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Project Title: Synthesis of iron nitrosyl complexes with carbamate ligands

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Abstract: Evan Bonnand, Isaac Ramirez, S. Chantal E. Stieber

Title: Synthesis of iron nitrosyl complexes with carbamate ligands

Formation of first row transition metal complexes that can bind a nitrosyl group (NO) is of interest for understanding how biological systems reduce atmospheric pollutants, and for future chemical reactions. One approach is to construct complexes containing an ancillary ligand bound to the metal first and add the nitrosyl group second. A second approach is to form an iron nitrosyl complex with intermediate H₂O ligands first, followed by addition of an ancillary N,N-diethyldithiocarbamate ligand. This method and complex were previously reported to be air-stable, making the chemistry more accessible than typical procedures in the absence of oxygen and moisture. The current work investigated the various components of the reaction to identify the most robust procedure.

FelSO₄·7H₂O was reacted with NaNO₂ in sulfuric acid to form [Fe(NO)(H₂O)₅]²⁺, followed by addition of sodium N,N-diethyldithiocarbamate (dtc) to form (dtc)₂Fe(NO). Several different trials were conducted by changing the ratios of starting materials to determine the optimal conditions. IR spectroscopy verified the presence of the nitrosyl complex.

Additional variants included using Fe^{III} starting materials and silver

N,N-diethyldithiocarbamate, which both resulted in formation of the desired product.

Future work includes further characterization and isolation of the complex in bulk.



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