INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: **Catalytic Synthesis of Branched Ketones, and N-Heteroaromatic Compounds Using Acceptorless Dehydrogenative Coupling and Hydrogen Transfer Strategies**

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SHORT ABSTRACT

The present thesis, entitled as ***"Catalytic Synthesis of Branched Ketones, and N-Heteroaromatic Compounds Using Acceptorless Dehydrogenative Coupling and Hydrogen Transfer Strategies"*** is divided into six chapter based on the obtained results of experimental works performed during the complete course of the PhD research period.

Chapter-1 includes a brief introduction about the basic concepts of acceptorless dehydrogenation, borrowing hydrogen catalysis *via* metal-ligand cooperation, and a general background of transfer hydrogenation reactions.

Chapter-2 reports the synthesis and characterization of new phosphine-free triazine-based NNN pincer ligands and their ruthenium (III) complexes and its application in the catalytic synthesis of *β*-branched ketones *via* *α*-alkylation of ketones using secondary alcohols.

Chapter-3 demonstrates catalytic cross-coupling of primary and secondary alcohols to α–substituted ketones and two different secondary alcohols to *β*–disubstituted ketones with good to excellent yield under aerobic condition with catalytic amount of base and high selectivity in the C-C bond formation.

Chapter-4 describes an atom-economic acceptorless dehydrogenative coupling of alcohols using a simple phosphine-free Ru(III) complex with low catalyst and base loading under aerial condition to form a wide variety of substituted quinolines and quinazolines in moderate to good yields.

Chapter-5 reports boric acid-catalyzed chemoselective reduction of quinolines to synthetically versatile 1,2,3,4-tetrahydroquinolines under mild reaction conditions using Hantzsch ester as an organic hydrogen source. The synthetic utility of the present protocol was explored towards several bioactive molecules.

Chapter-6 illustrates arylboronic acid-catalyzed one-pot reduction of quinoline to *N*-arylated tetrahydroquinoline by external base-free Chan-Lam-Evans amination under air. The methodology proved to be useful alternative for the construction of bio-relevant *N*-heterocycles.