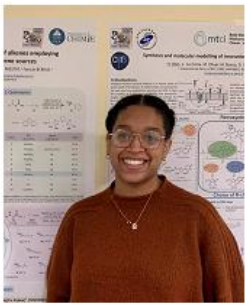
Iron-Catalysed Nitrene Transfer Processes Employing Hydroxylamine Derivatives as Clean Nitrene Sources



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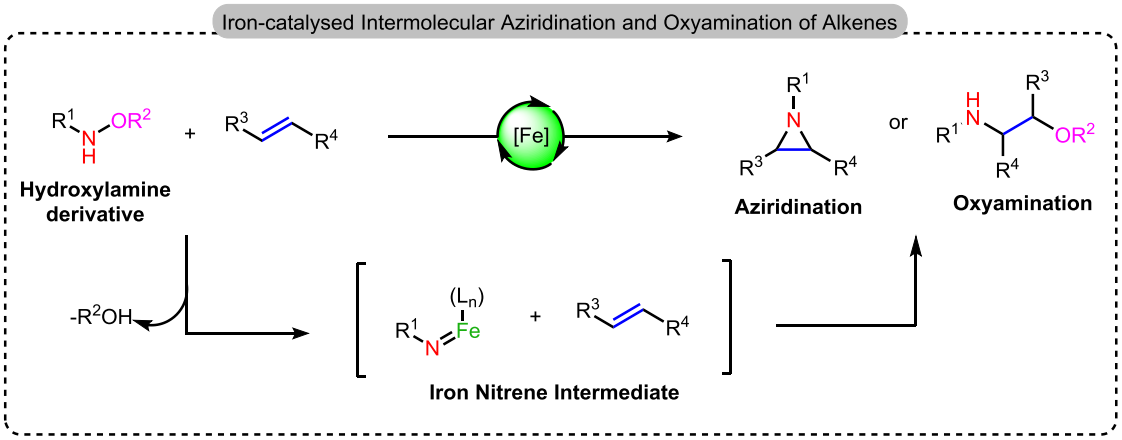
Nitrogen-containing molecules are incredibly valuable in organic synthesis as building blocks and as pharmaceutical agents. Since nitrogen atoms are ubiquitous in biologically active compounds, there has been an ongoing effort into the development of new and efficient methodologies for C-N bond formation.

Nitrenes are a powerful tool for the formation of C-N bonds and have led to the development of efficient processes such as C-H functionalisation, aziridination and alkene functionalisation.[1] Most of these developed processes are poorly atom economical, due to them requiring external oxidants, and are also based on the use of non-sustainable materials such as rare and expensive transition metals (Rh, Pd, etc.). Hydroxylamine derivatives, in the presence of a ruthenium or copper complex, can form a metal-nitrene intermediate avoiding the requirement for external oxidants, since the presence of an N–O bond acts as an endogenous oxidant.[2] Surprisingly, the generation of metal nitrenes from hydroxylamine derivatives and cheap, abundant, and non-toxic iron sources has been scarcely studied.[3]

Following our previous studies[4] on the reactivity of iron-nitrenes deriving from hydroxylamine derivatives, we will present our recently developed intermolecular iron-catalysed aziridination of alkenes using hydroxylamine derivatives as a nitrogen source.[5] This sustainable process allows for efficient access to protected aziridines in good-to-excellent yields. Furthermore, the iron-catalysed oxyamination of alkenes will also be presented. Mechanistic studies into these iron-catalysed nitrene transfer processes are currently ongoing within our group.



References

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