PHYSICS

Element 98 Prepared

The first pure compound of the man-made element californium has been prepared by University of California scientists with samples weighing about ten-millionth of a gram.

➤ THE FIRST PURE compounds of the man-made element californium, No. 98, have been prepared by scientists at the Lawrence Radiation Laboratory of the University of California, Berkeley, where this element was first made.

Preparation and identification of the compounds was carried out by Drs. Burris B. Cunningham and James C. Wallmann. Three separate californium compounds—californium trichloride, californium oxychloride and californium oxide—were prepared by treatment of the element with hydrochloric acid and steam at high temperatures.

Dr. Glenn T. Seaborg, Nobel Prize-winning chancellor of the University of California at Berkeley, described the work in a distinguished lecturer's address at the winter meeting of the American Nuclear Society.

Dr. Seaborg said the feat of carrying out identifiable chemical reactions with such minute quantities of material—samples weighing about a ten-millionth of a gram—was accomplished as a result of the recent perfection, by Dr. Cunningham and his colleagues, of techniques for working on the "submicrogram" scale.

Californium is one of the "dinosaurs" of matter—an element that may have been present in the beginnings of the earth but soon disappeared through radioactive decay. The element was first fabricated with the use of the atom smashers by University of California scientists.

Dr. Seaborg also stated that a neutron irradiation program now in progress at the Materials Testing Reactor at Arco, Idaho, will yield about a ten-millionth of a gram of einsteinium (element 99) early next year. This quantity, he said, might be enough to permit the isolation of einsteinium for the first time.

Einsteinium is likely to be the only remaining transuranium element that can be isolated in visible amounts, because of the increasingly short lifetimes of the heaviest synthetic elements. Visible quantities of berkelium and californium (elements 97 and 98) were first isolated two years ago by Dr. Cunningham and Dr. Stanley G. Thompson at the Lawrence Radiation Laboratory.

Although elements beyond the presently known 102 will undoubtedly be discovered, Dr. Seaborg said, it should be possible to produce and detect not more than an additional half dozen or so.

The best chance of success, he said, lies in the firing of heavy ions into targets of high atomic number. The small number of atoms of new elements produced, coupled with their extremely rapid decay, will soon require development of new methods of identification.

Dr. Seaborg predicted that the longest-lived isotope of element 104, for example, will have a half-life of only a few minutes or less. With element 106, this will be reduced to but a few seconds or less, and no isotope of element 108 is likely to have a half-life of more than a tenth of a second.

Dr. Seaborg also described the current research efforts of Dr. Albert Ghiorso and his co-workers to discover element 103 in the heavy ion linear accelerator at the Lawrence Radiation Laboratory.

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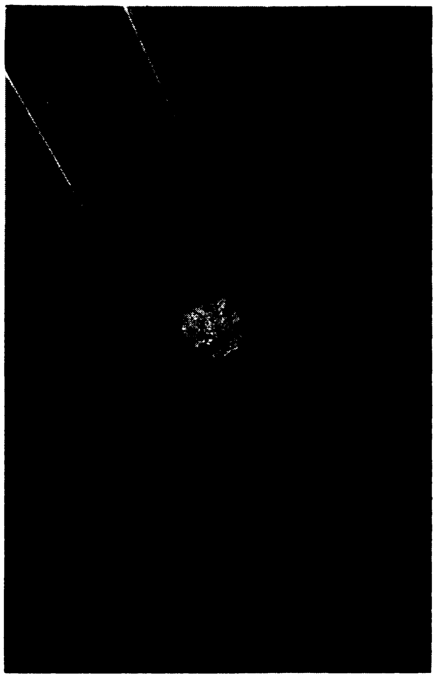

PURE CALIFORNIUM

PHYSICS

Gas Centrifuge Plant for Uranium Easily Hidden

➤ A GAS CENTRIFUGE plant to produce high-grade uranium-235 for atomic weapons could be easily hidden by any nation desiring to do so, the chairman of the U. S. Atomic Energy Commission, John A. McCone, reported.

He said that practical use of the gas centrifuge method for producing weapons is "several years away," although the process will ultimately prove useful. The problems still to be solved will be solved in time, Mr. McCone predicted.

The gas centrifuge process will not be simple or cheap. Thousands of machines would be needed to produce uranium-235 for weapons. Each, with auxiliary equipment, might cost several thousand dollars.

Scientifically and industrially advanced countries would require several years, perhaps eight, to perfect the gas centrifuge method to the point where it could produce enough material for a nuclear weapon, Mr. McCone reported. Less industrialized countries would need a much longer period, depending on how much outside assistance they received from more advanced nations.

Mr. McCone predicted that perfection of the gas centrifuge process would introduce "an additional complicating factor in the problems of nuclear arms among nations and our quest for controlled disarmament." The production plant could be simply housed. Its power requirements would be relatively small, and there would be no effects of the operation that would easily disclose the plant.

The AEC also proposed to allow private industry to work, under security wraps, on development of the gas centrifuge method.

The gas centrifuge is a machine being tested for the separation of heavy isotopes of uranium that can be handled in gaseous form. Separation of uranium-235, the fissionable variety, from the uranium-238 with which it occurs naturally is an example.

Continuation of basic research under way at the University of Virginia is planned, as well as experimental operation of small groups of machines by Union Carbide Nuclear Corporation at Oak Ridge, Tenn.

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TECHNOLOGY

Telephone Cables Girdle World via Pacific in 1964

➤ BY LATE 1964 you should be able to telephone around the world by cable.

A proposed transpacific telephone system is intended to be the immediate next step in the "round-the-world" system after the completion of the new transatlantic cable (CANTAT) next year.

The annual report of the British Commonwealth Telecommunications Board reports how plans are being developed rapidly for the construction of this stage and a complete world system.

It is expected that the laying of this cable will be completed by 1964. The route will be Sydney-Auckland-Suva-Fanning Island-Hawaii (subject to agreement of U. S. authorities)-Vancouver.

The plan is one of the largest telecommunications projects ever undertaken. It will be over 8,000 nautical miles long, with more than 300 under-sea repeaters, and will have a capacity for at least 80 simultaneous telephone conversations. In places the cable and repeaters will have to be laid to depths of almost four miles.

The total cost of the complete "round-the-world" system, as estimated by the 1959 Sydney conference, is $225 million. Of this, Britain has provisionally agreed to contribute 50%, the other half being shared among the other Commonwealth countries. The total estimated cost of the Pacific section is $75 million.

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