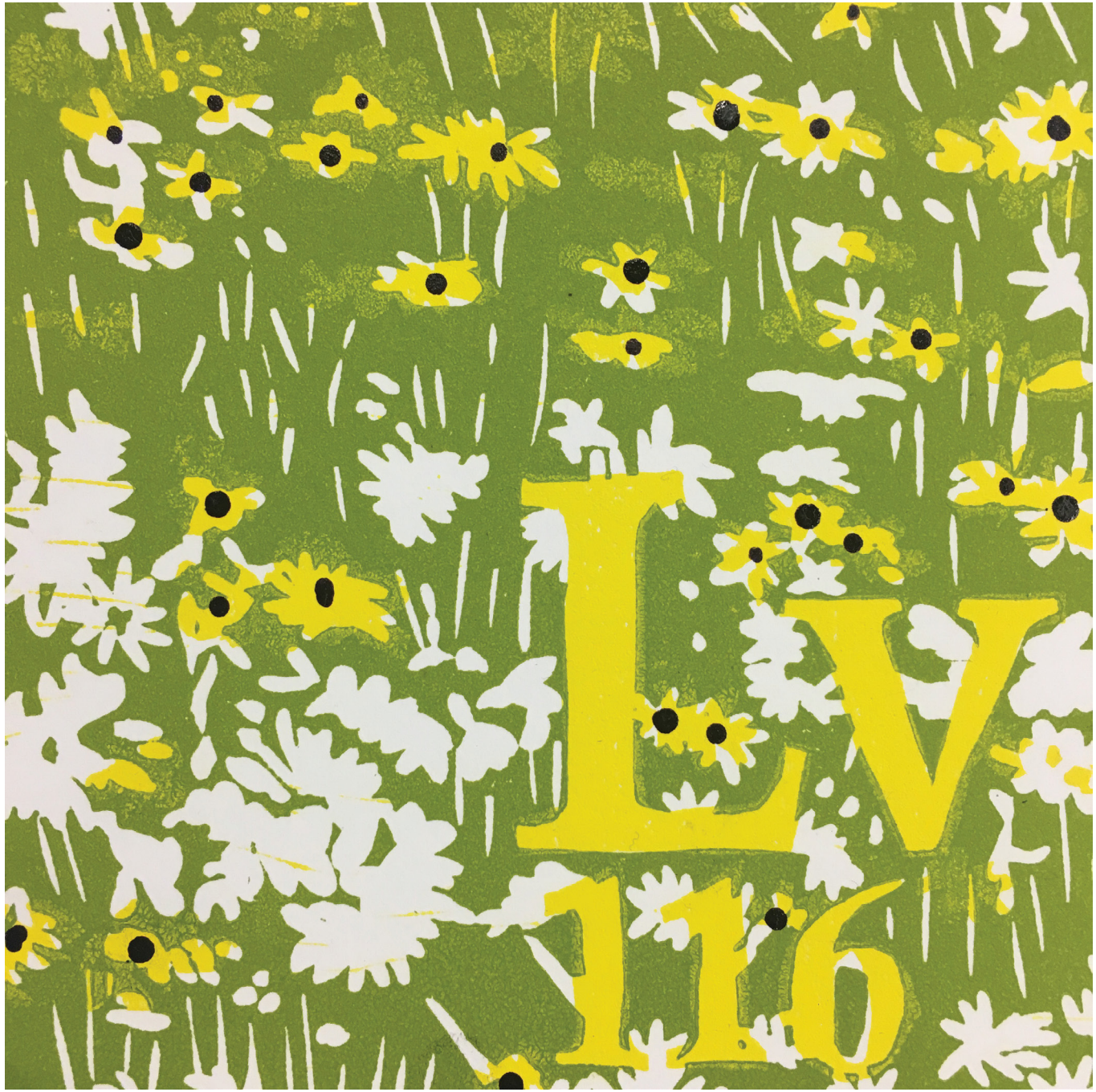

TINA CURTIS

LIVERMORIUM

Element Symbol: Lv
Atomic Number: 116

In celebration of
The International Year of the
Periodic Table of Chemical Elements

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LIVERMORIUM

Before it was named livermorium, ununhexium (the placeholder name for element 116) was at the centre of a scandal. A 1999 report in Physical Review Letters by a research team from the Lawrence Berkeley National Laboratory claimed synthesis of both element 118 (later to be named oganesson) and its daughter by alpha decay, element 116, by high-speed collision of krypton-86 with lead-208. Through multiple failures of other laboratories to reproduce this experiment, the team discovered to their chagrin that their published observation of the decay chain was unsupported by their own data, implicating the lead author in scientific misconduct. The paper was retracted in 2002, with the laboratory resolved to learn from their mistakes.

Meanwhile, a research team based at the Joint Institute for Nuclear Research in Dubna, Russia was engaged in 2000 with its own synthesis attempts: firing accelerated ions of calcium-48 at a curium-249 target. Repeated experiments by this laboratory and others confirmed the finding, and in 2011 the International Union of Pure and Applied Chemistry/Physics Joint Working Party accepted the Dubna team's claim for the discovery of element 116. Reportedly, the leadership of the laboratory wished to name element 116 "moscovium" after the Moscow region where the laboratory is based. However, the Russian-American team of researchers ultimately decided on livermorium instead, in recognition of the collaboration by the Lawrence Livermore National Laboratory on the element's discovery. Livermorium was officially added to the periodic table in 2012, and was joined in the seventh period by its almost-namesake in 2016.

As a superheavy element, livermorium is radioactive and extremely unstable, with a half-life of mere milliseconds across the range of its known isotopes. It is exclusively accessible on Earth through human-directed synthesis. Any knowledge of livermorium's chemical properties is thus based on the consideration of trends arising from the periodic system, as well as computational calculations. Element 116 is currently the heaviest member of group 16, the chalcogens, with the valence electron configuration ns2np4. Due to the relative stabilisation of the pair of electrons occupying the valence s-orbital (inert pair effect), especially for heavier elements in the group, the most common stable oxidation state among the chalcogens is +4. Because the valence electrons of superheavy elements move at a greater velocity than those of their lighter counterparts, some variation in chemistry is expected: for livermorium, this may mean an energetically split p-orbital giving rise to a second inert pair, causing greater stability of the +2 oxidation state over +4. The oddities in livermorium's chemistry – along with those of other superheavy elements – remain unconfirmed until such a time that synthetic methods can reliably produce their more neutron-rich isotopes, thus elevating certain superheavy elements to the fabled "island of stability."

Provided by Anna Ahveninen, RACI Communications Officer

Resources

https://web.archive.org/web/20071012075515/http://physicsworld.com/cws/article/news/2629
https://www.nytimes.com/2002/10/15/science/at-lawrence-berkeley-physicists-say-a-colleague-took-them-for-a-ride.html?scp=2&sq=victor%20ninov&st=cse&pagewanted=1

ARTIST'S DESCRIPTION

The Lawrence Livermore National Laboratory, for which this element is named, is based in California. California always makes me think of daisies because of the 60s "flower power" and "summer of love" movements. Livermorium, an extremely radioactive synthetic element, has not been seen in nature but only in the laboratory. Spring flowers such as these daisies can be seen in the rolling grasslands of Livermore County in California. The daisies are fleeting but not nearly as fleeting as isotopes of Livermorium with half-lives of less than 60 milliseconds.

TINA CURTIS