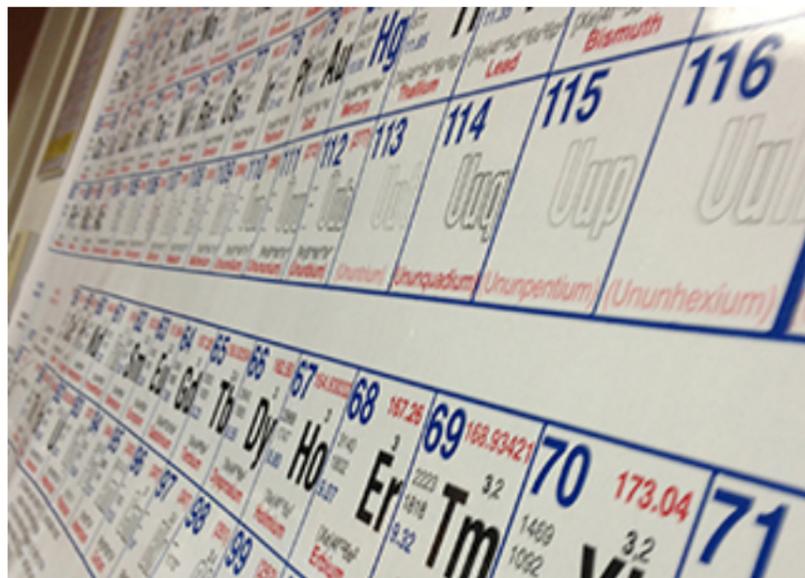


New Super-heavy Element 117 Found

Australian National University



The stage is set for a new, super-heavy element to be added to the periodic table following research published in the latest *Physics Review Letters*, by a multinational team of physicists and chemists, including researchers from The Australian National University.

Led by researchers at Germany's GSI laboratory, the team created atoms of element 117, matching the heaviest atoms ever observed, which are 40 percent heavier than an atom of lead.

"Making element 117 is at the absolute boundary of what is possible right now," says Professor David Hinde, Director of the Heavy Ion Accelerator Facility operated by the ANU Nuclear Physics Department.

"That's why it's a triumph to create and identify even a few of these atoms."

The periodic table includes every known element, from the lightest substances, hydrogen and helium, through to super-heavy elements, nearly 300 times heavier than hydrogen.

Each chemical element is defined by the number of protons in its nucleus. The new element has 117 protons, hence its temporary name.

Super-heavy atoms such as element 117 have not been found in nature, but can be made by fusing together the nuclei of smaller atoms that combine to give the right number of protons.

But the chances of successfully forming a single atom of element 117 are very low.

In this experiment, carried out at the German accelerator laboratory GSI, over 10^{19} (ten billion billion) extremely rare calcium-48 nuclei, with 20 protons and 28 neutrons, were fired at a target made of the even rarer isotope, berkelium-249, having 97 protons.

The researchers were able to identify four atoms of element 117 by their characteristic radioactive decay, which occurs within a tenth of a second.

The German researchers regularly visit ANU and collaborate on related experiments using the ANU Heavy Ion Accelerator Facility. These Australia-based experiments provide unique insights into the best choice of nuclei to collide in order to form still heavier elements.

The first report of the creation of element 117 came from a Russian group in 2010. The international body that defines the periodic table, IUPAC, does not acknowledge the creation of a new element until there is independent corroboration from another accelerator laboratory.

"On the basis of this paper it is likely that element 117 will be accepted," Hinde says.

Evidence for the creation of element 118 has also been found in Russia. However, Professor Hinde is already looking further forward.

"The big question is, how can we create elements 119 and 120?"

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