Novel Synthetic Methods to Produce Nitrogen Heterocycles

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Complex cyclic molecules containing nitrogen atoms, known as nitrogen heterocycles, are prevalent throughout nature and are key components to many biologically active compounds and medicines. Although very common, nitrogen heterocycles are not trivial to produce. Several synthetic methods and approaches towards the formation of these heterocycles have been studied by the Brewer group as a part of our on-going research that focuses on organic synthesis. Specifically, our research focuses on the development of new synthetic organic methods to construct molecules, as well as the total synthesis of important molecules found in nature (i.e. natural products). We are currently developing new methods to prepare complex nitrogen containing molecules from simple starting materials. Specifically, hydrazones are a class of molecules that are simple to make from commercially available compounds and we have discovered that hydrazones (**Ia&b**) can react in a way that forms two new bonds and sharply increases molecular complexity

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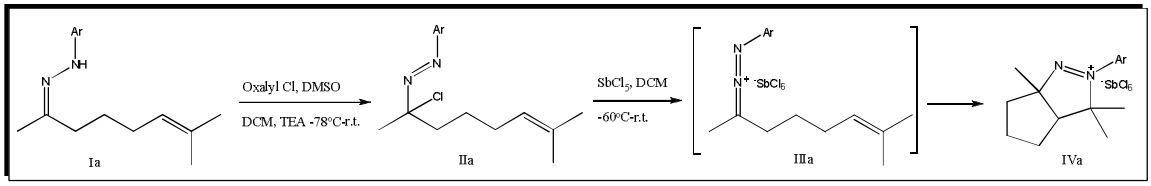
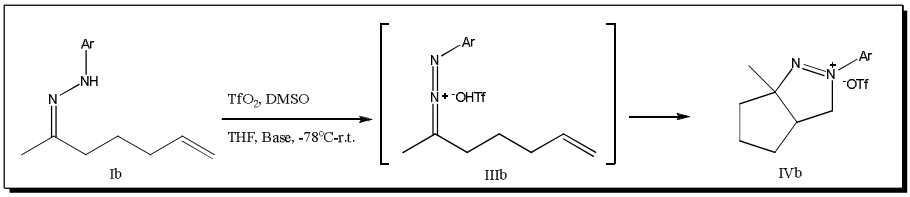


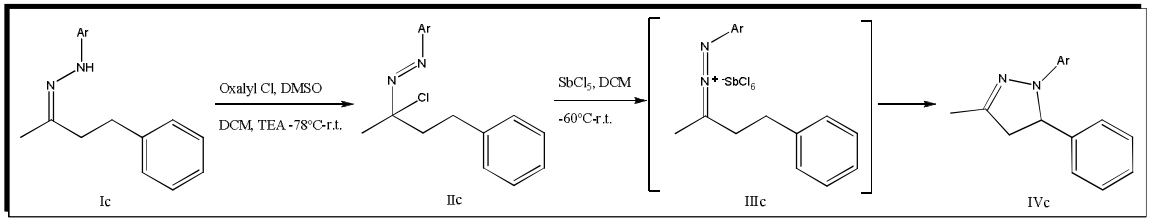
Scheme 1. Hydrazone transformation to nitrogen heterocycles.

Hydrazones are also precursors to α-chloroazo compounds(**IIa**), which under lewis acidic reaction conditions have provided 1-aza-2-azoniaallene salt intermediates (**IIIa**) in-situ (**Scheme 1**). Alternately hydrazones have reacted to produce 1-aza-2-azoniaallene salt intermediates in one step under slightly different oxidation conditions (**Scheme 2**).



Scheme 2. Hydrazone transformation to nitrogen heterocycles in one fewer step.

These 1-aza-2-azoniaallene salt intermediates, made in-situ, have proven effective in many different cyclization reactions, to create several types of nitrogen heterocycles (**IVb**). Recently this work has led us discover another novel cyclization reaction (**Scheme 3**). This new discovery has offered the potential of an alternate synthetic method towards nitrogen heterocycles. The depth and scope of this method is currently under investigation and will be presented along with the previously mentioned work.



Scheme 2. New Hydrazone transformation to nitrogen heterocycles.