

# Valeric fuels: a new generation of biogasoline and biodiesel from lignocellulose

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(PhysOrg.com) -- One of the most pressing problems of our time is the increasing demand for energy in the face of decreasing oil and natural gas reserves, which is also tied to the increasing release of the greenhouse gas CO<sub>2</sub>. Biofuels could be part of the solution to this problem.

Jean-Paul Lange and his co-workers at Shell in Amsterdam (Netherlands), Cheshire (UK), and Hamburg (Germany) have now developed a highly promising new generation of biofuels based on wood. As the scientists report in the journal [Angewandte Chemie](#), modern vehicles could use it without modification, and the existing network of fueling stations could be used for distribution.

The first generation of biofuels was based on sugars, starch, and oils derived from plants. However, because these raw materials are primarily used for food, they could not be supplied in the quantities required by the transportation sector. One potential alternative is lignocellulose (latin lignum = wood), which makes up the cell walls of [woody plants](#). This material is more widely distributed and cheaper, and its use can be produced more sustainably. However, until now lignocellulose has required complex and expensive processing for conversion to biofuels.

There is one compound that is claimed to be obtained from lignocellulose through a simple acid hydrolysis: levulinic acid, a product otherwise produced from glucose and used as an additive in the cosmetics, plastics, and textile industries. However, to date, it has not

been possible to convert levulinic acid into any fuels with satisfactory properties.

Lange and his co-workers have now found the right trick: they hydrogenated levulinic acid in a newly developed process to make valeric acid, which they then esterified to make valerates (some valerates are used as artificial flavors). This produces a new family of fuels, known as valeric biofuels. Depending on the reactants used in the esterification, the [fuel](#) may be in the form of biogasoline or [biodiesel](#), and can be mixed with other fuels currently available. Modern cars can use them without any modification to their motors; similarly, the existing network of fueling stations could be used for their distribution.

The new fuels have passed a long list of exacting tests. In one road test, ten current types of vehicle, new and used, were fuelled exclusively with a mixture of normal gasoline mixed with 15 % by volume of the vareric biogasoline, and were sent out on the road to cover 500 km a day. After a total distance of 250,000 km, no negative impacts were found in the motor, tank, or fuel lines.

**More information:** Jean-Paul Lange, Valeric Biofuels: A Platform of Cellulosic Transportation Fuels, *Angewandte Chemie International Edition*, [dx.doi.org/10.1002/anie.201000655](https://doi.org/10.1002/anie.201000655)

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