Activation of N_2O by New Homogeneous Catalysts

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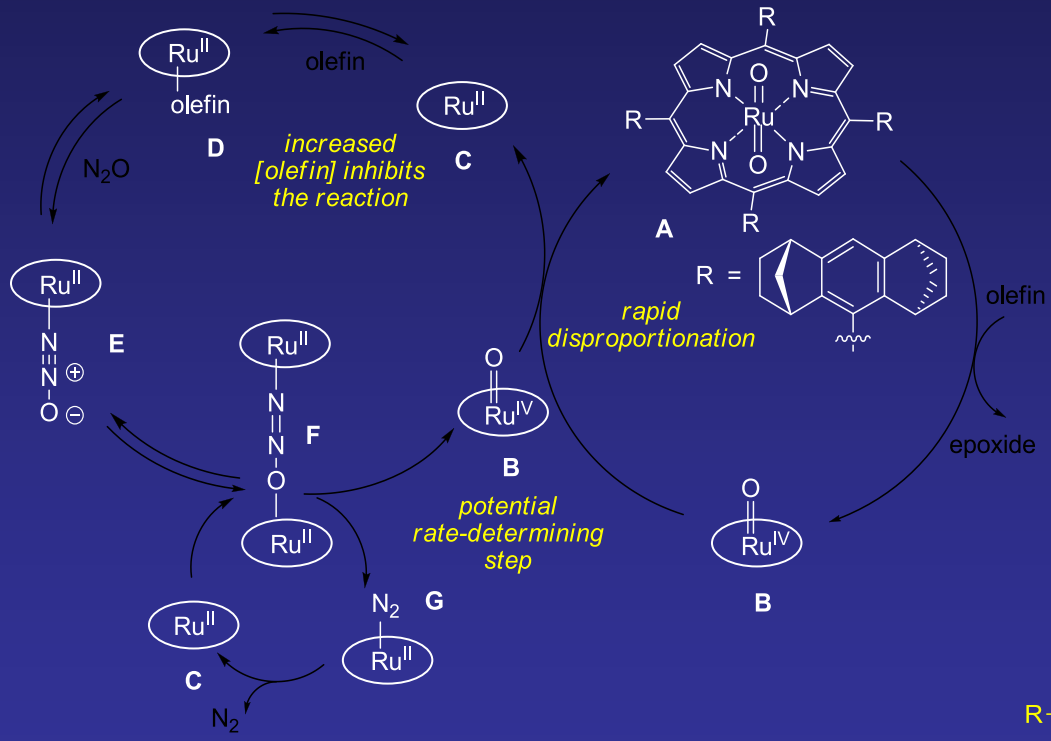
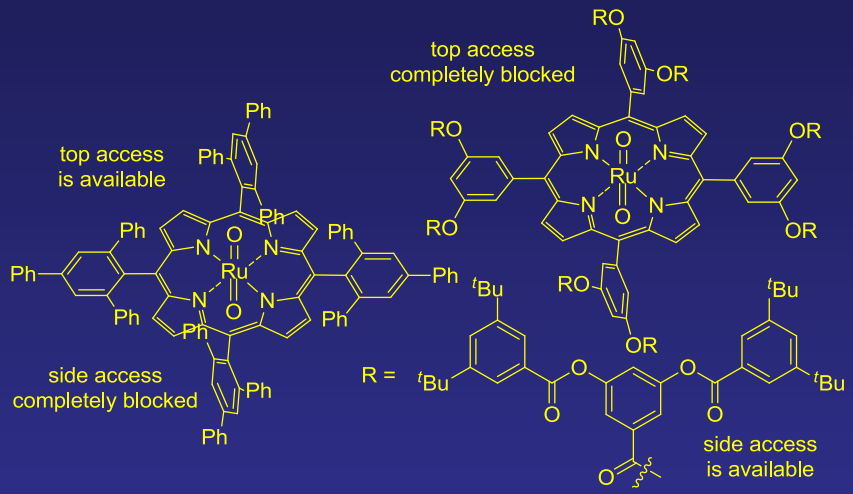
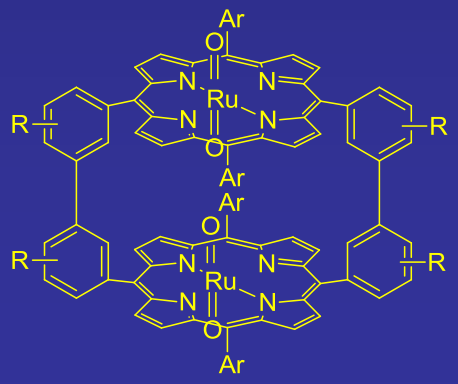
The majority of methods for oxidation of hydrocarbon feedstocks require oxidants that are not environmentally friendly. Nitrous oxide (N_2O), a potent greenhouse gas, has received attention as a benign oxidant that yields only N_2 as a waste product. The major drawback to using N_2O as an oxidant is its high kinetic stability. Homogeneous catalysts reported to activate N_2O require high temperatures and pressures. The design of homogenous catalysts capable of N_2O activation at near-ambient conditions would represent a major step forward in the utilization of this potent and selective oxidant.





catalysts that block "top" access of the olefin to the metal center *vs.* those that block "side" access

Our mechanistic studies imply that substrate inhibition is the major problem with the use of high-valent oxo complexes in the epoxidation of alkenes with N_2O and the regeneration of the Ru(VI)(por)$(O)_2$ is the rate-determining step in the reaction. We are designing catalysts to address these issues.



bi- and trimetallic catalysts to assist in activating N_2O and promoting the rapid disproportionation of Ru(IV)O intermediates back to active Ru(VI)O_2