

**UNIVERSITI TEKNOLOGI MARA**

**SYNTHESIS OF STILBENOIDS VIA HECK  
REACTION IN IONIC LIQUID ACCELERATED BY  
MICROWAVE IRRADIATION**

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## ABSTRACT

Ionic liquids, being composed entirely of ions have interesting characteristics that make them suitable to be used as solvents for Heck reaction. This study was carried out to investigate the effects of ionic liquids and microwave irradiation on Heck reaction. 4-iodoanisole and 4-iodophenylbenzyl ether were used as the aryl halide, and 4-methoxystyrene as the alkene. Six different reaction conditions were used in order to synthesize stilbenes via palladium-catalyzed Heck reactions. The coupling of 4-iodoanisole and 4-methoxystyrene were done for six hours in ionic liquids  $\text{bmimPF}_6$  and  $\text{bmimBF}_4$ . The yields obtained were 43.69% and 24.27% respectively. The coupling between 4-iodophenylbenzyl ether and 4-methoxystyrene gave the yield of 49.02%. Heck reaction between 4-iodoanisole and 4-methoxystyrene in ionic liquid  $\text{bmimPF}_6$  accelerated by microwave irradiation produced as much as 67.96% stilbene in less than two hours. The results showed that the reaction time could be shortened to just several hours to produce the stilbene as compared to the reaction in conventional solvents such as DMF that normally takes between one to three days.

## CHAPTER 1

### INTRODUCTION

#### 1.1 Stilbenes

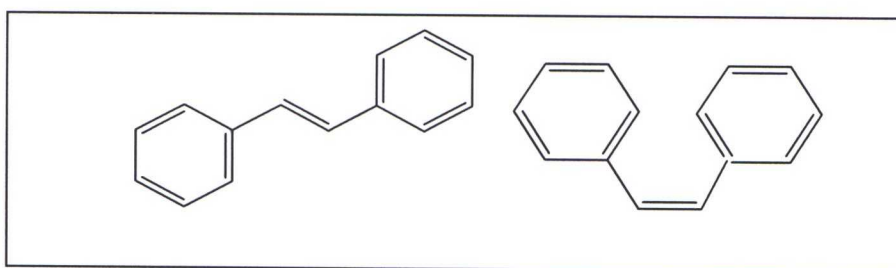


Figure 1.1: Structures of *trans*-stilbene (left) and *cis*-stilbene (right)

Stilbenes are small molecular weight, naturally occurring compounds that are found in a wide range of plants, aromatherapy products, and dietary supplements (Roupe, K.A. *et al.*, 2006). Stilbenes exist in two stereoisomers, the *cis* and *trans* forms. In nature, stilbenes mostly occur in the *trans* form. However, *trans* and *cis*-stilbenes can isomerize, that is interconvert under the influence of light. Stilbene is used in the manufacture of dyes, optical brighteners, as phosphors and a scintillator (Wikipedia, 2008).

Many stilbene derivatives are found in nature, and the most well-known is resveratrol. Primarily found in peanuts, red wine and grapes, resveratrol has been found to have