



## Preparing HMF from Biomass in Polar Aprotic Solvents

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**WARF: P140138US01**

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a cheaper, milder method to produce HMF from cellulosic biomass using polar aprotic solvents.**

### Overview

HMF (5-hydroxymethyl furfural) is a highly sought renewable compound that can be used to produce bulk and value-added chemicals. Such chemicals include FDCA, which is useful in the polymer industry, and DMF, which can be used as a liquid transportation fuel.

HMF can be prepared from cellulosic biomass using aqueous acid hydrolysis with 30 percent yields, but this requires high temperatures and pressures, and often results in undesirable byproducts like humin. Higher yields can be obtained using costly ionic liquids.

Needed is an easier, faster and more economical method to produce HMF from biomass.

### The Invention

UW–Madison researchers have developed a method to prepare HMF from biomass under mild reaction conditions without the presence of water. The reaction can use any polar aprotic solvent (e.g., tetrahydrofuran). Yields are on par with those obtained using ionic liquids.

The reaction requires mild mineral acids and moderate temperatures (about 200 degrees C). In the process, cellulose decomposes to levoglucosan, which is then dehydrated to HMF. Glucose, levulinic acid and formic acid also are produced as a result of side reactions. HMF and the byproducts can be separated from the solvent using conventional methods like distillation and evaporation.

### Applications

- Industrial scale production of HMF from cellulosic biomass

### Key Benefits

- Yields comparable to ionic liquid methods
- Sustainable
- Mild and inexpensive
- HMF is easily recovered downstream.
- Challenges the assumption that water is required

### Stage of Development

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HMF yields of 44 percent and combined HMF, levulinic acid yields of 56 percent have been obtained using this process rival those obtained in ionic liquids or biphasic systems.

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## Additional Information

### For More Information About the Inventors

- [George Huber](#)

### Related Technologies

- [WARF reference number P120325US01 describes a method to convert biomass into HMF and other value-added chemicals using organic solvents.](#)
- [WARF reference number P08210US describes a two-step process for converting lignocellulosic biomass into useful fuels and chemicals, such as HMF or DMF.](#)

### Tech Fields

- [Clean Technology](#): Biobased & renewable chemicals & fuels

For current licensing status, please contact Jennifer Gottwald at [jennifer@warf.org](mailto:jennifer@warf.org) or 608-960-9854

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