

## Re: Making petrol from the air

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- *From:* "Craig" <cagerken@xxxxxxx>
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Tom Anderson wrote:

Could we use electrical energy to convert air into petrol (aka gasoline)?

What i'm after is a process which allows me to build a plant where CO<sub>2</sub>, water and electricity go in one end, and alkanes and oxygen come out the other. It can be done with biotechnology, but not at a particularly great rate, i think. Is there a feasible chemical solution here?

In principle, sure. Convert CO<sub>2</sub> and water to hydrocarbons and oxygen, just like the plants do it.

The big hurdle is thermodynamics. You'd need to put in some substantial energy to make this go. Essentially, you'd be storing energy in a chemical form. Plants do this by tapping the energy in sunlight, which you have observed only comes so fast, although it is free. If you use electricity, you will invariably contend with imperfect efficiencies – 100 Joules of energy in won't ever, in practice, give you 100 Joules of energy stored. I hope your electricity is awfully cheap...

The other obvious problem is "how." The best that I know of is Fischer–Tropsch, for converting CO and hydrogen to hydrocarbons. If we could do this more cheaply than pumping oil out of the ground, we already would be. The Fischer–Tropsch synthesis has only been used in very special circumstances around the world. In the 1940's, it was used by Nazi Germany as the only alternative to a wartime blockade. South Africa under apartheid developed the technology further for similar reasons (restricted trade). Today, it is used in Southeast Asia (Indonesia, Malaysia) as a way to convert plentiful natural gas reserves into more easily transportable liquid fuels. In all of these cases, Fischer–Tropsch was viable only because of unique local conditions. In short, the best available technology for synthesizing hydrocarbon fuels is not yet better than other ways of getting them.

– Craig