

CHAPTER I

INTRODUCTION

Biaryls are important intermediates of biological active compounds and often found in a pool of pharmaceuticals, herbicides, natural products, bioactive products, microelectrode arrays, conducting polymers, and engineering materials. In a view of the importance of biaryls, many effective catalytic methods have been developed for forming these compounds in cross-coupling reactions. (Hajipour *et al.*, 2012)

Reduction coupling of aryl halides is another method studied to synthesize biaryls. Historically, copper was used as a catalyst in a reaction known as the Ullmann reaction. However, the reaction typically required a stoichiometric amount of copper at high temperature. In recent year, to overcome these problems, other transition metal, including palladium (Pd) known as Suzuki coupling reaction, was employed. (Park *et al.*, 2011, Chang *et al.*, 2012) Many Pd complexes were investigated in homogeneous systems in the Suzuki reaction of aryl halides. However, palladium metals tend to be expensive and sometimes difficult to manipulate, recover, and reuse. One method to construct a recoverable and reusable catalyst is to immobilize the active palladium species on a solid material. Several types of the solid material were used to support palladium species. (Artok *et al.*, 2004)

M41S family is mesoporous materials with regular and well-defined channel system. One of the members of this family, called MCM-48, has attracted considerable interest owing to its periodic framework of regular mesopores, large surface area, and good thermal stability. MCM-48 has a cubic structure of ordered mesoporous molecular sieves with a 3-dimensional pore structure, consisting of two interwoven pore systems separated by a continuous pore wall. This type of the structure is potentially more advantageous for catalytic applications, as compared with unidirectional pore systems. Therefore, it is still a challenging task to use MCM-48 as a catalyst support for promoting the activity of the Suzuki reaction, and this is a focus for this study. Palladium is used as a metal promoter loaded on

catalysts supported MCM-48, for Suzuki reaction. (Bhattacharyya *et al.*, 2003, Russo *et al.*, 2008, Zhao *et al.*, 2010, Yeong *et al.*, 2010)