

Returnee's Report

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Program Report

<Program Contents>

I studied about syntheses of iron complexes with *N*-heterocyclic carbene ligands (tris[2-(3-alkyl-imidazol-2-ylidene)ethyl]amine, TIMEN^R) that have been studied systematically in Meyer's group. TIMEN^R can coordinate to practically all metals in the periodic table, in both low and high oxidation states. So, they are tripodal ligands suitable for studies of high-valent iron oxo complexes that are often found in biological and industrial systems, which make up to carry out a challenging theme in many scientific strategies. I synthesized two TIMEN^R ligands (R = tBu and iPr) and prepared iron complexes with TIMEN^R in inert glove box. Ligands and complexes were identified by ¹H-NMR spectroscopy.

<Achievements/Ambitions>

I synthesized TIMEN^R (R = iPr and tBu), which are prepared by deprotonation of the imidazolium precursors [H₃TIMEN^R](PF₆)₃ with KOtBu, NaH, or KHMDS as a base. Addition of FeCl₂ to THF or DME solution of TIMEN^R afforded [H₃TIMEN^R]X₃, but the iron complex was not obtained. The iron complex was not also obtained from the reaction of [H₃TIMEN^{iPr}](PF₆)₃, FeCl₂, and KOtBu in THF. Fortunately, obtained the iron complex from the reaction of [H₃TIMEN^{tBu}](PF₆)₃, FeCl₂, and KOtBu, which were by in the ¹H-NMR spectrum. However I failed in isolating as the iron complex.

I want to make use of the techniques that I learned abroad in my work.



Figure 1. The lab bench that I synthesized organic compounds on.



Figure 2. NMR measurement devices for analyzing compounds.



Figure 3. The inert glove box that I treated water- and air-sensitive compounds in.