CHEMISTRY

Element 103 Synthesized

Element 103 has been synthesized as the last of its series. The next new element to be made by man will have properties unlike the other synthetic elements.

➤ THE NEXT NEW CHEMICAL element to be made by man, No. 104, will have properties entirely unlike the other synthetic elements, Nos. 93 through 103. The finding of element No. 103 closes the books on the actinide series since it is the last one of this group of the building blocks of the universe.

Element No. 104 should resemble hafnium and zirconium in its physical and chemical properties since it falls directly under them in the periodic table.

The various compounds of the next new element should be relatively easy to separate from the compounds of the actinides by solvent extraction, since there are marked differences in solubility.

The series of elements to be opened up by the discovery of element No. 104 are the fourth of the so-called "transitional metal series." These will include elements No. 104 through 112, if and when they are produced. The elements No. 112 through 118 will complete the seventh row in the periodic table, and also will have different properties.

The larger the atomic number, the shorter the life of the element. The half-life of element No. 103 is found to be about eight seconds. The chance of the production and identification of elements beyond No. 103 grows progressively dim. Element No. 110 has a predicted half-life of one-hundredth of a second, which may be the limit of discovery.

Element No. 103 was produced by bombarding three-millionths of a gram of californium with boron-10 or boron-11 nuclei having energies of about 70,000,000 electron volts. This was accomplished using the heavy ion linear accelerator (HILAC) in the Lawrence Radiation Laboratory of the University of California in Berkeley.

Californium was bombarded with boron nuclei and then the californium atoms emitted neutrons, thus changing the californium into element 103. The very few atoms of 103 so formed were caught on a thin copper conveyor belt that carried them in front of a series of silicon crystal detectors. Here alpha particles with 8.6 million electron volts of energy were detected. Final proof of the existence of element 103 consisted in carrying out experiments to rule out the possibility of the alpha particles coming from atoms of nobelium or mendelevium.

The atomic weight of this new element is thought to be no more than 257 but further work is planned to determine this accurately.

Since 1940, University of California scientists have discovered or participated in the discovery of ten synthetic elements heavier than uranium—from neptunium, element No. 93, through element No. 102. Who gets the credit for the discovery of element No. 102 is still a matter of controversy. A research group in Stockholm, Sweden, reported its preparation in 1957 but their results were disputed by the California scientists.

A report on the research leading to the discovery of element No. 103 has been submitted to Physical Review Letters by Drs. Albert Ghiorso, Torbjorn Sikkeland, Almon E. Larsh and Robert M. Latimer. Their work was supported by the U. S. Atomic Energy Commission.

The discoverers have suggested that the element be named lawrencium in honor of the late Dr. Ernest O. Lawrence, Nobel Prize winner, founder of the laboratory in which the discovery was made.

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TECHNOLOGY

Can Score Space First

➤ COMMUNICATION satellites offer the United States its best chance to beat the Russians to a spectacular first in space.

The United States now leads in this area of space research. The development of an operational satellite communications system by the United States for world use would reduce substantially the international impact of the Soviet achievement in manned space flight, many scientists and Government officials in Washington believe.

Rep. Jessica McC. Weis (R.-N.Y.), a member of the House Committee on Science and Astronautics, has asked the National Aeronautics and Space Administration to "leapfrog" and push ahead in communications development in space.

A report by the House space committee said " . . . the first world-wide communications system of this (satellite) type, and whether it is conducted in English or Russian, may have crucial prestige and propaganda ramifications."

Industry is eager to participate and share the cost in such a program. The American Telephone and Telegraph Company has offered to pay the Government the cost of experimental satellites and their launchings. However, NASA has announced it will continue development of its communication satellite program without industry investment.

"It is too early to start to negotiate with private industry in this field and unfair to industry to have it assume risks unknown at this time," James E. Webb, NASA administrator, said.

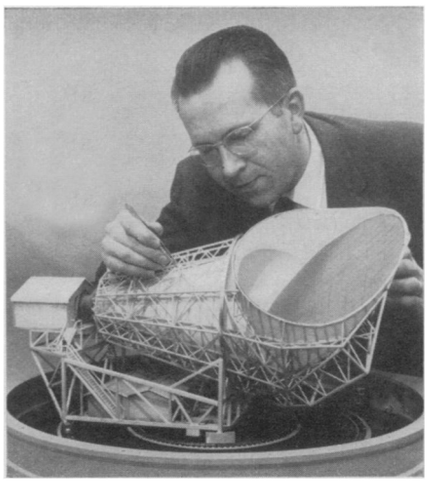
NASA officials have budgeted for a communications program, but the amount allotted is not sufficient for a crash effort. However, the entire program of communication satellites is under review.

A study by A. T. & T. on industry participation concluded that "the cost of the latest, most efficient overseas cable now being designed . . . will be substantially more per circuit than the indicated cost for satellite communication."

In addition to A. T. & T., other companies are vitally interested in development of an operational communications system by means of satellites, among these Radio Corporation of America, Philco, General Electric, International Telephone and Telegraph, General Telephone and Electronics, Collins Radio, Lockheed Aircraft and Hughes Corp.

Their interest is reinforced by scientific estimates that satellites can multiply present long-distance communications by as much as 10,000 times and can contribute to long-range radio communications and even to international TV.

Population increases, the personal and industrial demands on present facilities for communication, complicated by the saturation of the conventional radio spectrum, emphasize the need for a satellite communications system. A hornshaped antenna to be built this year near Rumford, Me., will be used for experiments in sending television and highspeed data as well as telephone calls across the Atlantic by way of satellites.



HORNSHAPED ANTENNA — For TV and telephone by satellite.

The antenna will be 177 feet long and housed in an inflated radome made of synthetic rubber and fabric that is "transparent" to radio waves. The radome will be 210 feet across and 161 feet high. People and even trucks will enter the dome through air locks to keep it from deflating.

The antenna, to be built by American Telephone and Telegraph Company, rotates on two circular tracks and also turns about its horizontal axis.

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