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Synthesis and Characterization of Bissilyl Cobalt and Iron Hydrides Bearing Disilazane Ligands via Si-H Bond Activation

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Abstract

The reaction between 2-pyridinetetramethyldisilazane **1** and CoMe(PMe₃)₄ led to the formation of the novel bissilyl cobalt(III) hydride CoH((C₅H₄N)-N(SiMe₂)₂)(PMe₃)₃ (**2**) via the cleavage of two Si-H bonds with the elimination of methane. The reaction of phenyltetramethyldisilazane **3** with CoMe(PMe₃)₄ could directly provide the hydrido cobalt(III) complex CoH((C₆H₅)-N(SiMe₂)₂)(PMe₃)₃ **4**. Complex **4** is an analogue to complex **2**. This result indicates that a pre-coordination of the nitrogen atom in pyridine to the cobalt center before Si-H bond activation can be excluded in the formation mechanism of **2**. This exclusion is further supported by the *in situ* ¹H NMR spectra of the reaction mixtures between 2-pyridinetetramethyldisilazane **1** with CoMe(PMe₃)₄ in C₆D₆ in different reaction times. A new bissilyl iron hydride FeH((C₅H₄N)-N(SiMe₂)₂)(PMe₃)₃ (**5**) was obtained through the reaction of Fe(PMe₃)₄ with **1**. Complexes **2**, **4** and **5** with two metal-Si bonds are very stable and did not react with MeI, EtBr, acetylacetonone, CO or CO₂. The molecular structures of complexes **2**, **4** and **5** were determined by single crystal X-ray diffraction.

Keywords: Si-H bond activation; Silyl iron hydride; Silyl cobalt hydride; Disilazane ligand; Trimethylphosphine

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