CHEMENTATOR

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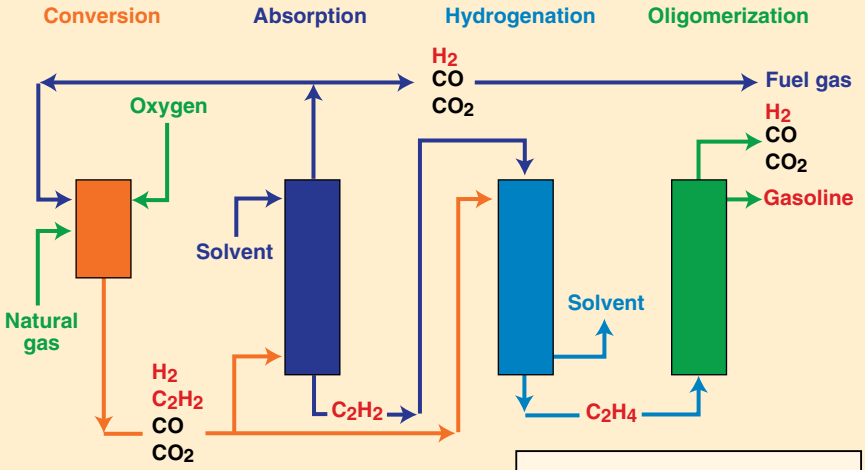
Methane-to-gasoline process nears commercialization

Synfuels International, Inc. (Dallas, Tex.; edlinks.che.com/7370-**561**) plans to commercialize its patented gas-to-liquids (GTL) process in Kuwait through a newly formed partnership with Kuwait's Aref Energy Holding (edlinks.che.com/7370-**562**). In contrast with Fischer-Tropsch technology, the process produces a high-octane gasoline blend, rather than waxy paraffins for diesel fuel. Within two years, the partners expect to start up a plant to convert about 50-million scfd of gas to 3,800–4,000 bbl/d of gasoline-blend feedstock.

Originally conceived at Texas A&M University (College Station, Tex.), the process (flowsheet) has been tested in a 100,000-ft^3/d demonstration plant since 2005. Natural gas is first converted to acetylene (plus some carbon monoxide, carbon dioxide and hydrogen) by direct-fired pyrolysis, fueled by recycled syngas and oxygen. Pyrolysis takes about one millisecond at temperatures up to 4,500°F. The acetylene is then dissolved in a standard commercial solvent and converted to ethylene by hydrogenation at around 100–300°F and 80–400 psi, over a proprietary catalyst. Finally, the ethylene is oligomerized, using a zeolite catalyst, to obtain a gasoline-blend refinery feedstock that is mostly C_7–C_9 liquids of 90–110 octane, says Edward Peterson, chief engineer. The yield is 80–85%.



Performing the hydrogenation step in the liquid phase is a key part of the process, he explains, since hydrogenation of acetylene alone is highly exothermic. "Also, we never isolate pure acetylene, but process it with other components, such as CO, CO_2 and H_2, at the appropriate temperature and pressure, to keep it below the explosive limit." The selectivity for acetylene-to-ethylene conversion is 98%, he says, and the conversion rate is 96–98%.

Synfuels International expects to produce gasoline feedstock at a cost "in the mid-$20/bbl range," using stranded gas valued at $1/million ft^3, says company chairman Ben Weber. The process is economical at a smaller scale than that of Fischer-Tropsch technology, he says, because the reaction times are fast and there is less recycle.

Amine scrubbing

Alstom Power, Inc. (Windsor, Conn.; edlinks.che.com/7370-**571**) and The Dow Chemical Co. (Midland, Mich.; edlinks.che.com/7370-**572**) have established a joint development and commercialization agreement for advanced amine scrubbing technology for the removal of carbon dioxide from low-pressure fluegases of fossil-fuel-fired power plants and other industries. Under the agreement, Alstom will commercialize and manage the installation of carbon-capture solutions using the developed process. Dow will support Alstom by leveraging its technical capabilities to co-develop an optimized capture system.