with lignin extracted from poplar using a copper-alkaline hydrogen peroxide pretreatment process developed in the GLBRC. They digested the lignin in the presence of oxygen gas to break it down into a mixture of oxygenated aromatic compounds, including the useful industrial chemicals vanillin and *p*-hydroxybenzoic acid. The researchers then applied the centrifugal partition chromatography to the mixture and found they could successfully isolate vanillin, syringic acid, syringaldehyde, vanillic acid and *p*-hydroxybenzoic acid in two stages of extraction.

These findings suggest that centrifugal partition chromatography can provide a scalable way to isolate valuable industrial chemicals from lignin and other biomass-derived feedstocks.

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**Publication**

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