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SYNTHESIS OF CINNAMATE DERIVATIVES AND RELATED COMPOUNDS
AS ULTRAVIOLET FILTERS

Miss Thitinun Monhaphol

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Chemistry

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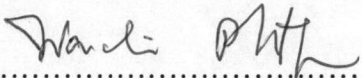
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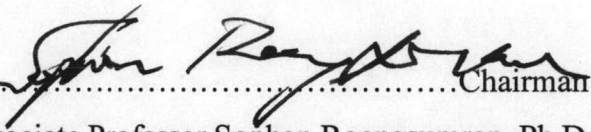
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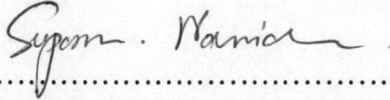
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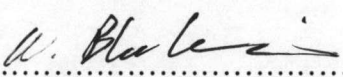
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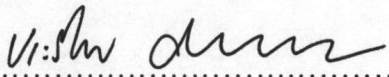

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งานวิจัยนี้เป็นการสังเคราะห์อนุพันธ์ของซินนามตที่มีหมู่แทนที่ต่างๆบนวงแอโรมาติก เพื่อใช้เป็นสารกรองรังสียูวี พบว่า 2-เอธิลเฮกซิล-2,4,5-ไตรเมธอกซีซินนามต สามารถดูดกลืนแสงยูวีได้ดีทั้งในช่วงยูวีเอ และยูวีบี โดยดูดกลืนแสงมากที่สุดที่ความยาวคลื่น 349 และ 290 นาโนเมตร ตามลำดับ นอกจากนี้ได้สังเคราะห์อนุพันธ์ของเบนแซลมาโลเนต พบว่า ไดเอธิล-2,4,5-ไตรเมธอกซีเบนแซลมาโลเนต และ ได-2-เอธิลเฮกซิล-2,4,5-ไตรเมธอกซีเบนแซลมาโลเนต สามารถดูดกลืนแสงทั้งในช่วงยูวีเอและยูวีบีได้ และเมื่อศึกษาความเสถียรหลังการดูดกลืนแสงของสารเหล่านี้พบว่า 2-เอธิลเฮกซิล,2,4,5-ไตรเมธอกซีซินนามต มีความสามารถในการดูดกลืนแสงลดลง แต่ไดเอธิล-2,4,5-ไตรเมธอกซีเบนแซลมาโลเนต และได-2-เอธิลเฮกซิล-2,4,5-ไตรเมธอกซีเบนแซลมาโลเนต มีความเสถียรหลังจากดูดกลืนแสงยูวี ซึ่งสารเหล่านี้สามารถพัฒนาไปเป็นสารกรองรังสียูวีในเครื่องสำอางต่างๆได้

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Various substituted *trans*-cinnamate derivatives were synthesized and their UV absorption properties were studied. Absorption profile of 2-ethylhexyl-2,4,5-trimethoxycinnamate revealed UVA and UVB screening properties. In addition, benzalmalonate derivatives, diethyl-2,4,5-trimethoxybenzalmalonate and di-(2-ethylhexyl)-2,4,5-trimethoxybenzalmalonate, also exhibited both UV-A and UV-B absorption. The UV absorption efficiency of 2-ethylhexyl-2,4,5-trimethoxycinnamate gradually decreased upon UV light exposure. However, UV light stability test showed that diethyl-2,4,5-trimethoxybenzalmalonate and di-(2-ethylhexyl)-2,4,5-trimethoxybenzalmalonate were photostable. These compounds, therefore, gave promising prospect as UV-screening compounds.

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CONTENTS

	Pages
Abstract in Thai.....	iv
Abstract in English.....	v
Acknowledgement.....	vi
List of Figures.....	ix
List of Tables.....	xiii
List of Abbreviations.....	xiv
CHAPTER I: INTRODUCTION.....	1
1.1 Classification of Sunscreen Chemicals.....	3
1.1.1 Physical Blockers.....	3
1.1.2 Chemical Absorbers.....	3
1.2 Mechanism of Sunscreen Action.....	6
1.3 Effect of Vehicle on the Ultraviolet Absorbance of Sunscreen.....	6
1.3.1 Effect of pH.....	6
1.3.2 Effect of Solvent.....	7
1.3.3 Effect on the Extinction Coefficient.....	7
1.4 Literature Reviews.....	8
1.5 Research Goal.....	13
CHAPTER II: EXPERIMENTAL.....	14
2.1 Instruments and Equipment.....	14
2.2 Chemicals.....	14
2.3 Synthesis of Substituted <i>trans</i> -Cinnamic Acids.....	15
2.4 Synthesis of <i>trans</i> -cinnamate Esters.....	17
2.5 Synthesis of Benzalmalonate Derivatives.....	19
2.6 General Procedure for Molar Absorptivity Measurement.....	22

	Pages
2.7 General Procedure for Photostability Test.....	22
2.8 General Procedure for Irritation Test.....	23
CHAPTER III: RESULT AND DISCUSSION.....	24
3.1 Synthesis and UV Absorption Properties of Substituted <i>trans</i> -Cinnamic Acids.....	24
3.2 Synthesis and UV Absorption Properties of <i>trans</i> -Cinnamate Esters....	26
3.3 Synthesis and UV Absorption Properties of Benzalmalonate Esters.....	29
3.4 Photostability Test.....	32
3.5 Irritation Test.....	35
3.6 Spectroscopic Data of All Synthetic Compounds.....	37
3.6.1 Infrared Spectroscopy.....	37
3.6.2 NMR Spectroscopy.....	37
3.6.3 Mass Spectroscopy.....	38
CHAPTER IV: CONCLUSION.....	39
REFERENCES.....	41
APPENDICES.....	44
Appendix A.....	45
Appendix B.....	47
Appendix C.....	78
VITA.....	86

List of Figures

Figs	Pages
1.1	Electromagnetic spectrum..... 2
1.2	Light penetration into the skin..... 2
1.3	The seven major groups of chemical sunscreen filters currently used in the suncare industry..... 5
1.4	Schematic representation of the process in which a sunscreen chemical absorbs the harmful high-energy rays and renders them relatively harmless low energy rays..... 6
2.1	Structure of synthesized cinnamic acids..... 16
2.2	Structure of synthesized cinnamate esters..... 18
2.3	Structure of synthesized benzalmalonate esters..... 20
2.4	Applying of the test compounds to plaster, Finn Chamber..... 23
3.1	UV spectrum of ten substituted <i>trans</i> -cinnamic acids..... 26
3.2	UV spectrum of a) 2-ethylhexyl- <i>p</i> -methoxycinnamate (E1), b) 2-ethylhexyl-2,4,5-trimethoxycinnamate (E8) and c) 2-ethylhexyl-2,4,6-trimethoxycinnamate (E10)..... 28
3.3	UV spectrum of a) BM1-1 b) BM8-1 c) BM1-2 d) BM8-2 e) BM1-3 and f) BM8-3 31
3.4	Photo-equilibrium of synthetic UV-filters in methanol; a) in UVB region and b) in UVA region; \blacklozenge E1 , \blacksquare E8 , \blacktriangle E10 , \times BM8-1 , $*$ BM8-2 , \bullet BM8-3 , $+$ BM1-1 , $-$ BM1-2 and $-$ BM1-333
3.5	Photo-equilibrium of synthesized UV-filters in hexanes a) UVB region and b) UVA region; \blacklozenge E1 , \blacksquare E8 , \blacktriangle E10 , \times BM8-1 , $*$ BM8-2 , \bullet BM8-3 , $+$ BM1-1 , $-$ BM1-2 and $-$ BM1-334
3.6	Propose structures of ground state (a) and excited state (b) of E1035
3.7	Propose structures of ground state (a) and excited state (b) of E835

Figs	Pages
4.1 Structure of cinnamate esters and dialkyl-2,4,5-trimethoxybenzal-malonates.....	39
4.1 Structure of cinnamate esters and dialkyl-2,4,5-trimethoxybenzal-Malonates (continue).....	40
4.2 UV spectra of four synthetic UV filters; — • • E8, •••• BM8-1, -- BM8-2 and — BM8-3.....	40
A.1 Structure of synthesized malonate esters.....	44
B.1 ¹ H-NMR spectrum of 2-ethylhexyl-2,4,5-trimethoxycinnamate (E8).....	47
B.2 ¹³ C-NMR spectrum of 2-ethylhexyl-2,4,5-trimethoxycinnamate (E8).....	48
B.3 IR spectrum of 2-ethylhexyl-2,4,5-trimethoxycinnamate (E8).....	49
B.4 Mass spectrum of 2-ethylhexyl-2,4,5-trimethoxycinnamate (E8).....	50
B.5 ¹ H-NMR spectrum of 2-ethylhexyl-2,4,6-trimethoxycinnamate (E10).....	51
B.6 ¹³ C-NMR spectrum of 2-ethylhexyl-2,4,6-trimethoxycinnamate (E10).....	52
B.7 IR spectrum of 2-ethylhexyl-2,4,6-trimethoxycinnamate (E10).....	53
B.8 Mass spectrum of 2-ethylhexyl-2,4,6-trimethoxycinnamate (E10).....	54
B.9 ¹ H-NMR spectrum of diethyl-2,4,5-trimethoxybenzalmalonate (BM8-1)...	55
B.10 ¹³ C-NMR spectrum of diethyl-2,4,5-trimethoxybenzalmalonate (BM8-1)...	56
B.11 IR spectrum of diethyl-2,4,5-trimethoxybenzalmalonate (BM8-1).....	57
B.12 Mass spectrum of diethyl-2,4,5-trimethoxybenzalmalonate (BM8-1).....	58
B.13 ¹ H-NMR spectrum of di-(2-ethylhexyl)-2,4,5-trimethoxybenzalmalonate (BM8-2).....	59
B.14 ¹³ C-NMR spectrum of di-(2-ethylhexyl)-2,4,5-trimethoxybenzalmalonate (BM8-2).....	60
B.15 IR spectrum of di-(2-ethylhexyl)-2,4,5-trimethoxybenzalmalonate (BM8-2).....	61
B.16 Mass spectrum (MALDI-TOF) of di-(2-ethylhexyl)-2,4,5-trimethoxybenzalmalonate (BM8-2).....	62
B.17 ¹ H-NMR spectrum of dihexyl-2,4,5-trimethoxybenzalmalonate(BM8-3)...	63
B.18 ¹³ C-NMR spectrum of dihexyl-2,4,5-trimethoxybenzalmalonate (BM8-3)..	64

Figs	Pages
B.19 IR spectrum of dihexyl-2,4,5-trimethoxybenzalmalonate (BM8-3).....	65
B.20 Mass spectrum of diethyl-2,4,5-trimethoxybenzalmalonate (BM8-3).....	66
B.21 ¹ H-NMR spectrum of diethyl-4-methoxybenzalmalonate (BM1-1).....	67
B.22 ¹³ C-NMR spectrum of diethyl-4-methoxybenzalmalonate (BM1-1).....	68
B.23 IR spectrum of diethyl-4-methoxybenzalmalonate (BM1-1).....	69
B.24 Mass spectrum (MALDI-TOF) of diethyl-4-methoxybenzalmalonate (BM1-1).....	70
B.25 ¹ H-NMR spectrum of di-(2-ethylhexyl)-4-methoxybenzalmalonate (BM1-2).....	71
B.26 ¹³ C-NMR spectrum of di-(2-ethylhexyl)- 4-methoxybenzalmalonate (BM1-2).....	72
B.27 IR spectrum of di-(2-ethylhexyl)- 4-methoxybenzalmalonate (BM1-2).....	73
B.28 ¹ H-NMR spectrum of dihexyl-4-methoxybenzalmalonate (BM1-3).....	74
B.29 ¹³ C-NMR spectrum of dihexyl-4-methoxybenzalmalonate (BM1-3).....	75
B.30 IR spectrum of dihexyl-4-methoxybenzalmalonate (BM1-3).....	76
B.31 UV spectra of a) OMC, b) E8 and c) E10 before and after UV irradiation for 2 hours.....	77
C.1 Photo-equilibrium of OMC (E1); ■ in methanol and ◆ in hexanes.....	81
C.2 Photo-equilibrium of 2-ethylhexyl-2,4,5-trimethoxycinnamate (E8); ■ in methanol and ◆ in hexanes; a) absorbed in UVB region and b) absorbed in UVA region.....	81
C.3 Photo-equilibrium of 2-ethylhexyl-2,4,6-trimethoxycinnamate (E3); ■ in methanol and ◆ in hexanes.....	82
C.4 Photo-equilibrium of diethyl-2,4,5-trimethoxybenzalmalonate (BM8-1); ■ in methanol and ◆ in hexanes; a) absorbed in UVB region and b) absorbed in UVA region.....	82

Figs	Pages
C.5 Photo-equilibrium of di-(2-ethylhexyl)-2,4,5-trimethoxybenzalmalonate (BM8-2); ■ in methanol and ◆ in hexanes; a) absorbed in UVB region and b) absorbed in UVA region.....	83
C.6 Photo-equilibrium of dihexyl-2,4,5-trimethoxybenzalmalonate (BM8-3); ■ in methanol and ◆ in hexanes; a) absorbed in UVB region and b) absorbed in UVA region.....	83
C.7 Photo-equilibrium of diethyl-4-trimethoxybenzalmalonate (BM1-1); ■ in methanol and ◆ in hexanes.....	84
C.8 Photo-equilibrium of di-(2-ethylhexyl)-4-trimethoxybenzalmalonate (BM1-2); ■ in methanol and ◆ in hexanes.....	84
C.9 Photo-equilibrium of dihexyl-4-trimethoxybenzalmalonate (BM1-3); ■ in methanol and ◆ in hexanes.....	85

List of Table

Tables	Pages
1.1 Names and Chemical Structures of Cinnamate Derivatives.....	11
1.2 Names and Chemical Structures of Dialkylbenzalmalonate Derivatives.....	12
3.1 UV Absorption spectral data of substituted <i>trans</i> -cinnamic acids in methanol.....	25
3.2 UV Absorption spectral data of substituted <i>trans</i> -cinnamate esters in Methanol.....	29
3.3 UV Absorption spectral data of benzalmalonate esters in methanol.....	30
3.4 Results of patch test (PT) and photopatch test (PPT) of synthesized UV-filters on ten volunteers.....	36
3.6 M/Z of nine synthetic compounds.....	38
C.1 Percent relative absorbance of synthesized UV-filters in UVA region in methanol.....	78
C.2 Percent relative absorbance of synthesized UV-filters in UVB region in methanol.....	79
C.3 Percent relative absorbance of synthesized UV-filters in UVA region in hexanes.....	80
C.4 Percent relative absorbance of synthesized UV-filters in UVB region in hexanes.....	80

List of Abbreviations

br	broad	m	multiplet (NMR)
°C	degree Celsius	mL	milliliter (s)
cm ⁻¹	unit of wavenumber (IR)	mmol	millimole
cm ⁻¹	per centimeter (s)	m.p.	melting point
Cpd	compound	MS	mass spectroscopy
CDCl ₃	deuterated chloroform	<i>m/z</i>	mass per charge
d	doublet (NMR)	nm	nanometer (s)
DMSO	dimethylsulfoxide	NMR	nuclear magnetic resonance
EtOAc	ethylacetate	ppm	parts per million
FDA	Food and Drug Administration	q	quartet (NMR)
g	gram (s)	R _f	retardation factor
Hex	hexanes	s	singlet (NMR)
Hz	hertz	t	triplet (NMR)
IR	infrared	δ	chemical shift
IPM	isopropylmyristate	%	percent
J	coupling constant	λ	wavelength
lit	literature	ε	molar absorptivity