

UNIVERSITI TEKNOLOGI MARA

**NICKEL (II) ACETATE TETRAHYDRATE AND
TRIPHENYLPHOSPHINE IN HECK COUPLING**

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ABSTRACT

Stilbenes are known to have important biological activities and various therapeutic properties. Because of the minute amount in plants and the increasing demand for it, stilbene analogues are synthesized in the laboratory by using Heck reaction. Heck reaction is palladium-catalyzed C-C coupling between aryl halides and activated alkenes in the presence of a base. Due to high-cost of palladium, nickel (II) acetate tetrahydrate which was relatively very cheap compared to palladium was used as a catalyst in this research. As claimed by other researchers, nickel has a higher activity in Heck reaction although palladium was known to be the most active catalyst. Therefore, this research was aimed to synthesize stilbene analogue by using Heck reaction and also to observe the efficacy of nickel (II) acetate tetrahydrate in terms of the amount and the temperature that are required to be used for the reaction. This research was carried out in two established reactions. The first reaction was to produce protected 4-iodophenol, 4-iodoanisole by using iodomethane. The successfully synthesized 4-iodoanisole was not used in the next step due to small amount and hence, was not enough to be consumed in the next reaction, the Heck reaction. The second reaction was to produce the stilbene analogue, *trans*-4,12-dimethoxystilbene by using commercially available 4-iodoanisole and 4-methoxystyrene. However, due to some reasons the stilbene analogue was not able to be synthesized. Instead, an unknown compound which was not able to be identified has been synthesized in small amount.

CHAPTER 1

INTRODUCTION

1.1 Stilbene

Stilbene or 1,2-diphenylethene is the alkene, ethene with two phenyl groups on either carbon of the parent chain. The name was derived from the Greek word *stilbos*, which means shining (Wikipedia 2007).

Stilbene is not a natural compound but a large number of its analogues have been isolated from various plant species (Ferré-Filmon, K. *et al.*, 2004). Stilbenoid compounds such as polyhydroxystilbenes and their glucosides are currently attracting considerable attention because they have wide range of biological activities and potential therapeutic value (Ferré-Filmon, K. *et al.*, 2004). Ferré-Filmon, K. *et al.* (2004) and Billes, F. *et al.* (2006) reported that these molecules are found among members of the vegetable kingdom classified as spermatophytes (examples are Vitaceae and Myrtaceae). Frequently encountered natural hydroxylated stilbenes include resveratrol (*E*-3,5,4'-trihydroxystilbene), pterostilbene (a dimethylated derivative of resveratrol), piceid (the 3- β -D glucoside of resveratrol), and viniferins, which are resveratrol oligomers (Ferré-Filmon, K. *et al.*, 2004). It is also reported that stilbene analogues are classified as phytoalexins (plant antibiotics) which act by inhibiting the growth of pathogenic fungi. Phytoalexins are defence compounds that