Science News of the Week

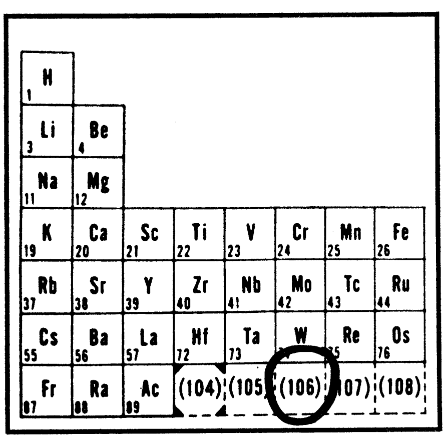
Element 106 co-discoverers Hulet, Seaborg and Ghiorso.

The Newest Element: 106

When nature finished with the earth as we now have it, it contained 92 chemical elements. For more than 30 years scientists have continually striven to produce more. The new elements are called transuranic because uranium, number 92, is the heaviest to occur naturally on earth. There is debate over whether the transuranics can and do exist naturally in the universe outside earth, but from a provincial terrestrial point of view they can truly be called manufactured elements. The parade started in World War II days with numbers 93 and 94, neptunium and plutonium. The latest news is that it has now reached element 106.

One report comes from the Lawrence Berkeley Laboratory of the University of California, a place that has a large number of transuranics to its credit. The experimenters include two nuclear chemists prominent in transuranics manufacturing since its early days, Albert Ghiorso (co-discoverer of eight other elements) and Glenn T. Seaborg (co-discoverer of four others including plutonium). Other members of the group are E. Kenneth Hulet and R. W. Lougheed of the Lawrence Livermore Laboratory and J. M. Nitschke, Jose R. Alonso, Carol T. Alonso and Matti Nurmia of LBL. The report was presented this week at the meeting of the American Chemical Society in Atlantic City.

LBL's chief competitors in the new-element business are in the Soviet Union. It is often difficult to decide who did what first to what and with what in these matters. The discoveries of elements 104 and 105 are still-unresolved matters of Soviet-American dispute. Element 106 is no exception. The Soviet claim is entered by G. N. Flerov of the Joint Institution for Nuclear Research at Dubna and 11 others. Element 106 falls into the same family of elements in the periodic table as chromium, molybdenum and tungsten.



106: Below tungsten in periodic table.

Newer and heavier elements are made by taking nuclei of a known heavy element and bombarding them with nuclei of another in hopes that the two will fuse and make nuclei of the desired element. One has to work fast because all the transuranics are radioactive. (That is why, if they ever did exist on earth, they no longer do.) Plutonium is stable enough that it can be made in large batches and is commonly used as a reactor fuel and bomb charge. Most of the others are so ephemeral that they disappear before anyone hardly knows they were there. The half-life of element 106 is 0.9 seconds.

In these circumstances chemical tests for the existence of a new element are not possible. So the experimenters record the products of radioactive decay, perhaps alpha particles, perhaps fission products, and try to identify the nuclei produced.

The LBL technique was to use the laboratory's SuperHILAC accelerator to bombard a target of californium 249 with oxygen 18 nuclei in the hope of producing the isotope of 106 with atomic weight 263. The chain of events the Berkeley scientists recorded as evidence of the presence of 106 starts with the emission of an alpha particle with 9.06 million electron-volts energy, which changes the 106 into an isotope of element 104, which the Berkeley people call rutherfordium 259. The element 104 emits alpha particles of 8.8 million electron-volts and becomes nobelium 255 (element 102), and then the latter decays, giving off an 8.11-million-electron-volt alpha particle.

In the Soviet Union, Flerov and his colleagues bombarded lead 207 and 208 with chromium 54. They then recorded fission products that they consider evidence of element 106. On the whole the American group tends to feel that its evidence is better, but it intends to try to duplicate the Soviet experiment to prove it right or wrong.

Usually the discoverer of a new element has the privilege of suggesting a name for it. In view of a simultaneity of the Dubna and Berkeley work, the LBL group is not doing this, but leaving the choice to the International Union of Pure and Applied Chemistry. IUPAC is still juggling the hot potatoes involved in the discoveries of elements 104 (rutherfordium or kurchatovium) and 105 (hahnium or bohrium), so it now has three such disputes to decide. □

Chemical prevents fertility in mice

The search for a male fertility control agent has taken researchers from hormone control to sperm duct valves to immune-reaction control. Many of the experimental techniques have worked but most have unfortunate side effects that send researchers back to the lab bench. Now, for the first time, fertility in male mice has been controlled with a nontoxic sugar, an effect which the major investigator calls "quite startling and remarkable."

Roy L. Whistler, a Purdue University biochemist, reported at the American Chemical Society's annual meeting in Atlantic City this week that his team has successfully prevented spermatogenesis in male mice for up to two months with oral and injected doses of 5-thio-D-glucose, an analogue of the common sugar glucose. (An analogue is a chemical that has the same chemical and physical properties as another but a different structure and origin.)

Whistler and colleagues John R. Zysk, Alfred A. Bushway and William W. Carlton made the compound by substituting a sulfur atom for the oxygen