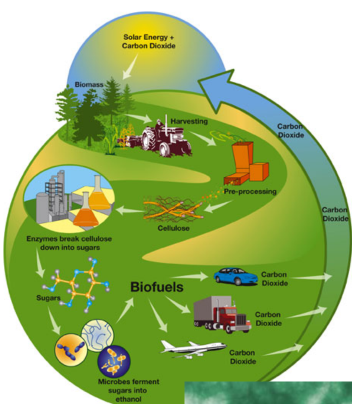
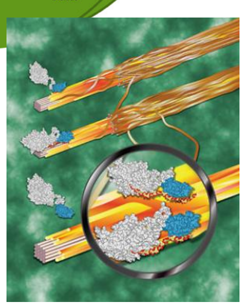
Alternative Fuels and Synchrotron Science

Research into alternative fuel sources is being conducted around the world in an effort to reduce human reliance on fossil fuels. Biofuels like biodiesel, biobutanol, and biohydrogen are being developed by scientists, often with the help of a synchrotron facility. Synchrotrons allow researchers the opportunity to study these fuels at the molecular level and determine the properties of the fuel. Important data on fuel efficiency, compatibility with current engine technology, and emissions output can be discovered. When an alternative to oil is introduced into the mainstream, there is a great chance that a synchrotron facility had a part in the development.

Biodiesel is produced from oils such as canola, rapeseed, soybean, and even animal fat. This product contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. It is less toxic than table salt and biodegrades as fast as sugar. Infra red spectroscopy can be used to determine the oil content of the seeds. This information can lead to the development of seed varieties with higher oil content. Other synchrotron possibilities include the study of a genetically engineered bacterium to improve biodiesel production. This bacterium could lay the foundation for new types of liquid fuel

www.agwest.sk.ca/publications/documents/BPnov04.rtf
www.biodiesel.org/resources/biodiesel_basics/default.shtm





http://www.sciencedaily.com/releases/2007/04/070427125709.htm

Cellulose is the primary structural component in the cell walls of green plants. A critical step in producing **cellulosic ethanol** involves breaking down a plant's cell wall material and fermenting the sugars that are released. Microbial enzymes are efficient at breaking down the plant's cell wall by binding to and digesting plant cell wall material. Once attached, a catalyst then breaks the cell wall material into small units, which can then be turned into ethanol. Synchrotron techniques can be used to analyse cellulose-binding enzymes that will break down the cell wall in a more efficient manner. Additionally, these techniques can be used to further understand lignin cellulose structures of plant material.

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