

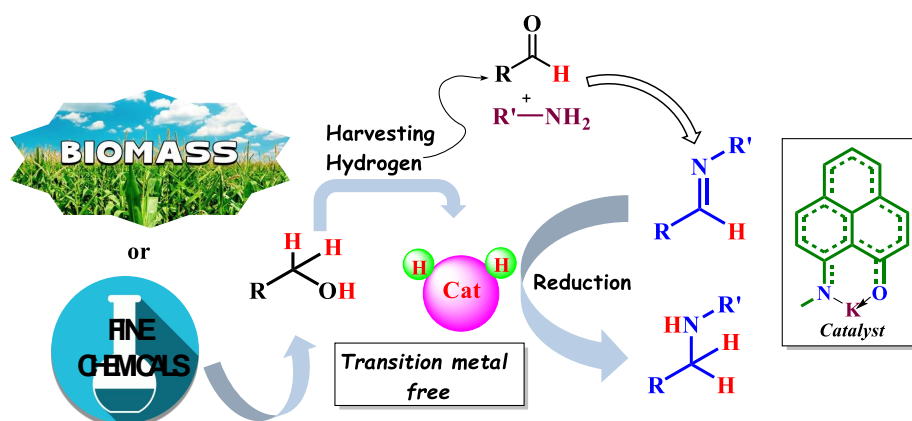
Metal Free Harvest, Storage and Transfer of Hydrogen

By Ananya Banik



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The storage and catalytic transfer of hydrogen molecule is one of the most demanding problems in today's society as it can be utilized for solving many critical issues like energy storage and conversion. Many of the transition metals have been employed till date for the catalytic hydrogen storage and transfer where a hydrogen molecule is stored as metal hydride or in the form of a proton in the ligand backbone and a hydride in metal centre by metal-ligand cooperative effect. One of the most convenient processes for transferring this stored hydrogen to other in situ generated intermediates for further catalytic hydrogenation is termed as 'borrowing hydrogen methodology'. As alcohols are typically used as hydrogen source and water is the only by-product, the process is not only cost effective, but also a very environment friendly way to prepare different valuable organic molecules.



Banik *et al.* "Mimicking Transition Metals in Borrowing Hydrogen from Alcohol" *Chem. Sci.* 2021, 12, 8353–8361.

In this work, we have taken advantage of a phenalenyl ligand as a transition metal free catalyst for such storage and transfer of hydrogen. Here, we have realized that the phenalenyl ligand can store one hydrogen molecule via dearomatization of one of the benzene rings in the form of two C-H bonds after sequential uptake of H^+ , $H\cdot$ and an electron. Such stored hydrogen can further be transferred for hydrogenation of in situ generated unsaturated molecule. Moreover, the hydrogen molecule comes from an alcohol, which can be harvested from biomass. Thus, the process can be utilized for catalytic storage of hydrogen molecule and further reduction of different organic molecules. This study opens up the possibility of exploring various other transition metal free catalytic processes.