Researchers find way to turn sawdust into gasoline

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Researchers at KU Leuven's Centre for Surface Chemistry and Catalysis have successfully converted sawdust into building blocks for gasoline. Using a new chemical process, they were able to convert the cellulose in sawdust into hydrocarbon chains. These hydrocarbons can be used as an additive in gasoline, or as a component in plastics. The researchers

reported their findings in the journal *Energy & Environmental Science*.

Cellulose is the main substance in plant matter and is present in all non-edible plant parts of wood, straw, grass, cotton and old paper. "At the molecular level, cellulose contains strong carbon chains. We sought to conserve these chains, but drop the oxygen bonded to them, which is undesirable in high-grade gasoline. Our researcher Beau Op de Beeck developed a new method to derive these hydrocarbon chains from cellulose," explains Professor Bert Sels.

"This is a new type of bio-refining, and we currently have a patent pending for it. We have also built a chemical reactor in our lab: we feed sawdust collected from a sawmill into the reactor and add a catalyst - a substance that sets off and speeds the chemical reaction. With the right temperature and pressure, it takes about half a day to convert the cellulose in the wood shavings into saturated hydrocarbon chains, or alkanes," says Dr. Bert Lagrain.

"Essentially, the method allows us to make a 'petrochemical' product using biomass - thus bridging the worlds of bio-economics and petro chemistry," he adds.

The result is an intermediary product that requires one last simple step to become fully-distilled gasoline, explains Sels. "Our product offers an intermediate solution for as long as our automobiles run on liquid gasoline. It can be used as a green additive - a replacement for a portion of traditionally-refined gasoline."

But the possible applications go beyond gasoline: "The green hydrocarbon can also be used in the production of ethylene, propylene and benzene - the building blocks for plastic, rubber, insulation foam, nylon, coatings and so forth."

"From an economic standpoint, cellulose has much potential," says Sels. "Cellulose is available everywhere; it is essentially plant waste, meaning it does not compete with food crops in the way that first generation energy crops - crops grown for bioethanol, for example - do. It also produces chains of 5 to 6 hydrocarbon atoms - 'light nafta' in the technical jargon. We are currently facing shortages in this because it is becoming quite difficult and more expensive to distil these specific hydrocarbon chains from crude oil or shale gas. In time, hydrocarbon derived from cellulose may provide an alternative," says Sels.

"Our method could be especially useful in Europe, where we have little crude oil and cannot easily produce shale gas," concluded Sels.

Provided by KU Leuven

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