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ENANTIOMERIC SEPARATION OF ALCOHOLS BY GAS
CHROMATOGRAPHY USING CYCLODEXTRIN DERIVATIVES
AS STATIONARY PHASES

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for the Degree of Master of Science in Chemistry

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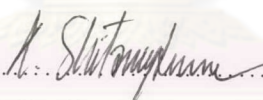


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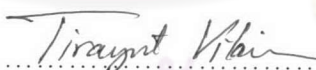
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Enantiomeric separations of 70 alcohols were studied by means of capillary gas chromatography using heptakis(2,3-di-*O*-methyl-6-*O*-*tert*-butyldimethylsilyl)cyclomaltoheptaose (or BSiMe) and octakis(2,3-di-*O*-methyl-6-*O*-*tert*-butyldimethylsilyl)cyclomaltooctaose (or GSiMe) as chiral stationary phases. The influence of analyte structure, e.g. the type and position of substituent, alcohol chain length, the position of chiral center, and main-structure of alcohols, on retention and enantioselectivity was systematically investigated. Thermodynamic data were also calculated to clarify the strength of analyte-stationary phase interaction and enantioselectivity towards the selected group of alcohols.

All of alcohols studied, except for **35F** and **2oct**, were successfully separated with either BSiMe or GSiMe, or both of them. Generally, BSiMe phase exhibited greater enantioseparation towards most analytes than GSiMe phase. On both columns, the structure of alcohol analytes plays an important role on separation. Changing the position of substituent or chiral center causes changes in the interaction and enantioselectivity. The type and size of substituent also significantly affect enantioselectivity. In addition to the analyte structure, the size of cyclodextrin molecules greatly affects enantioselectivity.

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CONTENTS

	PAGE
ABSTRACT (IN THAI)	iv
ABSTRACT (IN ENGLISH)	v
ACKNOWLEDGEMENTS	vi
CONTENTS	vii
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF ABBREVIATIONS AND SIGNS	xiv
CHAPTER I INTRODUCTION	1
CHAPTER II THEORY	4
2.1 Gas chromatographic separation of enantiomers	4
2.2 Cyclodextrins and their derivatives	4
2.3 Parameters affecting enantioseparation	6
2.4 Mechanistic considerations on enantioseparation	8
2.5 Thermodynamic investigation of enantiomeric separation by GC	9
CHAPTER III EXPERIMENTAL	12
3.1 General	12
3.2 Syntheses of racemic alcohols	12
3.3 Preparation of capillary columns	22
3.4 Gas chromatographic analyses	22

CONTENTS (Conts)

		PAGE
CHAPTER IV	RESULTS AND DISCUSSION	23
4.1	Synthesis of alcohol derivatives	23
4.2	Evaluation of coated column performance	23
4.3	Gas chromatographic separation of alcohol derivatives	28
4.4	Thermodynamic investigation by van't Hoff approach	32
4.4.1	Enthalpy change ($-\Delta H$) and entropy change ($-\Delta S$) ...	32
4.4.2	Enthalpy difference ($-\Delta(\Delta H)$) and entropy difference ($-\Delta(\Delta S)$)	40
CHAPTER V	CONCLUSIONS AND SUGGESTIONS FOR FUTURE WORK	63
REFERENCES	65
APPENDICES	68
Appendix A	Glossary	69
Appendix B	NMR Spectra	71
Appendix C	Thermodynamic studies	86
VITA	108

ศูนย์วิทยทรัพยากร
 จุฬาลงกรณ์มหาวิทยาลัย

LIST OF TABLES

TABLE		PAGE
3.1	Structure and abbreviation of all alcohol derivatives used in this study	15



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

LIST OF FIGURES

FIGURE		PAGE
1.1	Chemical structures of thalidomide, dichlorprop, and limonene	1
2.1	(a) A structure of cyclodextrin molecule with n glucose units and (b) side-view of cyclodextrin showing primary and secondary hydroxyl groups	5
4.1	Chromatogram of Grob test on OV-1701 column (16.53 m × 0.25 mm i.d. × 0.25 μm film thickness); temperature program: 40 to 150 °C at 3.02 °C/min.	25
4.2	Chromatogram of Grob test on BSiMe column (15.22 m × 0.25 mm i.d. × 0.25 μm film thickness); temperature program: 40 to 170 °C at 3.29 °C/min.	26
4.3	Chromatogram of Grob test on GSiMe column (15.84 m × 0.25 mm i.d. × 0.25 μm film thickness); temperature program: 40 to 150 °C at 3.26 °C/min.	27
4.4	Retention factors (k') of represented alcohols on OV-1701 column at 150 °C.	29
4.5	Retention factors (k'_2) of the more retained enantiomers of represented alcohols on (a) BSiMe and (b) GSiMe columns at 150 °C.	30
4.6	Enantioselectivity values (α) of the enantiomers of represented alcohols on (a) BSiMe and (b) GSiMe columns at 150 °C.	31

FIGURE		PAGE
4.7	Enthalpy values ($-\Delta H$, kcal/mol) of alcohol analytes on OV-1701 column obtained from van't Hoff approach ($\bar{x} = 12.27$; SD = 1.01).	33
4.8	Entropy values ($-\Delta S$, cal/mol · K) of alcohol analytes on OV-1701 column obtained from van't Hoff approach ($\bar{x} = 16.74$; SD = 1.08).	34
4.9	Enthalpy values ($-\Delta H_2$, kcal/mol) of the more retained enantiomers of alcohol analytes on BSiMe column obtained from van't Hoff approach ($\bar{x} = 16.74$; SD = 1.08).	36
4.10	Entropy values ($-\Delta S_2$, cal/mol · K) of the more retained enantiomers of alcohol analytes on BSiMe column obtained from van't Hoff approach ($\bar{x} = 24.07$; SD = 2.33).	37
4.11	Enthalpy values ($-\Delta H_2$, kcal/mol) of the more retained enantiomers of alcohol analytes on GSiMe column obtained from van't Hoff approach ($\bar{x} = 13.78$; SD = 1.06).	38
4.12	Entropy values ($-\Delta S_2$, cal/mol · K) of the more retained enantiomers of alcohol analytes on GSiMe column obtained from van't Hoff approach ($\bar{x} = 19.67$; SD = 1.13).	39
4.13	Difference in enthalpy values ($-\Delta(\Delta H)$, kcal/mol) of the enantiomers of mono-substituted 1-phenylethanol derivatives on BSiMe column.	41
4.14	Difference in entropy values ($-\Delta(\Delta S)$, cal/mol · K) of the enantiomers of mono-substituted 1-phenylethanol derivatives on BSiMe column.	42
4.15	Chromatograms of (a) 2CF₃ and (b) 2Me on BSiMe column at 150 °C.	44

FIGURE		PAGE
4.16	Difference in enthalpy values ($-\Delta(\Delta H)$, k cal/mol) of the enantiomers of mono-substituted 1-phenylethanol derivatives on GSiMe column.	45
4.17	Chromatograms of 2Cl , 3Cl , and 4Cl on (a) BSiMe and (b) GSiMe columns at 150 °C.	46
4.18	Difference in enthalpy values ($-\Delta(\Delta H)$, kcal/mol) of the enantiomers of di-substituted 1-phenylethanol derivatives on (a) BSiMe and (b) GSiMe columns.	48
4.19	Chromatograms of 24Cl , 25Cl , and 34Cl on (a) BSiMe and (b) GSiMe columns at 160 °C.	49
4.20	Difference in enthalpy values ($-\Delta(\Delta H)$, kcal/mol) of the enantiomers of alcohols in series 3 on BSiMe (white bar) and GSiMe (gray bar) columns.	51
4.21	Difference in enthalpy values ($-\Delta(\Delta H)$, kcal/mol) of the enantiomers of alcohols in series 3.1 on BSiMe (white bar) and GSiMe (gray bar) columns.	52
4.22	Chromatograms of (a) triF , (b) tetraF , and (c) pentaF on BSiMe column at 110 °C.	53
4.23	Difference in enthalpy values ($-\Delta(\Delta H)$, kcal/mol) of the enantiomers of alcohols in series 3.2 on BSiMe (white bar) and GSiMe (gray bar) columns.	54
4.24	Chromatograms of 22 on (a) BSiMe and (b) GSiMe columns at 160 °C.	55
4.25	Chromatograms of (a) 2 and (b) 3 on BSiMe column at 170 °C.	56
4.26	Difference in enthalpy values ($-\Delta(\Delta H)$, kcal/mol) of the enantiomers of alcohols in series 3.3 on BSiMe (white bar) and GSiMe (gray bar) columns.	58

FIGURE		PAGE
4.27	Ln α versus 1/T plots for the enantiomers of alcohol 8 on BSiMe (●) and GSiMe (○) columns.	58
4.28	Chromatograms of (a) 1 , (b) 21 , (c) 16 , and (d) 20 on BSiMe column at 130 °C.	59
4.29	Ln α versus 1/T plots for the enantiomers of alcohols 10 (●) and 12 (○) on BSiMe column.	60
4.30	Difference in enthalpy values ($-\Delta(\Delta H)$, kcal/mol) of the enantiomers of alcohols in series 3.4 on BSiMe (white bar) and GSiMe (gray bar) columns.	61



ศูนย์วิทยทรัพยากร
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LIST OF ABBREVIATIONS AND SIGNS

BSiMe	=	heptakis(2,3-di- <i>O</i> -methyl-6- <i>O</i> - <i>tert</i> -butyldimethylsilyl)cyclomaltoheptaose
CD	=	cyclodextrin
°C	=	degree celsius
GSiMe	=	octakis(2,3-di- <i>O</i> -methyl-6- <i>O</i> - <i>tert</i> -butyldimethylsilyl)cyclomaltooctaose
i.d.	=	internal diameter
K	=	distribution constant
k'	=	retention factor or capacity factor
m	=	meter
min	=	minute
mm	=	millimeter
N	=	number of theoretical plates
OV-1701	=	7% phenyl, 7% cyanopropyl, 86% dimethyl polysiloxane
ppm	=	part per million
R	=	universal gas constant (1.987 cal/mol · K)
R ²	=	correlation coefficient
SD	=	standard deviation
SN	=	separation number
T	=	absolute temperature (K)
α	=	separation factor or selectivity
β	=	phase ratio
ΔG	=	Gibb's free energy
$\Delta(\Delta G)$	=	difference in Gibb's free energy for enantiomeric pairs
ΔH	=	enthalpy change of each enantiomer in enantiomeric pairs
$\Delta(\Delta H)$	=	difference in enthalpy change for an enantiomeric pair

LIST OF ABBREVIATIONS AND SIGNS (Cont.)

ΔS	=	entropy change of each enantiomer in enantiomeric pairs
$\Delta(\Delta S)$	=	difference in entropy change for enantiomeric pair
μm	=	micrometer
\bar{x}	=	mean
σ	=	chemical shift



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