

Synthesis and Characterization of Ruthenium Complexes as Catalysts for PCET (Proton-Coupled Electron Transfer)

Huy Nguyen

Faculty: Paul Rillema

Department of Chemistry, Fairmount College of Liberal Arts and Sciences

PCET (Proton-Coupled Electron Transfer) is a process carried out in photosynthesis, but has not been duplicated successfully with materials synthesized in the laboratory. One solution is to exploit the electron transfer capability of photoexcited ruthenium(II) heterocyclic ligand complexes by modifying the ligand with a pendent uracil component capable of both electron and proton transfer. Uracil, is an aromatic heterocyclic organic compound, contains more than one atom with available electrons. Thus, it is capable of electron donating. Moreover, the two hydrogen atoms attached to the nitrogen atoms at position 1 and 3 in the ring, in uracil are also, available for proton transfer. The newly designed complex would then be capable of simultaneously transferring electrons and protons to a substrate such as molecular oxygen to form water. Step one in this project to synthesize the modified ruthenium(II) complexes and characterizing them by various techniques in the laboratory is underway and step two would involve examining the complexes for simultaneous electron/proton reactions.