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Abstract

Synthesis and Structural Characterization of Cyclometallated Gold(III) Complexes

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The study of organogold complexes has drawn increasing interest as practical applications of this chemistry including antitumor activity have been discovered. With this in mind, this study explores fundamentals of structure and bonding in gold(III) complexes. Specifically, cyclometallated gold(III) planar complexes were synthesized, incorporating 1,3,7-trithiacyclononane(9S3) ligands. These complexes were accessed through a scheme first involving the preparation of neutral intermediates of the form $Au(N^{\wedge}CH)Cl_3$ ($N^{\wedge}CH = 2\text{-}(p\text{-tolyl})\text{pyridine}$, $2\text{-}(2'\text{-benzothienyl})\text{pyridine}$). These neutral noncyclometallated complexes were heated as neat solid complexes to induce cyclometallation. The cyclometallated complexes of the form $Au(N^{\wedge}C)Cl_2$ were then reacted with 9S3 and metathesized to access the target complex salts of the form $[Au(N^{\wedge}C)(9S3)](PF_6)_2$. These systems were characterized by numerous methods including one- and two-dimensional nuclear magnetic resonance spectroscopy, electronic spectroscopy, thermogravimetric analysis, differential scanning calorimetry and X-ray crystallography.