PHYSICAL CHEMISTRY

Make New Element 102

Curium, bombarded with accelerated carbon ions, has yielded scientists their newest man-made element, number 102, tentatively named nobelium.

➤ THE LATEST man-made element, number 102, has been created by an international team of scientists from Argonne National Laboratory, Lemont, Ill., the British Atomic Energy Research Establishment at Harwell and the Nobel Institute for Physics, Stockholm.

Only about 50 atoms, a completely unweighable amount, have been made.

The new element was found by bombarding curium, which is also a synthetic element, with carbon ions accelerated to great speeds in the Nobel Institute's cyclotron.

The U. S. and British scientists suggest the name, nobelium, for the heaviest element. The Institute where the work was performed is named in honor of the Swedish chemist, the late Alfred Nobel, who established the Nobel Prizes awarded annually for outstanding contributions in the arts and sciences.

The form of nobelium made by the international team is reported to have an atomic mass number of 253. It is very unstable, having a half life of about ten minutes. When the nobelium decays, one way by which it was identified, it emits alpha particles, which are the nuclei of helium atoms.

It was also identified by its chemical behavior in a "standardized zeo-carb resin column."

Nobelium is the fourth element scientists have reported finding in the past three years. Elements 99 and 100, einsteinium and fermium, were found jointly by groups at Argonne and at the University of California Radiation Laboratory when they examined the nuclear debris from the first hydrogen bomb explosion in November, 1952. First reports of the discoveries appeared in 1954. (See SNL, Feb. 13, p. 103, and March 6, p. 147, 1954.)

Element 101, mendelevium, was first made in 1955, by Dr. Glenn Seaborg and his associates at the California Laboratory. Only 17 atoms, an almost unimaginably small amount, were synthesized. (See SNL, May 14, 1955, p. 307.)

The scientists cooperating in discovery of element 102 were Paul R. Fields and Arnold M. Friedman of Argonne National Laboratory, John Milsted and Alan Beadle of Harwell, and Hugo Atterling, Wilhelm Forsling, Lennart Holm and Bjorn Astrom of the Nobel Institute for Physics.

The United States, through the Argonne National Laboratory, provided the very rare isotope curium 244, used in the experiments. The curium was shipped to Harwell, where it was prepared for the cyclotron bombardment. Harwell also provided the rare isotope carbon 13 that was used as the bombarding particle. The Nobel Institute provided the cyclotron, selected because it could furnish the intense speed for high-energy carbon 13 ions necessary for the experiments.

Prior to making element 102, Mr. Fields and his associates had theorized that the best chance for building it would come from bombarding the heaviest element with the lightest possible particle. Curium is the heaviest element available in sufficient quantities for testing purposes and carbon ions are the lightest particles that would create element 102.

The classification system for elements, called the periodic table, was established in 1869 by the Russian chemist, D. Mendeleev. It lists the elements in order of increasing atomic numbers. Elements heavier than uranium, number 92, are all synthetic. Curium is man-made element number 96.

Scientific details of the discovery of nobelium will be reported in a forthcoming issue of the *Physical Review*.

Science News Letter, July 20, 1957

SEISMOLOGY

Study Earth's Inner Core

➤ EARTHQUAKE waves caused by H-bomb explosions, recorded at stations halfway round the world from the Pacific, pass through the earth's inner core, two Australian scientists report.

They analyzed earthquake readings taken by sensitive seismographs during 1954 and discovered a certain pattern for four thermonuclear detonations. From this information they could reconstruct the exact time the fireballs were formed.

United States scientists, under security restrictions, have announced that seismographs can detect both atomic and hydrogen bomb explosions, but have not revealed further information. The hydrogen explosions could be of value in learning about the earth's structure, the Australian scientists point out in *Nature* (July 6).

Drs. K. E. Bullen of the University of Sydney and T. N. Burke-Gaffney of Riverview College Observatory, New South Wales, say detection of these earthquake waves from H-bombs helps to prove the earth possesses an inner core.

The currently accepted picture of the earth's structure is that it consists of four parts.

The topmost layer, with which every one is familiar, is called the crust and is 25 miles thick. Below the crust is the mantle, which is about 1,800 miles in depth. The next 1,400 miles deeper into the interior is the outer core. Completing the 4,000 miles to the center is the inner core, some 800 miles thick.

The inner core is thought to consist of a more solid substance than the outer core, which is believed to be composed of a relatively plastic material such as molten metal.

Since no one has seen more than a thin layer of the earth's crust, scientists have to use the information they can glean from seismograph readings to learn about the earth's interior. Large earthquakes release considerably more energy than a hydrogen bomb explosion, but both have now been shown to be useful research tools.

Science News Letter, July 20, 1957

AERONAUTICS

Passenger Helicopter Has Turbo-Prop Engines

See Front Cover

➤ DESIGNED WITH turbo-prop engines on its stub wings providing forward propulsion and with pressure jets at the tips of the rotor blades providing forward lift, a helicopter is being built in Britain for flight this summer.

Named the Fairey Rotodyne, it is said to be capable of carrying 48 passengers at a maximum speed of 170 miles per hour over stages of 400 miles.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows the Rotodyne's starboard engine and two rotor blades being tested on a special spinning rig at the British Ministry of Supply's experimental establishment in Wiltshire, England.

Science News Letter, July 20, 1957

WEATHER EYE—Two of these devices, developed by the Perkin-Elmer Corporation, Norwalk, Conn., will be mounted in one of the earth satellites that will circle the earth during the International Geophysical Year. They will measure radiation reflected from the earth's cloud layer to help meteorologists gather information for study and long-range forecasting.