

Selective Catalytic Hydroelementation and Deuteration Reactions

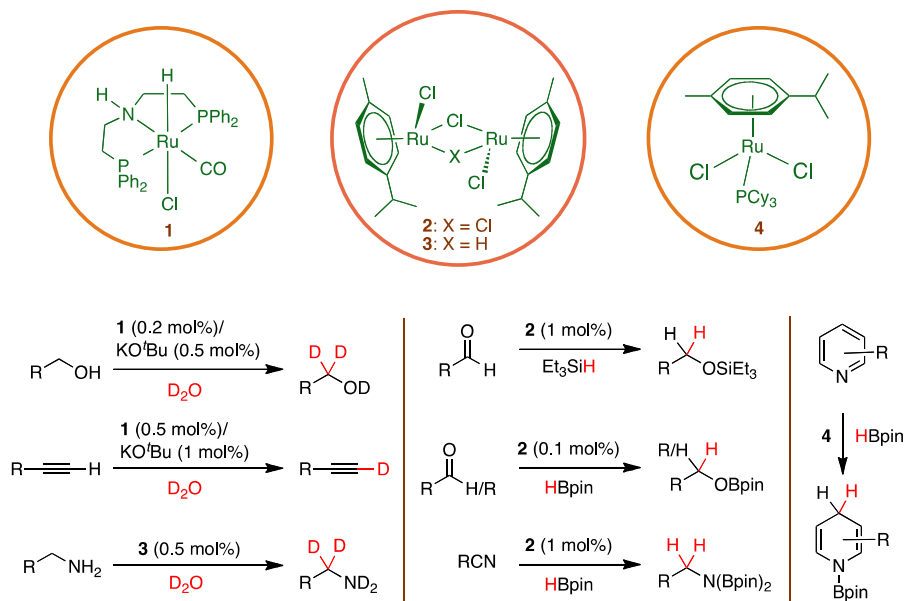
C. Gunanathan*

School of Chemical Science, National Institute of Science Education and Research (NISER),
Bhubaneswar, Odisha, INDIA (E-mail: gunanathan@niser.ac.in)

Abstract:

Isolation and characterization of intermediates in catalytic processes are uncommon and challenging owing to their inevitable low stability. However, overcoming this barrier and succeeding in these challenging task can turn out to be highly beneficial in further fine tuning and optimization of catalysts, and for the fundamental understanding of reaction mechanisms. By employing pincer and half-sandwich ruthenium complexes, simple, atom-economical and important catalytic transformations were developed in which interesting and hitherto unknown intermediates were identified and uncovered. These catalytic intermediates were independently synthesized and further successfully used as efficient catalysts.

Selective deuteration of alcohols, and terminal alkynes were developed by employing ruthenium pincer complexes that operate via amine-amide metal-ligand cooperation.¹ Using half-sandwich ruthenium complexes as catalysts, efficient chemoselective hydroelementation reactions (hydroboration^{2,3} and hydrosilylation⁴) were devised (Scheme 1). The unexpected intermediate involved in the hydroelementation reactions²⁻⁴ turned out to be an efficient catalyst for the challenging selective deuteration of amines and amino acids.⁵ Notably, direct selective deuteration of organic compounds using heavy water (D₂O) as a source of deuterium was established in three different catalytic processes.



Scheme 1.

References and Notes:

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[†]Equal contribution.