PHYSICS

New Atomic Material

Hint at possibility of using uranium 238, considered nonfissionable, as source for nuclear energy. It releases three to five neutrons when bombarded with relatively heavy atoms.

▶ A NEW possibility has arisen of obtaining nuclear energy directly from supposedly nonfissionable uranium that composes 99.3% of the earth's supply of this element.

The same scientific announcement that revealed the manufacture of the latest and heaviest chemical element, No. 99, tells how relatively heavy atoms of nitrogen and carbon can be used to bombard uranium isotope 238, with the release of three to five neutrons.

This is the important new discovery that may, somehow, indicate the possibility of a new atomic energy reaction, possibly even a new kind of atomic bomb. The A-bomb reaction operates by fission that releases one and a half neutrons per fission. That is necessary and sufficient to keep the chain reaction going, explosively or more peacefully in an atomic reactor.

Heretofore no use for uranium 238 has been known except to convert it to plutonium. Plutonium 239 shares with uranium 235, the rare unstable isotope, ability to fission spontaneously whenever a neutron is encountered. These are the atomic fuels that are now practical.

Heavy particles like nitrogen and carbon, used in the cyclotron in place of hydrogen and helium as bombarding particles, give rise to many neutrons, it appears from the scientific papers reporting the process in *Physical Review* (Jan. 1).

At the same time, the new elements resulting from the nuclear reactions are six and seven steps up the scale of transuranium elements. When the bombarding particle is nitrogen, this produces the new man-made element 99. This latest element has not been produced by a small step from californium, element 98. (See SNL, Feb. 13, p. 103.)

An air of mystery hangs about the discovery of the new man-made chemical element 99. Coupled with the fact that a fundamental law of cyclotron operation discovered in this country remains unpublished, while the same law has appeared in two British scientific journals, *Proceedings of the Physical Society* and *Nature,* as the independent discovery of scientists at the University of Birmingham, the wisdom of secrecy in scientific matters must again be questioned.

In the article announcing element 99 a footnote states:

"There is unpublished information relevant to element 99 at the University of California, Argonne National Laboratory, and Los Alamos Scientific Laboratory. Until this information is published the question of the first preparation should not be prejudged on the basis of this paper."

Two departments of the University of California contribute complementary papers to the current *Physical Review*. The general law of cyclotron tuning, used for producing the new element 99 in one operation by adding nitrogen to uranium 238, in the 60-inch cyclotron of the Crocker Laboratory is announced by Drs. G. Bernard Rossi, William B. Jones, Jack M. Hollander and Joseph G. Hamilton of the Crocker Laboratory, the Radiation Laboratory and the Division of Medical Physics.

According to this law, much heavier ions than the hydrogen and helium ones originally used to bombard uranium can now be used in the cyclotron.

Carbon, which is 12 times as heavy as hydrogen, and nitrogen, which is 14 times as heavy, can be kept in motion by the cyclotron's magnetic field when it is tuned to a resonance that is one-third the natural vibration period of the heavier particles. Other heavy particles that have been tried out in the cyclotron include beryllium, oxygen and neon.

Announcement of this fundamental law for operating the cyclotron by principles analogous to the well-known harmonic vibrations in music is stated in the *Physical Review* article to have been reported previously. However, the reference cited by the authors of the paper is to an unclassified report issued in 1951 by the California Radiation Laboratory, but still unpublished. This is the law reported independently by a group operating a 60-inch cyclotron at the University of Birmingham in England.

Must American scientists turn to British sources to learn what has been accomplished but kept secret in their own country?

The second paper first announces the transmutation products of uranium 238, including two isotopes of element 99. This paper is by Albert Ghiorso, G. Bernard Rossi, Bernard G. Harvey and Stanley G. Thompson of the Radiation Laboratory and the Department of Chemistry, University of California.

It may be the emission of neutrons in quantity is keeping these researches secret. This would be like keeping secret the recipe for making match heads for the production of fire. It will not keep fires from being started. It will only give commercial advantage to those who do not see any value in always doing things the hard way.

Science News Letter, February 20, 1954

AERONAUTICS

Convertible Airplanes

▶ CONVERTIBLE AIRPLANES may prove to be useful military tools, but they are not expected to revolutionize the mode of everyday travel, the Aircraft Industries Association has said.

Helicopters already are doing well on short inter-city hauls. Regular airliners are performing satisfactorily on the long-distance runs. Convertiplanes seem unlikely to improve on either of these commercial services.

However, the hybrid planes, which are the aeronautical engineer's cross between a helicopter and its fixed-wing cousin, are expected to be highly useful in military reconnaissance.

They can take off vertically and fly at fast forward speeds toward the enemy.

FIRST MILITARY CONVERTIPLANE—Known as the XV-1, this odd-looking craft, cross between an airplane and a helicopter, is called a convertiplane. The rotor is for vertical flight, the propeller for forward flight.