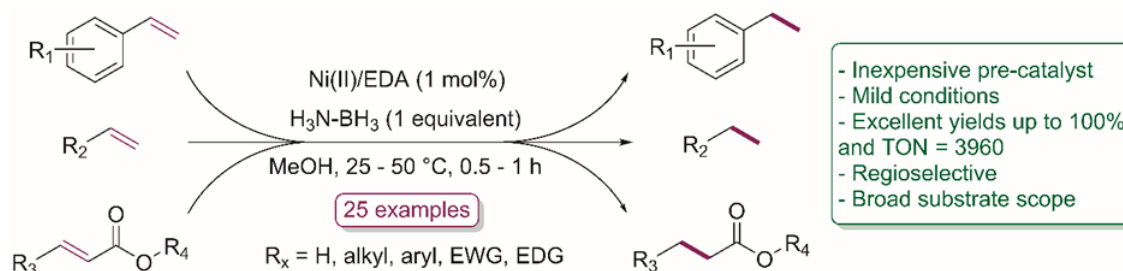


HIGHLY EFFICIENT TRANSFER HYDROGENATION OF ALKENES WITH AMMONIA BORANE MEDIATED BY A SIMPLE Ni(II) CATALYST SYSTEM

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The transition metal catalysed hydrogenation of unsaturated compounds containing π -systems remains an essential reaction in organic chemistry due to the valuable products resulting from it [1a]. These reactions typically use dihydrogen (H_2) and have received particular attention in homogeneous Ni catalysed hydrogenations [1b]. Typical drawbacks include high reaction temperatures, extended reaction times, high catalyst loadings and safety concerns. This resulted in research moving towards transfer hydrogenation (TH) reactions, which is a much safer method for the hydrogenation of unsaturated compounds[2a]. The research efforts of the Swarts Research Group focus on the development of catalyst systems derived from earth-abundant metals. As part of our program, we have reported the TH of N-heteroaromatics and nitriles mediated by readily-available Ni(II)-based pre-catalyst with ammonia borane (AB) as hydrogen source [2b-c]. Extending the scope of our catalyst system, we describe the catalytic transfer hydrogenation of alkenes (aromatic, aliphatic and α,β -unsaturated) to their respective alkane products utilizing an ethylene diamine ligated Ni(II)-catalyst with AB as the source of H_2 (Scheme 1). Using only 1 mol% of the pre-catalyst at ambient conditions provided excellent conversions and isolated yields of the respective alkane products, with TON values up to 3960. The chemo-selective hydrogenation of α,β -unsaturated esters was also achieved. Mechanistic elucidation revealed that borane activates dihydrogen, leading to the proposal of a two-step process during the transfer hydrogenation of styrene.



Scheme 1: Efficient Ni(II) catalysed TH of alkenes.

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