

Preparation of Plutonium Arene Complexes Through Oxidative Dissolution of Plutonium Metal

Ayush Gupta¹, Daniel J. Lussier¹, Andrew J. Gaunt¹, Aaron M. Tondreau^{1*}

¹Los Alamos National Laboratory, Los Alamos, USA; *tondreau_a@lanl.gov,

Oxidation and dissolution are important parts of reprocessing and purifying plutonium metal. Chlorination of plutonium metal using chlorine gas is a particular challenge due to its toxicity and handling challenges. Our group has been interested in advancing milder chlorinating reagents, such as GaCl₃, which can chlorinate *f*-element metals under a variety of conditions. Previous work by our group has established ethereal solvents as a possible media to effect this GaCl₃ mediated oxidation of plutonium metal. Here, we report that aromatic solvents are also competent solvents to effect this oxidation. Here, the GaCl₃ reagent acts as an oxidant, a chloride source, and as a capping ligand to form the final product. Bond metrics and spectroscopic data will be presented to elucidate periodic trends across the lanthanide and actinide series for these complexes. Notably, this is one of the few isostructural and isomorphous series of complexes that span the lanthanide and actinide series. Further reactivity studies will be presented to establish a more organometallic understanding of the complex.