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ORAL PRESENTATION - Superheavy element 114 is a volatile metal

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Abstract content

The experimental determination of chemical properties of element 114 (E114) is among the hottest topics in superheavy element research. A first experiment reported E114 to be highly volatile, and to form weak physisorption bonds with Au surfaces [1]. However, the large uncertainties of the measured adsorption enthalpy covered a wide range in volatility, which prevented the experiment from yielding an unambiguous answer concerning the chemical properties of E114. A noble gas-like behavior, representing a break in the trend in group 14 in the periodic table, would be in contradiction to many recent theoretical calculations, which predict a higher volatility and inertness compared to the lighter homolog Pb, but a stronger metallic behaviour compared to Cn [2-4]. We have performed a gas phase chemical study of E114 using a combination of the TransActinide Separator and Chemistry Apparatus (TASCA) to isolate single atoms of E114 [5], and the Cryo-Online Multidetector for Physics and Chemistry of Transactinides (COMPACT) [6], a gas chromoatography detector suitable for studying the interaction of single atoms with metallic Au surfaces. The setup allowed studying elements covering a broad range in volatility, from the non-volatile heavy metal Pb to the noble gas Rn, at a very low background level. In our experiment, the volatility of five elements was studied: the two superheavy elements E114 and Cn (Z=112), their lighter homologs Pb and Hg, and the noble gas Rn. Two element 114 decay chains, one from288114 and one from 289114, have been detected and indicate E114 to adsorb on Au surfaces at room temperature [7]. The interaction of element 114 with Au is at least as strong as that of Cn, in contradiction with a previous experiment [1]. Our results show element 114 to be the least reactive member of group 14, but still a metal.

`References`

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