The Year of the Periodic Table – Going Superheavy

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In the last decade we have seen the production of new elements for the Periodic Table up to nuclear charge 118. How far can we go? Where does the Periodic Table end and can we place the elements correctly into the Periodic Table as for example suggested by Pekka Pyykkö?[1] What chemistry can we do with such exotic elements?[2] What is the chemical and physical behavior of these exotic elements, and do we have to go beyond standard relativistic quantum mechanics to understand them? Recent developments in relativistic quantum theory have made it possible to obtain accurate electronic properties for the trans-actinide elements with the aim to predict their chemical and physical behavior.[3] We are now able, albeit with some computational effort and sophisticated algorithms, to correctly predict the aggregate state of these elements.[4] First-principles relativistic quantum simulations show that Cn is a liquid at standard conditions with a narrow temperature range to the gas phase,[5] behaving more like a rare gas, whilst Og shows a rather unusual Fermi-gas like behavior [6] being more reactive than the lighter rare gas elements and a semi-conducting solid at ambient conditions.[7,8]

References

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