

CO₂ and Methanol

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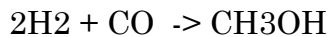
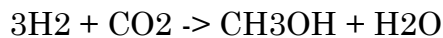
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A critical technology needing development is economical CO₂ extraction from the atmosphere or sea water. If this is accomplished then the energy transport/storage problem for a hydrogen economy is solved. We can convert to a combined hydrogen/methane economy. Hydrogen can be used in the manner methane is now, and methanol can replace oil distillates for vehicle fuel.

Methanol can also be used to drive fuel cells when combined with a steam forming process at 200 C:



Methanol is formed from CO or CO₂ using a copper catalyst at 750 PSI and 245 C:

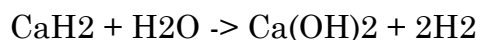


Methanol has a high octane rating, so makes for efficient ICE use. Vehicles running on pure methanol can have much lower lower NO_x, hydrocarbon and CO emissions than those run on gasoline. Methanol has good energy densities of 6.3 kWh/kg, 4.99 kWh/liter, 22,680 kJ/kg, about half that of gasoline.

Conversion of existing vehicles is feasible, but would be much easier on vehicles designed for future conversion to methanol use. For example, gas tank corrosion and dissolving of some plastics can be a problem. A vehicle designed for eventual methanol conversion, or even dual use, would not have these problems.

Methanol can also be formed from natural gas and in fact this is economically advantageous over LNG for long shipping trades. Methanol can also be reformed at the delivery end into a natural gas replacement or hydrogen.

Another potential transport mechanism is a solid: CaH₂. It has an energy density of 3.75 kWh/kg, 6.38 kWh/liter, 13,500 kJ/kg. It can be used to drive a fuel cell by simply combining it with water:



Sounds a bit like miner's carbide. The problems with CaH₂ are recycling the

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Ca(OH)₂, and the fact it is a solid.

Methanol seems to provide an immediate answer to the transport and storage problem, provided a cheap form of CO₂ recycling (not using already sequestered carbon) is available.