ENERGY

Cruisin' on fuel cells

Some scientists get a charge out of fuel cells and use it to power electric vehicles. In fact, it's a promising approach to achieving the performance of a petroleum-powered car from an alternative and relatively clean fuel.

Like batteries, fuel cells employ chemical energy. But while batteries are closed systems, fuel cells are open, requiring a renewable source of fuel. A system under test at Los Alamos Scientific Laboratory pumps air and hydrogen — generally derived from methanol — through a phosphoric acid electrolyte. As oxygen from the air gravitates toward one electrode, hydrogen toward the other, electrons stripped from the hydrogen flow toward an electrical load setting up a current.

Efficiencies as high as 83 percent are possible, although 50 percent is more realistic today, LASL researchers find. And being able to refuel the power supply bypasses distance restrictions hobbling current electric vehicles. In fact, computer simulations suggest that a Volkswagen Rabbit with a 15-kilowatt fuel cell (roughly equivalent to a 15-horsepower engine) would perform comparably with a Rabbit diesel while delivering better efficiency during both stop-and-go urban driving and 55-mile-per-hour cruising. Water and carbon dioxide are its only emissions.

What fuel cells don't offer is the quick energy — high power — that drivers need for acceleration. As a result, LASL's propulsion system would supplement fuel cells with batteries for providing power bursts. It is anticipated that high reliability factors and low maintenance would be selling points in carving an eventual market for such vehicles.

But how well real-world power systems actually conform to the computer-predicted performance is only now being measured at LASL with a two-kilowatt fuel-cell-powered golf cart. Computers are also working to balance the types of transmission, drive-train linkages and other variables that would be needed to design an efficient and roadworthy vehicle.

Attention distillers: About gasohol . . .

While proponents and opponents dicker with Btu-accounting in gasohol — whether gasohol alcohol requires more energy to produce than it will liberate in use — Westinghouse Electric Corp. announces how it drastically cut energy requirements at one distillery sixfold — to 20,000 Btu per gallon.

Waste heat from a Detroit-area power plant warms a pond where three Westinghouse "temperature amplifier" heat pumps tap 90 °F water to produce 220 °F air for drying corn. When not on that assignment — roughly nine months a year — the heat pumps are turned to alternate duties at the 1.8-million-gallons-per-year Alphaeus Corp. gasohol alcohol distillery.

Less ambitious distillers may benefit from a toll-free telephone hotline at the National Alcohol Fuels Information Center in Golden, Colo. From 8 a.m. to 5 p.m. (Mountain Time) technical data, research and publications like the new, and free, "Fuel from Farms: Guide to Small-Scale Ethanol Production" will be available for the dialing at (800) 525-5555.

Switching by laser

The Minnesota Power and Light Co. began the first commercial tests last month of a cost-cutting light-triggered thyristor — solid-state switch — essential in the fine tuning of alternating current transmission systems. Since laser light carried along optical fibers trips these switches, they are immune to false triggering by electromagnetic "noise". And unlike their conventional electrically triggered cousins, they require neither high-voltage pulse transformers nor expensive auxiliary power supplies operating above ground potential.

BIOLOGY

Hobby-fish farming

Sea World

Yellowhead jawfish.

Aquaculture techniques, which are being developed to contribute to the world's food supply (SN: 10/27/79, p. 290), have a lighter and more colorful side. Sea World, the "oceanarium" in San Diego, has entered the ornamental fish market with home-grown tropical fish for aquarium hobbyists. Sea World claims to be the first to raise and market the brilliantly colored, yellowhead jawfish and also the rare orange skunk clownfish. Neon gobies and baby European lobsters are also reared in Sea World's 3,600-foot aquaculture facility. The facility now can produce 6,000 fish per month and marine biologists there hope to produce 20,000 fish per month by the end of the year. Most tropical fish now sold in stores are collected in the Caribbean and the Philippines and shipped by air to the United States. Besides reducing the cost of fish, Sea World says aquaculture can protect tropical reefs from excessive specimen collection and preserve marine fish as a natural resource.

Enkephalin and the lowly leech

The peptides recently discovered to play significant roles in mammalian pain and emotion appear not to be limited to the upper end of the animal kingdom. Enkephalin-like activity has been identified in earthworms and there is preliminary evidence for opiate receptors in the blue mussel. Now Birgit Zipser of Cold Spring Harbor Laboratory reports in the Feb. 28 NATURE detection of an enkephalin-like chemical in the leech. She finds that nerve cells in the leech bind antibodies that were made to Leu-enkephalin. The binding is quantitatively similar to that of mammalian nerve cells. The enkephalin-like substance is concentrated in only one of the 400 cells making up each bundle of leech nerve cells, called a ganglion, and that cell is the same size and in the same position in every ganglion of the posterior mid-body. It is likely that these easily accessible cells can be identified and studied electrophysiologically to discover the enkephalin-like chemical's role and mechanism of action.

Competition defeats corn contaminant

Aflatoxin, one of the most potent cancer-causing agents known, contaminates corn and other grains. As little as 20 parts per billion of the toxin makes corn unfit for feed or food by federal standards. The production of aflatoxin in corn, by the mold called *Aspergillus flavus,* has been measured with respect to corn genetics, insects and weather factors. Now Donald T. Wicklow of the U.S. Department of Agriculture finds that interactions between different types of fungi colonizing a corn kernel can affect aflatoxin contamination. In experiments, Wicklow infected sterilized corn kernels with the aflatoxin-producing mold and with one of 13 other fungi. A mold called *Trichoderma viride,* which is commonly found on corn at harvest, altogether prevented *A. flavus* from growing. Another corn mold, *A. niger,* stopped *A. flavus* from producing toxin. "The two molds grew together and produced equivalent numbers of spores on sterile kernels, yet no aflatoxin was detected," Wicklow says. He is now asking how the molds interfere with aflatoxin production. *A. niger,* for example, could be affecting *A. flavus* directly or altering the corn substrate or destroying aflatoxin as it is produced. Wicklow says, "The more we learn of these phenomena, the better we will be prepared to prevent aflatoxin from contaminating grain."