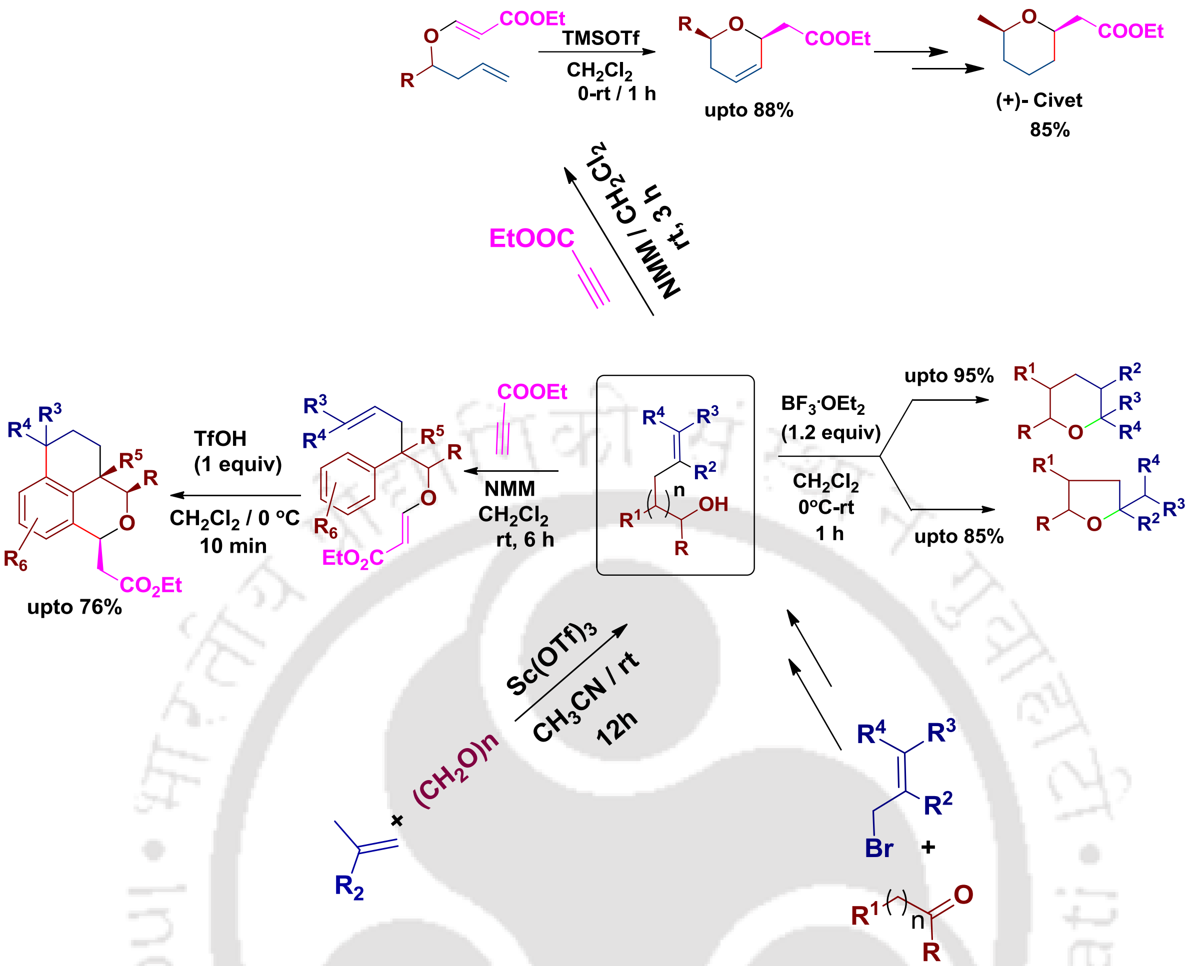
Abstract

The thesis entitled “Synthesis of Alkenols and their Use in Construction of Oxygen Heterocycles” is focused on acid catalyzed synthesis of alkenols and their utilization for the synthesis of oxygen bearing heterocycles such as dihydropyrans, tetrahydropyrans, tetrahydrofurans and isochromanes.

In synthetic organic chemistry, alkenols are considered as versatile intermediates due to their high reactivity. They are used as precursors for the synthesis of various *O*-heterocyclic compounds having synthetic and pharmaceutical importance. There are various reports for the synthesis of alkenols such as Barbier, Grignard, Hosomi-Sakurai and carbonyl-ene reactions. Among these methods, carbonyl-ene reactions have attracted much attention due to its ability to form C-C bond in presence of Lewis acids, high product yields and its usefulness in the synthesis of natural products and biologically active compounds. Oxygen containing heterocycles, especially five and six membered heterocycles are widely distributed in nature in various forms. They are also used as building blocks for the synthesis of numerous natural products and biologically active compounds starting from antibiotics to vitamins. To synthesize this class of heterocycles, many strategies have been developed over the years. The most widely used methods are the Prins cyclization, Hetero-Diels–Alder (HDA) reaction, oxonium-ene cyclization, intramolecular Michael addition, ring-closing metathesis, hydroalkoxylation of alkenols, oxa-Pictet-Spengler cyclization, Friedel−Crafts type intramolecular reaction and Baylis-Hillman reaction. These methods have their own advantages and disadvantages. Therefore, development of new and efficient methods is imperative especially to address the issue of diastereoselectivity. Thus in an attempt to overcome the limitations of the earlier methods, herein, we have reported few methodologies based on Prins cyclization, intramolecular oxonium-ene reaction, hydroalkoxylation of alkenols and oxa Pictet-Spengler reaction for the synthesis of highly diastereoselective *O*-heterocycles and its application towards natural product synthesis (Scheme 1).



Scheme 1: Thesis overview

In summary, the whole thesis is focused on the synthesis of alkenols and their use in various biologically important dihydropyrans, tetrahydropyrans, tetrahydrofurans and hexahydrobenzo[*de*]isochromanes. These newly developed methodologies and the synthesized novel compounds are expected to be widely used in synthetic organic chemistry and pharmaceutical industries.