

CONTENTS

	Page
ACKNOWLEDGEMENT	III
ABSTRACT (ENGLISH)	IV
ABSTRACT (THAI)	V
LIST OF TABLES	IX
LIST OF FIGURES	X
ABBREVIATIONS	XI
 CHAPTER 1 INTRODUCTION	 1
1.1 Diphenhydramine hydrochloride	1
1.2 Methods of analysis	2
1.2.1 Titrimetry	2
1.2.2 UV spectrophotometry	3
1.2.3 Colorimetry	4
1.2.4 Fluorometry	4
1.2.5 Gravimetry	4
1.2.6 Electrochemical analysis	5
1.2.7 Chromatography	6
1.2.8 Flow injection analysis	6
1.3 Ion pair formation	7
1.4 Flow injection analysis	9
1.4.1 Theory and principle	9
1.4.2 Basic components of a fia system	10
1.5 Scope and aims of study	11
 CHAPTER 2 EXPERIMENTAL	 12
2.1 Instruments, apparatus and chemicals	12
2.1.1 Instruments and apparatus	12
2.1.2 Chemicals	13
2.2 Solutions	13

2.3 Procedure	15
2.3.1 Determination of diphenhydramine hydrochloride by spectrophotometric flow injection analysis	15
2.3.2 Determination of diphenhydramine hydrochloride by HPLC	16
CHAPTER 3 RESULTS AND DISCUSSION	17
3.1 Determination of diphenhydramine hydrochloride by spectrophotometric flow injection analysis	17
3.1.1 Absorption spectra	17
3.1.2 Study of extraction time	20
3.1.3 Manifold	21
3.1.4 Optimization of flow injection determination of diphenhydramine hydrochloride	22
3.1.4.1 Effect of carrier solution	22
3.1.4.2 Effect of pH of reagent	24
3.1.4.3 Study of wavelength of measurement	25
3.1.4.4 Effect of mixing coil length	26
3.1.4.5 Effect of sample volume	27
3.1.4.6 Summary of conditions used	28
3.1.4.7 Calibration curve and detection limit	28
3.1.4.8 Precision of FIA system	32
3.1.4.9 Reproducibility and efficiency of the extractions	32
3.1.4.10 Interference studies	32
3.1.4.11 Determination of diphenhydramine hydrochloride in pharmaceutical preparations	33
CHAPTER 4 CONCLUSION	36
REFERENCES	38
APPENDIX A Method development for determination of ethanol in distilled liquors by near infrared spectrometric flow injection analysis	43
APPENDIX B Molar absorptivity evaluation	60

APPENDIX C Detection limit evaluation	61
APPENDIX D Compositions of samples	63
APPENDIX E Test of significance	65
VITA	67

LIST OF TABLES

Table	Page
1.1 Ion-pair extraction methods for the determination of diphenhydramine hydrochloride	5
3.1 Absorption of the series of diphenhydramine hydrochloride [0-15.4 ppm] obtained from various conditions	19
3.2 Absorption of the series of diphenhydramine hydrochloride [4.4-22.1 ppm] obtained in various extraction times	21
3.3 Effect of carrier solution on peak height	23
3.4 Effect of pH of reagent on peak height	24
3.5 Study of wavelength of measurement	25
3.6 Effect of mixing coil length on peak height	26
3.7 Effect of sample volume on peak height	27
3.8 Condition used for the determination of diphenhydramine hydrochloride	28
3.9 Calibration curve (5.2-21.0 ppm of diphenhydramine hydrochloride, 1.05×10^{-4} M of bromocresol green solution)	29
3.10 Calibration curve (75.1-187.8 ppm of diphenhydramine hydrochloride, 5.42×10^{-4} M of bromocresol green solution)	30
3.11 Precision study	32
3.12 Reproducibility and efficiency of the extractions	32
3.13 Effect of the interfering compounds on the determination of diphenhydramine hydrochloride	33
3.14 Determination of diphenhydramine hydrochloride in various pharmaceutical preparations	34
3.15 Effect of pH of samples on determination of diphenhydramine hydrochloride by the proposed FIA method	35

LIST OF FIGURES

Figure	Page
1.1 A single-line fia manifold	9
3.1 Absorption spectra of DPH-BCG ion-pair compound in chloroform layer	18
3.2 Absorption spectra of the excess bromocresol green in aqueous layer	18
3.3 Absorption spectra of the excess bromocresol green in aqueous layer after adjusting to be alkaline	19
3.4 Study of various conditions on absorption	20
3.5 Study of extraction time	21
3.6 Flow diagram of the system	22
3.7 Effect of carrier solution on peak height	23
3.8 Effect of pH of reagent on peak height	25
3.9 Study of wavelength of measurement	26
3.10 Effect of mixing coil length on peak height	27
3.11 Effect of sample volume on peak height	28
3.12 FIA signals for determination of diphenhydramine hydrochloride (5.2-21.0 ppm)	29
3.13 Calibration curve for 5.2-21.0 ppm of diphenhydramine hydrochloride	30
3.14 FIA signals for determination of diphenhydramine hydrochloride (75.1-187.8 ppm)	31
3.15 Calibration curve for 75.1-187.8 ppm of diphenhydramine hydrochloride	31

ABBREVLATIONS

λ	wavelength
Anh.	anharmonicity
aq.	aqueous
M	molarity
mM	millimolar
ppm	part per million (microgram per milliliter)
sec	second
min	minute
mbar	millibar
v/v	volume by volume
%L.a	%labelled amount $\left(\frac{\text{amount found}}{\text{labelled amount}} \times 100 \right)$
sd	standard deviation
RSD	relative standard deviation
s/n	signal to noise ratio
ref.	Reference
SPME	Solid Phase Microextraction