

Title: Formation of H₂ from Silane Interactions with Electrophilic Nickel

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We have discovered that, when you make Ni⁺² sufficiently naked of ligands, the metal's electrophilicity becomes so high that it grabs any electron density locally; in this case it grabs the sigma bond between Si and C of its own ligand "backbone." This is the origin of the unusual structure of our (PNP)Ni⁺, where PNP is the tridentate ligand [tBu₂PCH₂SiMe₂)₂N]⁻¹. We have explored the reactivity of mono-, di-, and tri-substituted silanes (PhSiH₃, Ph₂SiH₂, PhMeSiH₂, and Et₃SiH), and discovered that the more bulky substituted the silane, the slower the reaction to the point of no reaction was observed. It is interesting to note that silanes that exhibit reactivity form the final product that is the same as the H₂ analogue reaction with (PNP)Ni⁺: [PN(H)P]NiH⁺. We discovered that the hydrogen additions on the nitrogen and on the nickel originated from two different silanes, instead of one, through isotopic ESI mass spectrometry studies. However the mechanism of this reaction is still under investigation. One possible mechanism of how this reaction occurs begins with a base abstraction of either a silicon or a proton of a coordinated silane.