

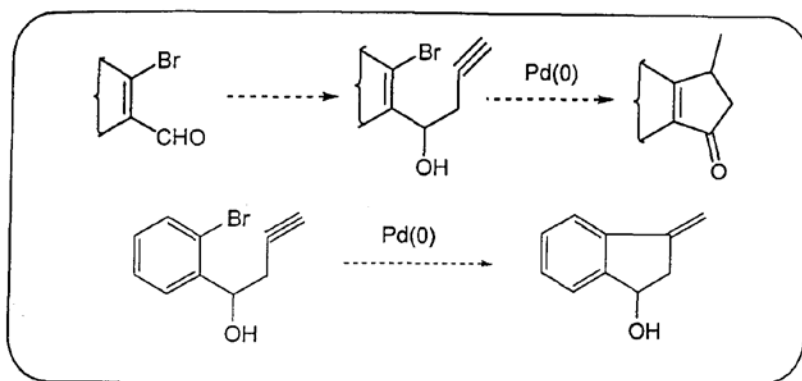
## ABSTRACT

Use of transition metal compounds or complexes as catalysts or reagents in organic synthesis is an exciting field in research and numerous novel reactions which are impossible to achieve by conventional synthetic methods have already been discovered. Total syntheses of many complex molecules have been achieved efficiently in shorter steps, which was unbelievable ten years ago. So the applications of transition metal-catalysts and reagents to organic synthesis are still being actively investigated. Substituted carbocycles represent a common structural component of naturally occurring and biologically active molecules. Among the carbocycles, specifically the substituted cyclopentenones are highly important. These are building blocks for the preparation of biologically active compounds and are major structural features of numerous natural products. The importance of substituted Cyclopentanes encouraged the development of numerous general methods for their preparation. Our investigation toward the synthesis of carbocycles has been carried out with a view to develop a new and efficient route toward the synthesis of substituted cyclopentenones and extend its applicability toward the natural products using palladium-catalyzed intramolecular Heck reaction. During the investigation, we tried to synthesize some of the substituted benzene derivatives starting from  $\beta$ -bromovinylaldehydes. During this trial we were able to establish the appropriate condition for the synthesis of trisubstituted aromatics in the absence of palladium catalysts.

The dissertation entitled "Synthetic Studies on Palladium-Catalyzed Cyclizations Leading to Substituted Cyclopentenones Along with Related Sesquiterpenes and Base-Catalyzed Synthesis of Benzene Derivatives" has been organized in three chapters.

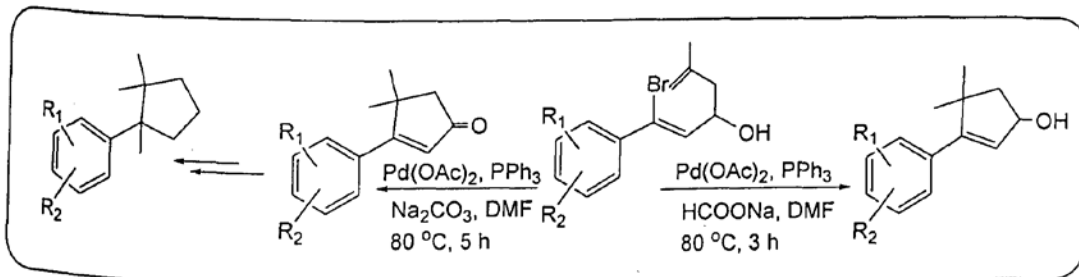
**Chapter 1: Palladium -Catalyzed Novel Cycloisomerization: An Unprecedented Domino Oxidative Cyclization Towards Substituted Carbocycles.**

This chapter describes an unexpected & novel palladium mediated Heck type intramolecular oxidative cyclization of 1-bromohexa-1-ene-5-yn-3-ol derivatives to afford substituted cyclopentenones. The aromatic analogs were found to furnish the cyclized product with an exocyclic double bond.



**Chapter 2: A Novel Synthetic Approach Toward ( $\pm$ )- $\beta$ -Cuparenone via Palladium-Catalyzed Intramolecular Cyclization of 1-Bromo-5-methyl-1-aryl-hexa-1,5-dien-3-ol Derivatives**

In this chapter a novel and convenient synthetic route toward ( $\pm$ )- $\beta$ -cuparenone and many other sesquiterpene natural product precursors has been developed via palladium-catalyzed tandem Heck cyclization of 1-bromo-5-methyl-1-aryl-hexa-1,5-dien-3-ols.



Well aware of the possibilities offered by this reaction, we utilized the method to obtain two different products from a common starting material by varying the reaction conditions.

**Chapter 3: Base-Catalyzed Condensation of  $\beta$ -Bromovinylaldehydes with  $\beta$ -Ketoesters Followed by Water Mediated Cyclization and Aromatization: One-Pot Access to Substituted Benzene Derivatives**

In this chapter a simple, convenient, one-pot synthetic approach towards substituted benzene derivatives using base-catalyzed condensation of  $\beta$ -bromovinylaldehydes with  $\beta$ -ketoesters followed by water mediated cyclization and aromatization has been developed.

