INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: **Catalytic (De)hydrogenative Annulation by Well-defined Mn(I) and Co(II)-complexes for the Construction of N-Heterocycles**

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SHORT ABSTRACT

The synthesis of N-heterocycles has always been considered as an emergent topic of chemical research due to its widespread usage in medicinal chemistry, material science, and natural product synthesis. The development of green, atom economical and sustainable strategies to construct those N-heterocycles employing readily available renewable starting material is a high priority for the scientific community. Alcohol is a suitable candidate to meet this demand, as it is an economically viable and widely abundant starting material derived from a diverse range of sustainable resources. Therefore, envisaging both noble and earth-abundant 3d-transition metal-based catalytic protocol for the benign synthesis of those N-heterocycles via Acceptorless Dehydrogenation (AD) and Borrowing Hydrogen (BH) or Hydrogen Auto-transfer (HA) pathway where eco-friendly, green by-products were solely liberated is still a demanding process in the contemporary science. Over the years, several reports dominated and documented on air, moisture sensitive, less cost-effective sophisticated phosphine ligand bearing both noble and 3d-transition metal-based catalyst. However, in that current century, both academic and industrial perspective witnessed on cheap, cost-effective, mild and economically viable approach. Therefore, to conquer this aspect, modern scientific research underlying and envisaged on replacement of phosphine-based ligand frame work by phosphine free arms such as NNN, NNO, NNS, NNC, CNC, CNS etc. ligands, albeit, their application in their corresponding catalyst remain infancy, especially non-precious 3d-metals. Henceforth, the present thesis is focused on designing and synthesizing new bifunctional NNS, NNO-Mn(I) and NNO-Co(II)-complexes from their respective precursor $MnBr(CO)_5$ and $CoBr_2$, well-defined them and explored their catalytic activity in various control (de)hydrogenative transformations enroute to construction of N-heterocycles. The chapter-**2** and chapter-**3** dealt with Mn-catalyzed (de)hydrogenative synthesis of Quinazolin-4(3*H*)-ones, 3,4-Dihydro-2*H*-1,2,4-benzothiadiazine 1,1-Dioxides, 2-Substituted and 2, 3-Disubstituted 4-Quinolones whilst chapter-**4** and chapter-**5** discussed about Co-catalyzed dehydrogenative construction of 3-Substituted Quinoline, Quinazoline and 2,3-Dihydro-1*H*-Perimidine derivatives.