

Waste water plus bugs make hydrogen

Bacteria that feed on vinegar and waste water zapped with a shot of electricity could produce a clean hydrogen fuel to power vehicles that now run on petrol, says a research report done by Professor Bruce Logan and Dr Shaoan Cheng of Penn State University using naturally-occurring bacteria in an electrolysis cell with acetic acid, the acid found in vinegar, published in the "Proceedings of the National Academy of Sciences" on November 13, 2009. These so-called microbial fuel cells can turn almost any biodegradable organic material into zero-emission hydrogen gas fuel. This would be an environmental advantage over the current generation of hydrogen-powered cars, where the hydrogen is most commonly made from fossil fuels. Even though the cars themselves emit no greenhouse gases, the manufacture of their fuel does. According to Prof. Logan this is a method of using renewable organic matter, using anything that's biodegradable and being able to generate hydrogen from that material. The bacteria slurp up the acetic acid and release electrons and protons creating up to 0.3 volts of electricity. When a bit more electricity is added from an outside source, hydrogen gas bubbles up from the liquid.

Water is the only emission

This is far more efficient than water hydrolysis, where an electric charge is run through water to break it down into its constituent parts of oxygen and hydrogen. According to the researcher it uses about a 10th as much energy as water electrolysis. That is because the bacteria do most of the work, breaking the organic material into subatomic particles, so all the electricity does is juice these particles to form hydrogen. The resulting fuel is a gas, not a liquid, but could still be used to power vehicles. This process could be used with cellulose, glucose, acetate or other volatile acids, Logan says. The only emission is water. Although it sounds futuristic, microbial fuel cell technology is available now. The researchers have filed for a patent on this work. These cells are too large to be put into cars, so the gaseous hydrogen fuel they produce must be made in a factory. These reactors can be applied by using waste water in food processing plants or agricultural cellulosic residues and making hydrogen out of it. This would be unlikely to work in big cities but might well be effective in rural areas. Prof Logan remarked that the first step is just to start using locations where we have waste waters that were spending money on treating, and turning those water treatment plants into hydrogen production plants.

Reference: <http://www.abc.net.au/science/news/stories/2007/2089315.htm?enviro>