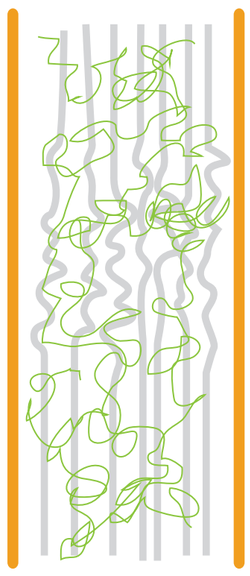
Using fermentation to make
CELLULOSIC ETHANOL

Advanced conversion processes

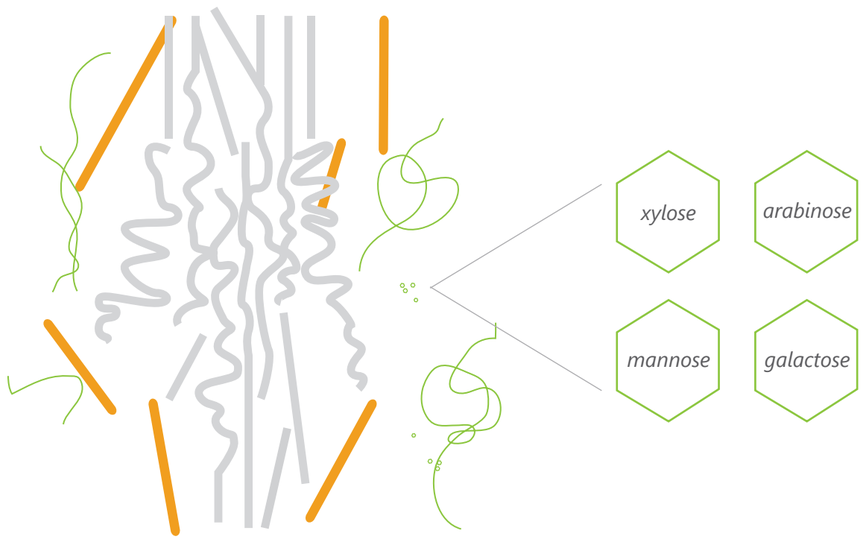
Cellulosic ethanol is an advanced biofuel. It does not compete with our food supply and is made from non-food sources such as residue from the forestry sector.

1



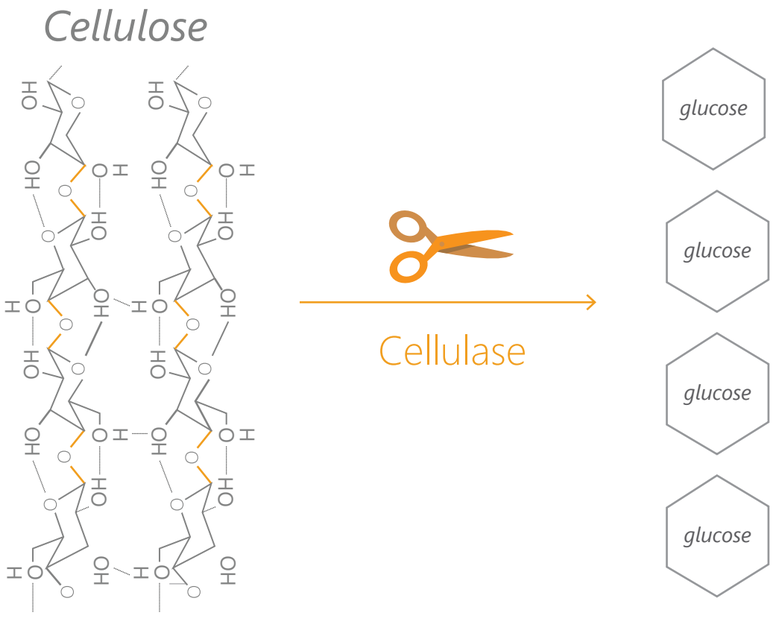
Cellulose and hemicellulose are complex sugars found within the cell walls of certain plants. They are bound by non-fermentable material called lignin.

2



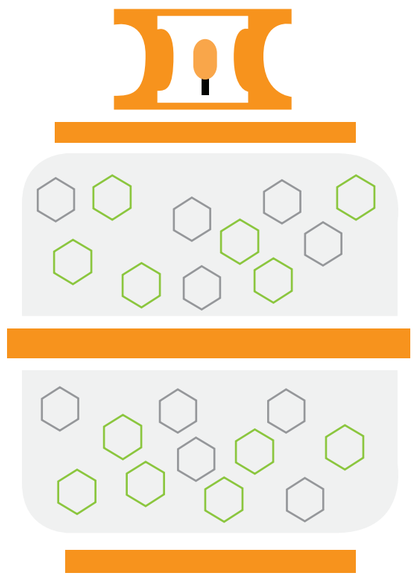
Before fermentation, plant biomass must be ground up and pre-treated with a hot dilute acid. This frees the cellulosic materials from the lignin and decomposes hemicellulose into its four individual sugars. Cellulose is still not broken down.

3



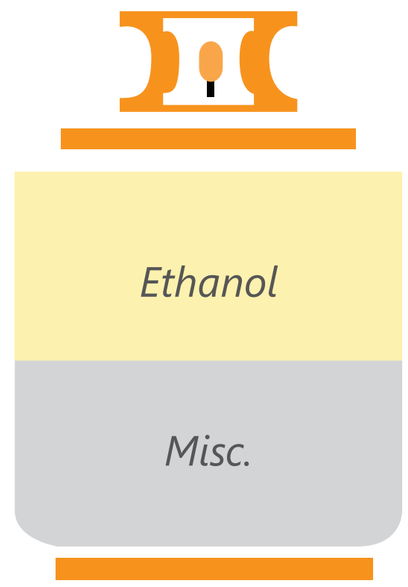
A process called cellulose hydrolysis deconstructs the cellulose. Sulfuric acid is washed off and enzymes called cellulases break down cellulose into individual glucose sugars.

4



The mixture of fermentable sugars is placed in a tank with microbes. The sugars are converted into ethanol (see fermentation fact sheet).

5



Separation occurs.
Everything that is not alcohol settles to the bottom of the tank and ethanol remains on the top of the tank.

6

The cellulosic alcohol is distilled.
It is purified and ready for use as transportation fuel.

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Adapted from information provided by the US Department of Energy.

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