CHEMISTRY

Algae as Source of Fuel

➤ THE CAPTURE of the sun's energy and the production of fuel, methane gas, has been achieved by means of a special method of harvesting algae. The process, which is still in its early stages, is being investigated by University of California scientists in Berkeley as a possible new source of fuel. Methane is a basic component for the production of gasoline and other fuels.

Small amounts of methane have been produced in the university's engineering laboratory by controlling a series of natural processes involving the growth and decay of algae.

Algae store energy through photosynthesis. When they die, the algae are attacked by bacteria at the bottom of stagnant ponds. Decay and fermentation of the algae and other organic material on the pond bottom in the absence of oxygen produces methane.

The University of California scientists have simulated the pond conditions in the laboratory. They form a controlled, closed system with detention reservoirs and tubes. They use fluorescent lamps for the "sun."

The process is started with the introduction of a dilute mixture of sewage and concentrated pond algae. Periodically, the algae are put into a digester, where bacteria break them down to give gases, including methane, carbon dioxide, nitrogen and oxygen, plus organic sludge.

At present, the system is circular and continuous. The gases and sludge are fed back for algae growth.

If methane were piped off for fuel, carbon dioxide would have to be replaced. However, a set-up is visualized where methane might be burned in a power plant that is part of a whole system, allowing recovery of carbon dioxide. A continuous closed system on an industrial scale might some day be possible. The research, now in its fundamental stage, is being conducted by Drs. Clarence G. Golueke, biologist, and William J. Oswald, engineer, in collaboration with Dr. Harold B. Gotaas. A report of the scientists work has been made to *Applied Microbiology* (Jan.).

Science News Letter, February 23, 1957

CHEMISTRY

Tire Vulcanized by Atomic Radiation

➤ AN "ATOMIC TIRE," vulcanized by nuclear radiation, has been made in Idaho by scientists from the B. F. Goodrich Company in Akron.

The feat marks the first time atomic energy has been used successfully for vulcanization, the process for treating rubber to improve its hardness, strength and other qualities.

The company's scientists reported the tire is the first large commercial item processed by nuclear radiation. Atomic vulcanization represents the first basic change in curing rubber since 1839. The tire is expected to wear longer and resist deterioration better than conventionally vulcanized tires.

Vulcanization normally involves adding sulfur and other chemicals to rubber, then heating it. This re-aligns the molecules to give the material stability.

Nuclear vulcanization was accomplished without using heat, sulfur or other chemicals. It resulted in a direct linkage of the carbon atom chains of the rubber molecules. Ordinarily, the carbon atom chains are linked through sulfur atoms, which are the weak link in regularly vulcanized rubber.

Scientists expect that, if nuclear energy becomes less expensive, tires could be vulcanized on a production basis "cold," much more rapidly than they are with today's 300-degree temperatures.

The vulcanization was done at the Atomic Energy Commission's National Reactor Testing Station in Idaho.

The tire, in a steel mold, was vulcanized by rotating it slowly over radioactive fuel elements taken from a nuclear reactor. The scientists worked out a complete mathematical model of the tire and radiation system before attempting vulcanization.

Science News Letter, February 23, 1957

NUCLEAR ENERGY VULCANIZATION—The first tire ever vulcanized by nuclear radiation is checked by B. F. Goodrich scientists at the National Reactor Testing Station in Idaho. The tire, encased in a steel mold, is slowly rotated over radioactive fuel elements in 17 feet of water which protects the scientists from radiation.

BIOCHEMISTRY

Chlorophyll Similar to Transistors in Radios

➤ THE FUNDAMENTAL CHLOROPHYLL material in photosynthesis, by which sun energy is stored by the green plant, seems to be a semiconductor, similar in several respects to the material used in making the transistors that are replacing electron tubes in radios and other electronic devices.

In the *Proceedings of the National Academy of Sciences* (Jan.), Drs. William Arnold and Helen K. Sherwood of the Oak Ridge National Laboratory's biology division report experiments that suggest the chloroplasts, or bits of chlorophyll, washed out of tobacco, spinach, beet and turnip leaves, and dried, act like semiconductors.

"If it is established that chloroplasts are semiconductors," they say, "then our ideas on the first step in photosynthesis may need some revision."

They suggest that photosynthesis has as much in common with solid-state physics as with the chemistry of solutions.

Dried chloroplasts and suspensions of Chlorella algae glow like inorganic crystals when light is shone on them and, when heated, the electrical resistance of dried chloroplasts shows changes that can be interpreted as the freeing of trapped electrons, such as happens in semiconductors.

Science News Letter, February 23, 1957