The Catalytic reduction of hydrazine to ammonia at vanadium thiolate complexes: biomimetic models of vanadium nitrogenase

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Nitrogen fixation catalyzed by nitrogenases is an important process in biological systems. The finding of V-nitrogenase prompted us to focus on the chemistry of vanadium compounds related to dinitrogen reduction. Previously, we have reported a vanadium thiolate complex binding with hydrazine, an intermediate of nitrogen fixation. Herein, we isolated the precursor of this hydrazine adduct, $[V(PS3")(Cl)]^-$ (**1**) (PS3" = $[P(C_6H_3\text{-}3\text{-}Me_3Si\text{-}2\text{-}S)_3]^{3-}$). Furthermore, compound **1** catalyzed the reduction of hydrazine that is the late stage of nitrogen fixation. Compound **1** represents an unprecedented example that the reaction is assisted by a single vanadium center, in particular, ligating with thiolate ligands, mimicking the sulfido environment of the vanadium site in V-nitrogenase.