EXPLORING THE PHOTOREDUCTION OF Au(III) COMPLEXES IN THE GAS-PHASE

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We have used photodissociation spectroscopy to probe the electronic structure and photoreduction of Au(III) in gas-phase complexes containing Cl^- and OH^-. The gas-phase electronic spectrum of $[AuCl_4]^-$ closely resembles the aqueous solution spectrum, showing a lack of strong solvatochromic shifts. Substitution of Cl^- ligands with OH^- results in a strong blue shift, in agreement with ligand-field theory. Upon excitation, $[AuCl_4]^-$ can dissociate by loss of either one or two neutral Cl atoms, resulting in the reduction of gold from Au(III) to Au(II) and Au(I) respectively. The hydroxide substituted complex, $[AuCl_2(OH)_2]^-$, demonstrates similar behavior but the only observable fragment channel is the loss of two neutral OH ligands, leading only to Au(I).