

## CHAPTER IV CONCLUSION

During the course of this research, the syntheses of various *trans*-cinnamate esters and benzalmalonate esters were carried out with the aim as novel UV-filters. Syntheses of the desired *trans*-cinnamate esters were accomplished by esterification between *trans*-cinnamic acid with alcohol through the acid chloride method. Various *trans*-cinnamic acids were synthesized by Knoevenagel-Doebner condensation between substituted benzaldehydes and malonic acids in the presence of pyridine and piperidine. UV absorption properties of each cinnamic acid were acquired. Cinnamic acids with interesting UV-filtering properties were further prepared into esters and dialkyl benzalmalonates (fig 4.1). Photostability of the prepared cinnamate esters and dialkyl benzalmalonates showed that dialkyl benzalmalonates were all photostable while photostability of the cinnamate esters varied with the ortho substitution in the benzene ring. Six dialkyl benzalmalonates were synthesized by the same method using malonate ester to place malonic acid. Since 2-ethylhexyl-2,4,5-trimethoxycinnamate and all dialkyl-2,4,5-trimethoxy benzalmalonates showed UVA and UVB screening properties, irritation test of the compounds on volunteers were performed. Results showed promising prospect of this newly developed UV filters.

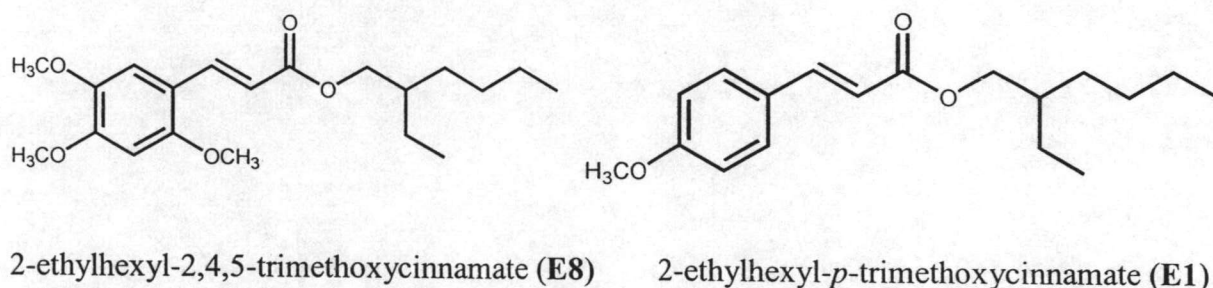
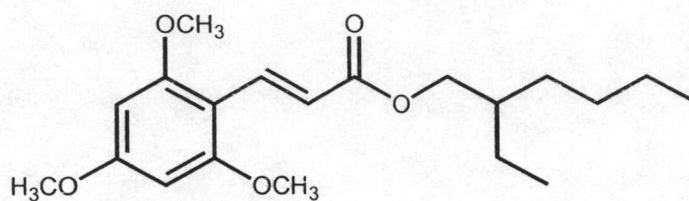
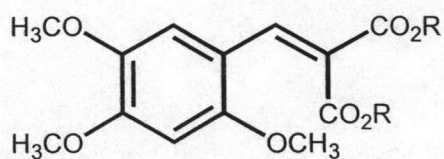
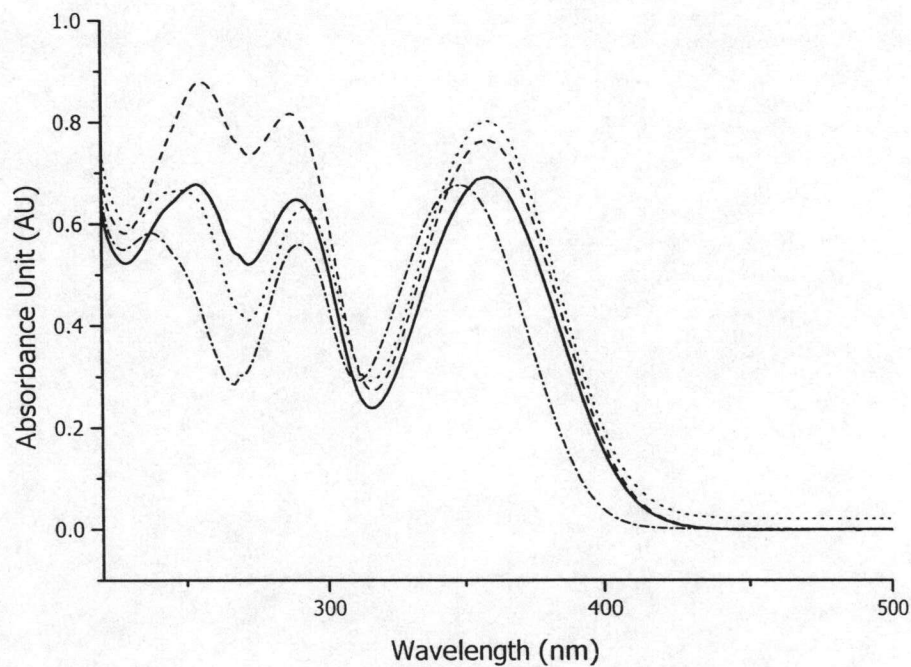


Figure 4.1 Structure of cinnamate esters and dialkyl-2,4,5-trimethoxybenzalmalonates

2-ethylhexyl-2,4,6-trimethoxycinnamate (**E10**)

Cpds	R
<b>BM8-1</b>	C <sub>2</sub> H <sub>5</sub>
<b>BM8-2</b>	C <sub>8</sub> H <sub>17</sub> (iso)
<b>BM8-3</b>	C <sub>6</sub> H <sub>13</sub>

Figure 4.1 Structure of cinnamate esters and dialkyl-2,4,5-trimethoxybenzalmalonates (continue)

Figure 4.2 UV spectra of four synthetic UV filters; **- -** **E8**, **....** **BM8-1**, **- . -** **BM8-2** and **—** **BM8-3**