NUCLEAR PHYSICS-CHEMISTRY

New Energy Source Ahead

A new kind of chemical reaction has been discovered in the atomic pile which may give a new source of energy. It may also eliminate the radiation danger.

➤ UNEXPECTED new sources of chemical energy may be present in the atomic piles now operating, when chemists learn to control and produce when needed a new kind of chemical reaction revealed in the Atomic Energy Commission's fifth semiannual report. This new discovery may allow application of atomic energy without the deadly danger of radiation.

After irradiation in the atomic pile, potassium chloride, a salt almost exactly like table salt, is found to have the chlorine in its structure changed to sulfur. The chemist might have expected the resulting material to be potassium sulfide. That would seem to be a simple substitution of one element for another in combination with the potassium.

Instead the scientists find, on examining the resulting salt, that the newly formed sulfur has combined with oxygen as well, forming an entirely different material. This is potassium sulfate, sometimes used in fertilizers. It would not have been formed by any process with which chemists have been familiar up to now.

Explanation of the difference lies in the field of energy. Potassium chloride has its elements joined with a chemical combining power of one. The sulfur which comes out of the pile as potassium sulfate has had this power increased to six times as much.

The chemist calls this increase oxidation, because it usually accompanies combination with oxygen. It can accompany reaction with other elements as well. It must usually be brought about by supplying energy, in the form of burning fuel, electric current or the like. Its opposite is reduction. Chemists want some materials oxidized, others reduced. But a highly oxidized material may often be used to reduce some other substance.

If the enormous power present in the atomic reactors can be used not only to transmute elements but to raise them at the same time to higher states of chemical energy, as seems to be foreshadowed in the report, the result will be compounding an additional source of industrial energy with that already being used for isotope production. This will mean more efficient use of present atomic power. Possibly it can be a way toward solving one of the greatest problems in harnessing atomic energy for the future, that of applying the power at a distance from the dangerous radiation that surrounds the atomic furnace.

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NUCLEAR PHYSICS

French Pile for Research

➤ FRANCE will produce its own radioactive elements for treating cancer and other diseases, although it has no intention of making atomic bombs.

Dr. Frederic Joliot-Curie, leading atomic scientist of France, said that perhaps within two years, when a second atomic pile is put into operation, it is hoped that France will be self-sufficient in radioisotopes for medicine and industry as well as research.

Dr. Bertrand Goldschmidt of the French Atomic Energy Commission explained that the new French atomic pile would have to run 50 centuries before it would produce enough of the man-made element, plutonium, for one atomic bomb.

The atomic bomb variety of uranium is not separated in the new French pile, and only a thousandth of a gram of plutonium is made each day.

"About 2,000,000 days would be required to produce two kilograms, which the Smyth Report officially issued in America says is less than the amount necessary (to build an atomic bomb)," Dr. Goldschmidt pointed out.

Dr. Goldschmidt escaped from France after the Nazi invasion and played an important role in the development of the Canadian atomic energy project at Chalk River, Ont., before returning to France after the war.

"We shall welcome from America and other countries isotopes for more extended research and for industry and for curing diseases," he emphasized.

Dr. Joliot-Curie disclosed that he hopes the second French pile, rated as a medium power atomic furnace, will be ready in less than two years. It will operate at about 1,000 kilowatts compared with only a few kilowatts for the first pile at Chatillon, near Paris.

France's present atomic pile, aside from being the first one known to be in operation outside of English-speaking countries, is unique in technical respects. It is called, technically, a heavy water-uranium oxide pile, first of its kind in the world. Brown oxide of uranium is the raw material for the operation of the pile instead of the pure metal.

Emphasizing the peaceful aims of French atomic development, Dr. Joliot-Curie declared, "We expect to add to our knowledge and the world's knowledge of atomic processes."

Practical atomic power is another goal, because France "is a country which needs new sources of energy for its development," the French scientist added.

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AERONAUTICS

Two New American Rockets Will Be Used for Training

➤ TWO new American guided missiles, developed for the U. S. Air Force, were just revealed although both have undergone extensive testing. Both are powered with liquid fuel rocket motors, and are to be used in training launching crews.

One is the Consolidated Vultee 774, which is 32 feet long. It is the first Air Force missile approaching the size of the German V-2, which was 45 feet in length. The second is the North American NATIV, 13 feet in length. Both rockets have been fired without incident several times since the tests began last summer. Both achieved supersonic speeds.

The NATIV was developed primarily for aerodynamics research and development of control systems, although it will also be used in launching training. It has obtained an altitude of more than 10 miles. It is fired from a tall metal tower, moving on guide rails during the first few seconds of its journey.

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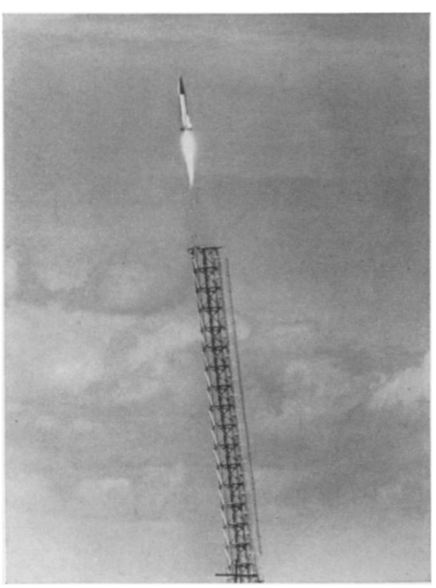

LIQUID-FUEL ROCKET LAUNCHED—The NATIV, U. S. Air Force rocket test missile, shoots from the metal framework of the tower through which it travels on guide rails the first few seconds of flight.