UNIVERSITI TEKNOLOGI MARA

HECK REACTION IN IONIC LIQUID ACCELERATED BY MICROWAVE IRRADIATION

SITI NUR UMI AMINAH BT ZAINAL BAHRI

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ABSTRACT

Heck reaction has gained recognition as one of the most common procedure for C-C bond formation between alkenes and organic halides. However, there are two main drawbacks of the conventional Heck reaction; the reaction time is too long and the expensive catalyst (i.e. palladium) cannot be recovered. This research aims at investigating the effectiveness of ionic liquid and microwave irradiation to overcome these problems. 4-iodoanisole and 4-iodophenylbenyl ether are used as the starting materials, coupled with 3,4-dimethoxystyrene to produce 3,4,12-trimethoxystyrene. Five different conditions were set up to study the effects of both ionic liquid and microwave heating. As the result, when using only ionic liquid, modest and satisfactory yield was obtained in as low as 9 hours. While combining both ionic liquid and microwave irradiation, the reaction can be accomplished in 1 hour and 40 minutes.

CHAPTER 1

INTRODUCTION

1.1.Stilbenoids

Stilbenoids are secondary products of heartwood formation in trees that can act as phytoalexins. Biochemically they belong to the family of phenylpropanoids and share most of their biosynthesis pathway with chalcones. An example of stilbenoids is reservatrol which is found in grapes and which has been suggested to have many health benefits (Wikipedia).

The Heck reaction, also known as the Mizoroki-Heck reaction, is palladium-catalyzed coupling of an aryl halide with an alkene to form a substituted alkene (Heck, R.F. *et al.*, 1972). Conventionally, this coupling reaction requires high temperature 70 °-180 ° C and the reaction time ranging from several hours to full day. According to Canadian Journal of Chemistry (79th, 2001), Heck reaction is used to produce several commercial products such as; the herbicide Prosulfuron™, Naproxen™, and antiasthma agent Singulair™.

Technically, an ionic liquid is a liquid that contains essentially only ions. In the broad sense, the term includes all molten salts, for instance, sodium chloride at temperatures higher than 800 °C. Today, however, the term "ionic liquid" is commonly used for salts whose melting point is relatively low (below 100 °C). In particular, the salts that are