

Group 11 Complexes with the Bidentate $(\text{SePPh}_2)_2\text{CH}_2$ and Tridentate $[(\text{SePPh}_2)_2\text{CH}]^-$ Ligands

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The reaction of $(\text{SePPh}_2)_2\text{CH}_2$ with group 11 metal complexes such as $[\text{Au}(\text{C}_6\text{F}_5)_3(\text{tht})]$ (tht = tetrahydrothiophene) affords the complex $[\text{Au}(\text{C}_6\text{F}_5)_3(\text{SePPh}_2\text{CH}_2\text{PPh}_2\text{Se})]$ in which the ligand coordinates to the gold(III) center only through one selenium atom. The treatment of the ligand with $\text{Ag}(\text{OTf})$ or $[\text{Cu}(\text{NCMe})_4]\text{PF}_6$ leads, depending on the molar ratio, to the complexes $[\text{Ag}_2\{(\text{SePPh}_2)_2\text{CH}_2\}_2](\text{OTf})_2$ or $[M\{(\text{SePPh}_2)_2\text{CH}_2\}_2]X$ ($M = \text{Ag}$, $X = \text{OTf}$; $M = \text{Cu}$, $X = \text{PF}_6$; $\text{OTf} = \text{CF}_3\text{SO}_3$) in which the phosphine selenide ligand coordinates as a bidentate bridging or chelating ligand through the Se,Se atoms. The reaction of $(\text{SePPh}_2)_2\text{CH}_2$ with $[\text{Au}(\text{C}_6\text{F}_5)_2(\text{acac})]$ (acac = acetylacetonate) occurs with deprotonation of the methylene group, and the methanide complex, $[\text{Au}(\text{C}_6\text{F}_5)_2(\text{SePPh}_2\text{CHPPh}_2\text{Se})]$, is obtained, with a bidentate chelate Se,C coordination to the gold(III) center. The selenium atom can react further with other metal complexes such as $[\text{Au}(\text{C}_6\text{F}_5)_3(\text{tht})]$ to give the dinuclear species $[\text{Au}(\text{C}_6\text{F}_5)_2\{\text{SePPh}_2\text{CHPPh}_2\text{SeAu}(\text{C}_6\text{F}_5)_3\}]$, in which the ligand coordinates in a tridentate Se,C,Se form. The crystal structure of $[\text{Au}(\text{C}_6\text{F}_5)_2\{\text{SePPh}_2\text{CHPPh}_2\text{SeAu}(\text{C}_6\text{F}_5)_3\}]$ has been established by X-ray diffraction.

Key words: Group 11 Metals, Selenium Ligands, Methanide Ligands