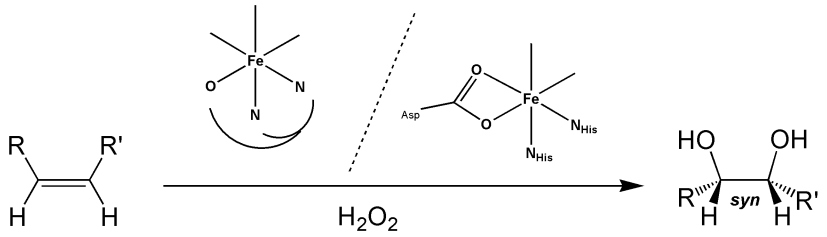
Efficient H_2O_2 Conversion into *cis*-Dihydroxylated Olefin Products Catalyzed by a Bio-Inspired Non-Heme Iron Complex

Paul D. Oldenburg[†], Albert A. Shteinman[§], and Lawrence Que, Jr.[†]

[†]*Department of Chemistry and Center for Metals in Biocatalysis, University of Minnesota, Minneapolis, Minnesota and* [§]*Institute of Problems of Chemical Physics, Russian Academy of Sciences, Chernogolovka, Moscow Region, Russia* (*email: oldenburg@chem.umn.edu*)

Our increasing understanding of oxygen activating non-heme iron enzymes has prompted an effort to design biomimetic non-heme iron oxidation catalysts. Among the bio-inspired reactions, perhaps the most attractive catalytic chemical transformation is the *cis*-dihydroxylation of olefins, a conversion that typically utilizes osmium and ruthenium reagents having significant inherent toxicities. Recently we have found that non-heme iron complexes are capable of catalyzing olefin *cis*-dihydroxylation with H_2O_2 as oxidant.[1] These complexes all, to some degree, concomitantly catalyze olefin epoxidation. The most efficient dihydroxylation catalysts developed thus far utilize tetradentate N4 ligands, a coordination environment that differs from the 2-His-1-carboxylate active site found in arene dihydroxylating Rieske dioxygenases.[2] To address this discrepancy, we have designed an amide-containing tridentate ligand to approximate the 2-His-1-carboxylate combination found in the enzymes and find that its iron(II) complex catalyzes olefin *cis*-dihydroxylation almost exclusively and with high H_2O_2 conversion efficiency.



Supported by DOE DE-FG02-03ER15455

(1) Chen, K.; Costas, M.; Kim, J.; Tipton, A. K.; Que, L., Jr. *J. Am. Chem. Soc.* **2002**, *124*, 3026-3035.
(2) Kauppi, B.; Lee, K.; Carredano, E.; Parales, R. E.; Gibson, D. T.; Eklund, H.; Ramaswamy, S. *Structure* **1998**, *6*, 571-586.