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EFFECTS OF PHOSPHINE LIGANDS ON HECK REACTION

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TABLE OF CONTENTS

ABSTRACT

The use of phosphine ligands in Pd-catalyzed Heck reactions between an aryl iodide and a styrene was investigated. One phosphine ligand is the P(*o*-Tol)$_3$ and the other is a phosphine ligannd that has been precomplexed with Pd, forming the preformed catalyst, Pd(PPh$_3$)$_4$. Two reactions using these ligands (one in each reaction) were made for the synthesis of 3,4-dimethoxy-12-benzyloxystilbene and the resulting reaction time and yield for the two reactions using two different ligands were compared. The reaction using P(*o*-Tol)$_3$ took 22 hours and gave 9.83% yield while the preformed catalyst [Pd(PPh$_3$)$_4$] took 12 hours and gave 16.4% yield.

Keywords: Heck reaction, phosphine ligands, preformed catalyst

CHAPTER ONE

INTRODUCTION

Stilbenes, sometimes referred to as bisbenzyls or stilbenoids are natural compounds found in many higher plant families and have the basic structure C_6-C_2-C_6.[22] The stilbenoids sometimes act as phytoalexins (a toxic compound produced in response to pathogens and to other stresses) and also act as growth regulators in plants. Stilbenoids often have anti-microbial and anti-fungal properties. One particular stilbenoid, resveratrol, a component of red wine, is famous for its antioxidant, anti-cancer, and anti-inflammatory properties. It is the compound thought to be responsible for the low incidence of heart disease in wine-drinking population particularly the French population.

The growing interest in the potential in stilbenoids led to efforts to produce them synthetically. Heck reaction is one of a few reactions that are used to synthetically produce stilbenoids.

Heck reaction is a coupling reaction (reactions that catalytically bring together two neutral organic precursors) used for carbon-carbon bond formation. It can be simply put as a palladium-catalyzed coupling of an aryl halide and an olefin to produce an aryl alkene. Similar methods include the Suzuki and Stille reaction.[31]