

Extraction Chromatographic Studies of Rf (Z=104) Homologs Using Crown Ether Based Resins

Megan E. Bennett

University of Nevada – Las Vegas

Studying the chemistry of transactinide elements, such as Rf (Z=104), allows not only for the element to be properly placed in the periodic table but also allows for extrapolation of the electronic structure based upon the position of the element in the Periodic Table. The chemical behavior of a transactinide element compared to its homologs allows for assessment of the role that relativistic effects play in chemical behavior of the heaviest elements, which in turn allows for a better understanding in the fundamentals that govern the Periodic Table. In order to study the chemistry of the transactinides chemical studies on homologs and pseudo-homologs of the Rf must first be done.

Separations based on extraction chromatography resins show promise in achieving the short separation times, high yields and separation factors that are necessary for transactinide studies. It has been previously shown that liquid-liquid extraction systems based on dicyclohexano-18-crown-6 and dibenzo-18-crown-6 are suitable for chemical studies of Rf. The extraction mechanism is based on the hydronium complex of the crown ether, this allows for intra-Group IV separations, however physical pre-separation of recoil products is necessary as the crown ethers complex formed is not inter-Group specific. The adsorption of Zr and Hf, the lighter homologs of Rf, on various crown ether based resins has been investigated from a hydrochloric acid matrix to evaluate the suitability of these systems for the study of Rf.