San Jose State University SJSU ScholarWorks

Master's Theses

Master's Theses and Graduate Research

2004

Electrochromatographic studies of select pharmaceutical compounds

Elham Moslehi San Jose State University

Follow this and additional works at: https://scholarworks.sjsu.edu/etd theses

Recommended Citation

Moslehi, Elham, "Electrochromatographic studies of select pharmaceutical compounds" (2004). *Master's Theses*. 2567. DOI: https://doi.org/10.31979/etd.9fmd-jukt https://scholarworks.sjsu.edu/etd_theses/2567

This Thesis is brought to you for free and open access by the Master's Theses and Graduate Research at SJSU ScholarWorks. It has been accepted for inclusion in Master's Theses by an authorized administrator of SJSU ScholarWorks. For more information, please contact scholarworks@sjsu.edu.

ELECTROCHROMATOGRAPHIC STUDIES OF SELECT PHARMACEUTICAL COMPOUNDS

A Thesis

Presented to

The Faculty of the Department of Chemistry

San Jose State University

In partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Elham Moslehi

May 2004

UMI Number: 1420449

INFORMATION TO USERS

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleed-through, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.



UMI Microform 1420449 Copyright 2004 by ProQuest Information and Learning Company. All rights reserved. This microform edition is protected against unauthorized copying under Title 17, United States Code.

> ProQuest Information and Learning Company 300 North Zeeb Road P.O. Box 1346 Ann Arbor, MI 48106-1346

© 2004

Elham Moslehi

ALL RIGHTS RESERVED

APPROVED FOR THE DEPARTMENT OF CHEMISTRY

Dr. Jøseph J. Pesek

Pruden M. Strice

Dr. Bradley M. Stone

unanime. L. J.

Dr. Roger Terrill

Dr. Brooke Lustig

APPROVED FOR THE UNIVERSITY

and the second s

ABSTRACT

ELECTROCHROMATOGRAPHIC STUDIES OF SELECT PHARMACEUTICAL COMPOUNDS

by Elham Moslehi

This study presents analyses of electrochromatographic migrations of select pharmaceutical compounds in two types of capillaries, prepared via etching and modification using 4-cyano-4'-pentoxy biphenyl and C-18 stationary phase, as well as a bare silica capillary. The liquid crystal stationary phase for open-tubular capillary electrochromatography (OTCEC) is prepared through silanization and hydrosilation processes. CEC in an open tubular format overcomes many problems associated with the use of packed column electrochromatography.

While OTCEC with liquid crystal and C-18 bonded stationary phases has a wide range of applications, this report presents focused CE & OTCEC studies of theophylline, dihydroxy-theophylline (dyphylline), aminophylline, and nortriptylline. The experimental conditions covered various buffer pH values (2.14 to 8.14), organic modifier volume ratios (0% to 50%), and applied voltages (±25 kV). The experimental results, including migration time and capillary efficiency, are analyzed for different conditions. The optimal migration efficiency conditions and capillary type are determined for each specific compound.

Acknowledgement

I would like to thank my research advisors, Dr. Joseph J. Pesek and Dr. Maria Matyska for giving me the opportunity to work on this exciting project. I am also grateful to them for their guidance and continual support throughout the course of my research work in their laboratory. Dr. Maria Matyska was always available and willing to help me with my questions and gave me excellent handson training on the instruments in the lab. I am indebted to her for her generous support, for providing access to the essential laboratory instruments, and for providing an office space so that I could conduct my experimental work. I am also very thankful to Dr. Joseph J. Pesek for his review of my thesis manuscript and valuable comments. I would like to thank my other thesis committee members, Dr. Bradley Stone, Dr. Roger Terrill, and Dr. Brooke Lustig, for their time and efforts spent to review my manuscript and to serve as my committee members.

I thank my husband, Mehrdad, as well as my daughters Roxanne and Dorsa, for their patience and support throughout the course of my graduate studies. I dedicate this work to them.

Table of Contents

List of Tables	
List of Figures	X
Symbols and Abbreviations	
1. Introduction	
1.1. Capillary Electrophoresis (CE) Overview	
1.1.1. Electrophoresis Theory	4
1.1.2. Electroosmotic Flow	5
1.1.3. EOF Flow Profiles	10
1.1.4. CE Capillary Properties	
1.2. Capillary Electrochromatography (CEC)	13
1.2.1. CEC Apparatus	15
1.2.2. Sample Injection	16
1.2.3. Detectors	
1.2.4. Data Acquisition Device	17
1.2.5. Separation Parameters	17
1.2.6. Joule Heating	21
1.3. CEC Columns	21
1.3.1. Different Stationary Phases in CEC	
1.4. Liquid Crystals	25
1.4.1. Various Types of Liquid Crystals	26
1.4.2. Liquid Crystal Uses and Applications	28
1.4.3. Liquid Crystals in Chromatography	
2. Experimental Procedures	31
2.1. Materials Used in This Study	31
2.1.1. Buffers and Related Materials Used in this Study	
2.1.2. Organic Modifier	
2.1.3. Etching Material	
2.1.4. Capillaries	
2.2. Capillary Modification Processes	38
2.2.1. Etching Process	
2.2.2. Modification of Etched Surface	

2.2.3. Bonded Material to the Etched Capillary	41
	_ 44
2.3. Experimental Overview	_ 44
2.3.2. Experiment Conditions	
2.4. Instrumentation	
2.4.1. Gas Chromatography Oven	_ 49
2.4.2. Capillary Electrophoresis	_ 49
2.5. Data Analysis	50
2.6. Capillary Preconditioning	_ 52
2.7. Materials Characterization of Bonded Phase	_ 52
2.7.1. SEM Analysis	_ 52
2.7.2. DRIFT Spectroscopy Analysis	
2.7.3. Electroosmotic Flow Measurements in Modified Capillaries	_ 53
3. Results and Discussions	_ 54
3.1. Capillary Modification Process	_ 54
3.1.1. Etching	54
3.1.2. Bonded Layer	_ 55
3.2. Chromatographic Studies of Solutes	_ 56
3.2.1. Migration Study of Theophylline	_ 56
3.2.2. Migration Study of Dyphylline (Dihydroxy-Theophylline	_ 60
3.3. Overview of Xanthine Family of Drugs Migration Studies	_ 70
3.4. Overview of Tricyclic Antidepressant (Nortriptylline) Migration Studies	_ 71
3.5. Effect of pH on Migration Behavior	_ 72
4. Conclusions	_ 74
References	106
Appendix	109

List of Tables

Table 1. List of materials used in this study with their chemical abstract service (CAS) registry numbers
Table 2. Theophylline Migration in Bare Silica Capillary (+25 kV)109
Table 3. Theophylline Migration in Bare Silica Capillary (-25 kV)111
Table 4. Theophylline Migration in C-18 Capillary (+25 kV)113
Table 5. Theophylline Migration in C-18 Capillary (-25 kV)115
Table 6. Theophylline Migration in Cyano Pentoxy Capillary (+25 kV)117
Table 7. Theophylline Migration in Cyano Pentoxy Capillary (-25 kV)119
Table 8. Dihyroxy-theophylline Migration in Bare Silica Capillary (+25 kV)121
Table 9. Dihyroxy-theophylline Migration in Bare Silica Capillary (-25 kV)123
Table 10. Dihyroxy-theophylline Migration in C-18 Capillary (+25 kV)125
Table 11. Dihyroxy-theophylline Migration in C-18 Capillary (-25 kV)127
Table 12. Dihyroxy-theophylline Migration in Cyano Pentoxy Capillary (+25 kV)kV)
Table 13. Dihyroxy-theophylline Migration in Cyano Pentoxy Capillary (-25kV)
Table 14. Aminophylline Migration in Bare Silica Capillary (+25 kV)133
Table 15. Aminophylline Migration in Bare Silica Capillary (-25 kV)135
Table 16. Aminophylline Migration in C-18 Capillary (+25 kV)137
Table 17. Aminophylline Migration in C-18 Capillary (-25 kV)
Table 18. Aminophylline Migration in Cyano Pentoxy Capillary (+25 kV)141
Table 19. Aminophylline Migration in Cyano Pentoxy Capillary (-25 kV)
Table 20. Nortriptylline Migration in Bare Silica Capillary (+25 kV)

Table 21.	Nortriptylline Migration in Bare Silica Capillary (-25 kV)147
Table 22.	Nortriptylline Migration in C-18 Capillary (+25 kV)
Table 23.	Nortriptylline Migration in C-18 Capillary (-25 kV)151
Table 24.	Nortriptylline Migration in Cyano Pentoxy Capillary (+25 kV)153
Table 25.	Nortriptylline Migration in Cyano Pentoxy Capillary (-25 kV)155
	Summary descriptions of the effects and ranges of the experimental parameters in this study
Table 27.	The primary experimental variable and their values157
Table 28.	The overall preferred experimental conditions for various compounds evaluated in this study (the pH values for obtaining the greatest numbers of successful measurements are shown)
Table 29	The optimal capillary type, applied voltage polarity, pH value, and Me volume ratio for various compounds evaluated in this study (for greatest number of peaks and good capillary efficiency)

List of Figures

	Figure 1.	Schematic diagram of the capillary electrophoresis (CE) technique and its operating principle	2
×*	Figure 2.	Stern's model for the double-layer charge distribution at a negatively-charged capillary wall, resulting in generation of zeta potential and EOF	6
	Figure 3.	Schematic diagrams of: (a) electroosmotic and electrophoretic migration components in a capillary, and (b) electroosmotic flow (EOF) in a capillary.	8
	Figure 4.	Schematic diagram of cross-sectional flow profiles as a result of: (a) electroosmotic flow, and (b) hydrodynamic flow1	1
	Figure 5.	Illustration of the capillary inner surface termination at low and high pH values	0
	Figure 6.	Orientation order in crystals, liquids, and plastic crystals2	6
	Figure 7.	Structural picture of nematic and smectic liquid crystal2	8
	Figure 8.	Schematic diagrams of: (a) the bonding reaction of [4-(allyloxy) benzoyl]-4methoxy phenyl to silica, and (b) the capillary wall surface reactions	3
	Figure 9.	Structural drawings of the materials used in this study: (a) 4-cyano- 4'-n-pentoxybiphenyl liquid crystal used for the bonded phase; (b) Theophylline; (c) Dyphylline; (d) Aminophylline; and (e) Nortriptylline	5
	Figure 10	0. Silanization/ Hydrosilation reaction scheme4	0
	Figure 11	1. Reaction scheme for synthesis of cyano bonded phase using free radical initiator4	2
	Figure 12	2. Schematic drawing of C-18 capillary bonding4	3
	Figure 13	3. HP 3D CE system with HP Chemstation (See Figures 1 and 3 for related schematic diagrams)5	1
	Figure 14	4. SEM micrographs of the etched capillary surface	7

Figure 15. Migration of theophylline in C-18 modified capillary: pH=7.06, no methanol, +25 kV; migration time in min79
Figure 16. Migration of theophylline in C-18 modified capillary: pH=7.06, 30% methanol, +25 kV; migration time in min
Figure 17. Migration of theophylline in cyano pentoxy modified capillary: pH=7.06, 10% methanol, +25 kV; migration time in min80
Figure 18. Migration of theophylline in cyano pentoxy modified capillary: pH=7.06, 40% methanol, +25 kV; migration time in min80
Figure 19. Migration of theophylline in cyano pentoxy modified capillary: pH=7.06, 50% methanol, +25 kV; migration time in min81
Figure 20. Migration of theophylline in bare silica capillary: pH=4.41, 50% methanol, +25 kV; migration time in min81
Figure 21. Migration of theophylline in bare silica capillary: pH=4.41, no methanol, +25 kV; migration time in min82
Figure 22. Migration of dihydroxy-theophylline in C-18 modified capillary: pH=7.06, no methanol, +25 kV; migration time in min
Figure 23. Migration of dihydroxy-theophylline in C-18 modified capillary: pH=7.06, 40% methanol, +25 kV; migration time in min
Figure 24. Migration of aminophylline in bare silica capillary: pH=4.41, 30% methanol, +25 kV; migration time in min83
Figure 25. Migration of aminophylline in bare silica capillary: pH=4.41, no methanol, +25 kV; migration time in min
Figure 26. Migration of aminophylline in C-18 modified capillary: pH=8.14, 40% methanol, +25 kV; migration time in min
Figure 27. Migration of aminophylline in C-18 modified capillary: pH=7.06, 30% methanol, +25 kV; migration time in min85
Figure 28. Migration of aminophylline in C-18 modified capillary: pH=7.06, 10% methanol, +25 kV; migration time in min85
Figure 29. Migration of aminophylline in cyano pentoxy modified capillary:

Figure 30. Migration of aminophylline in cyano pentoxy capillary: pH=7.06, 10% methanol, +25 kV; migration time in min
Figure 31. Migration of aminophylline in C-18 modified capillary: pH=8.14, no methanol, +25 kV; migration time in min87
Figure 32. Migration of nortriptylline in cyano pentoxy modified capillary: pH=4.41, 50% methanol, +25 kV; migration time in min87
Figure 33. Migration of nortriptylline in C-18 modified capillary: pH=4.41, 50% methanol, +25 kV; migration time in min
Figure 34. Migration of nortriptylline in C-18 modified capillary: pH=4.41, no methanol, +25 kV; migration time in min
Figure 35. Migration of nortriptylline in cyano pentoxy modified capillary: pH=4.41, 10% methanol, +25 kV; migration time in min89
Figure 36. Migration of nortriptylline in bare silica capillary: pH=4.41, 10% methanol, +25 kV; migration time in min89
Figure 37. Migration of nortriptylline in bare silica capillary: pH=4.41, 50% methanol, +25 kV; migration time in min90
Figure 38. Theophylline migration time vs pH for methanol volume ratios of 0%, 40%, and 50% in bare silica capillary at +25 kV91
Figure 39. Theophylline migration time vs methanol volume ratio at pH = 4.41, 7.06, and 8.14 in bare silica capillary at +25 kV91
Figure 40. Theophylline migration time vs methanol volume ratio at pH = 7.06, and 8.14 in C-18 modified capillary at +25 kV92
Figure 41. Theophylline migration time vs methanol volume ratio at pH = 7.06 in cyano pentoxy modified capillary at +25 kV92
Figure 42. Theophylline migration time vs pH for methanol volume ratio of 10% in cyano pentoxy capillary at +25 kV93
Figure 43. Theophylline migration time vs methanol volume ratio at pH=2.14, 3.0, & 4.41 in cyano pentoxy modified capillary at -25 kV93
Figure 44. Capillary efficiency for theophylline vs methanol volume ratio for bare silica, C-18 modified, and cyano pentoxy modified capillaries at pH=7.06 and +25 kV

	Dihydroxy-theophylline migration time vs methanol volume ratio at pH of 4.41, in bare silica capillary at +25 kV95
	Dihydroxy-theophylline migration time vs pH for methanol volume ratios of 0%, 40%, and 50% in bare silica capillary at +25 kV95
w	Dihydroxy-theophylline migration time vs methanol volume ratio at pH= 7.06, 8.14 in C-18 modified capillary at +25 kV96
v	Dihydroxy-theophylline migration time vs methanol volume ratio at pH=7.06 in cyano pentoxy modified capillary at +25 kV96
	Dihydroxy-theophylline migration time vs pH for methanol volume ratio of 0% in cyano pentoxy modified capillary at -25 kV97
N	Dihydroxy-theophylline migration time vs methanol volume ratio at pH= 2.14 & 3.0 in cyano pentoxy modified capillary at +25 kV97
•	Peak width for dihydro-theophylline vs methanol volume ratio for bare silica, C-18 modified, and cyano pentoxy modified capillaries at pH=7.06 and +25 kV98
	Aminophylline migration time vs methanol volume ratio at pH = 4.41 and 7.06, in bare silica capillary, at +25 kV98
	Aminophylline migration time vs pH in the range of 2.14 to 8.14 in bare silica capillary at +25 kV (no methanol modifier)99
	Aminophylline migration time vs methanol volume ratio at pH of 7.06 and 8.14, in C-18 capillary at +25 kV99
	Aminophylline migration time vs methanol volume ratio at pH of 7.06, in cyano pentoxy capillary at +25 kV100
	Aminophylline migration time vs pH in the range of 2.14 to 8.14 in cyano pentoxy capillary at -25 kV (no methanol modifier)100
.	Peak width for aminophylline vs methanol volume ratio for bare silica, C-18 modified, and cyano pentoxy modified capillaries at pH=7.06 and +25 kV
	Migration time vs pH for nortriptylline in cyano pentoxy capillary at +25 kV (no methanol modifier)102
	Nortriptylline migration time vs methanol volume ratio for $pH = 2.14, 3.0$ and 4.41 in evano pentoxy capillary at +25 kV

Figure 60	. Nortriptylline migration time vs methanol volume ratio for pH = 3.0, in cyano pentoxy capillary at -25 kV10)3
Figure 61	. Nortriptylline migration time vs pH in the range of 2.14 to 8.14 with 30% methanol volume ratio in C-18 capillary at +25 kV)3
Figure 62	. Nortriptylline migration time vs methanol volume ratio at pH of 3.0 and 4.41, in C-18 capillary at +25 kV10)4
Figure 63	. Nortriptylline migration time vs methanol volume ratio at pH = 2.14, 3.0, and 4.41, in Bare Silica capillary at +25 kV10) 4
Figure 64	. Capillary efficiency for nortriptylline vs methanol volume ratio for bare silica, C-18 modified, and cyano pentoxy modified capillaries at pH=7.06 and +25 kV10	05

Symbols and Abbreviations

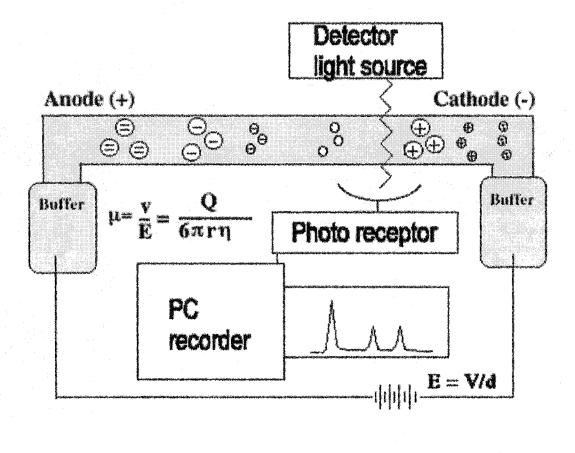
C-18	octadecyl	
CAS	Chemical Abstract Service	
CE	Capillary Electrophoresis	
CEC	Capillary Electrochromatography	
CGE	Capillary Gel Electrophoresis	
CIFE	Capillary Isoelectric Focusing	
CZE	Capillary Zone Electrophoresis	
	Electric Field	
EOF	Electroosmotic Flow	
FTIR	Fourier Transform Infrared Spectroscopy	
GC	Gas Chromatography	
HPLC	High Performance Liquid Chromatography	
	Effective Capillary Length	
i.d.	Internal Diameter	
i L	Total Capillary Length	
LCD	Liquid Crystal Display	
MEKC	Micellar Electrokinetic Chromatography	
MS	Mass Spectroscopy	
NMR	Nuclear Magnetic Resonance	
OT-CEC	Open Tubular Capillary Electrochromatography	
PC-CEC	Packed Column Capillary Electrochromatography	

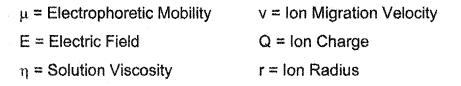
рН	(chemistry) p(otential of) H(ydrogen)
Q	Ion Charge
r	Ion Radius
SEM	Scanning Electron Microscopy
t	Migration Time
TES	Triethoxysilane
UV	Ultraviolet
V	Ion Migration Velocity
	Applied Voltage
η	Solution Viscosity
μ _a	Sample Mobility
με, μερ	Electrophoretic Mobility
μeof	Electroosmotic Flow Mobility

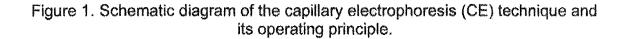
1. Introduction

1.1. Capillary Electrophoresis (CE) Overview

Electrophoresis refers to the migration of electrically charged particles through an electrolyte (within a capillary) under the action of an electric field. These charged particles migrate through a capillary in a particular direction at specific rates depending on their charge-to-size ratio. More specifically, the electrophoresis process can be defined as the differential movement or migration of ions by attraction or repulsion in an electric field. Cations migrate toward the negatively charged electrode (cathode) and anions move toward the positively charged electrode (anode). Capillary Electrophoresis (CE) is an analytical method based on conducting electrophoresis in buffer-filled, narrow-bore capillaries. The practical implementation of CE is conceptually quite simple (see the schematic diagram in Figure 1). A positive electrode (anode) and a negative electrode (cathode) are placed in a solution containing the analyte (ions). When an electrical voltage is applied between the two electrodes, the negatively charged anions and the positively charged cations will drift through the solution toward the electrode of opposite charge polarity. Because of their high separation speeds and good analytical efficiencies, capillary column separation techniques are among the most vital tools for characterizations of organic and inorganic materials in many fields, such as chemistry, medicine, and pharmaceutical industries.







Electrophoretic analyses using free solutions were performed and reported, for the first time, by Hjerten *et al.* in 1958 [1]. Their analytical work involved the use of a quartz column with a 1 - 3 mm inner diameter (i.d.). It was reported that using columns with smaller i.d. values would diminish or reduce the undesirable Joule-heating effects, hence the advent of capillary electrophoresis (CE). The use of capillary analysis with different types of sample materials has since demonstrated enhanced analytical stability and reproducibility in the coming years.

Capillary electrophoresis has evolved towards a variety of separation techniques, all involving the application of a high electrical voltage across the buffer-filled capillaries in order to achieve separations. Electrophoretic techniques include: (1) The capillary separation phenomenon, based on ion size and charge differences among samples or analytes (i.e., capillary zone electrophoresis or CZE); (2) separation of neutral compounds using surfactant micelles, known as micellar electrokinetic capillary chromatography (MEKC); (3) moving of solutes through a gel (capillary gel electrophoresis or CGE); and (4) separation of zwitterionic solutes within a pH gradient (known as capillary isoelectric focusing or CIFE) [2]. MEKC is a commonly used separation technique in pharmaceutical applications. CGE and CIEF are used for separation of biomolecules such as DNA and proteins, and are increasing utilized in the development of biotechnology and drugs. Many of the CE separation techniques rely on the presence of an electrically induced flow of solution or electroosmotic flow [3].

1.1.1. Electrophoresis Theory

Electrophoresis theory is the foundation for the CE operating principle and can be described by a few simple equations. As discussed earlier, electrophoresis is the migration or movement of solutes or ions under the action

of an applied electric field. Separation by electrophoresis (electrophoretic separation) is based on the differences in the migration speeds of ions (solutes) in an electric field. The ion migration velocity is proportional to the electric field, as shown in the following equation:

V= μ₀ Ε

Where: V = ion migration velocity (m s⁻¹)

 μ_e = electrophoretic mobility (m² V⁻¹ s⁻¹)

E = applied electric field strength (V m⁻¹)

The electric field is simply the applied voltage divided by the total capillary length.

The electrophoretic mobility, μ_{e} , is a parameter that describes how fast a given ion or solute may move through a medium such as a buffer-filled solution. It is essentially a measure of the balance of the electrical force (acting in favor of motion) and the frictional force (acting against motion) affecting each ion. The electrophoretic mobility is a constant for a specific ion and under a given set of experimental conditions. When an ion is migrating, these opposing forces are equal and opposite. The electrophoretic mobility is a function of the ion charge (q), the solution viscosity (η), and the ion radius (r), as follows:

 $\mu_{c} = \frac{q}{6\pi \mu r}$

Electrophoretic mobility is a characteristic constant for a given analyte or ion. The charge-to-size ratio of a given analyte ion determines its electrophoretic mobility. Higher ion charges and/or smaller ion sizes result in higher electrophoretic mobility values, whereas lower ion charges and/or larger ion sizes produce lower mobility values. Electrophoretic mobility in turn determines the migration velocities of the ions. Different solutes usually have different electrophoretic mobilities, thus, it is possible to separate mixtures of different ions and solutes using electrophoresis.

1.1.2. Electroosmotic Flow

Electroosmotic flow (EOF) is the bulk flow of liquid through the capillary that results from the longitudinal electric field acting on ions in the capillary diffuse layer (to be described by Stern's model below). EOF is an important parameter in CE and must be well controlled [4]. The capillary tube used in CE is usually made of fused silica. The inner surface of the capillary has silanol groups that are negatively charged when deprotonated. When the capillary is filled with the buffer solution, the negatively charged capillary wall attracts positively charged ions from the buffer solution. As shown in Figure 2 (i.e., Stern's model), this phenomenon produces an electrical double layer and a potential difference

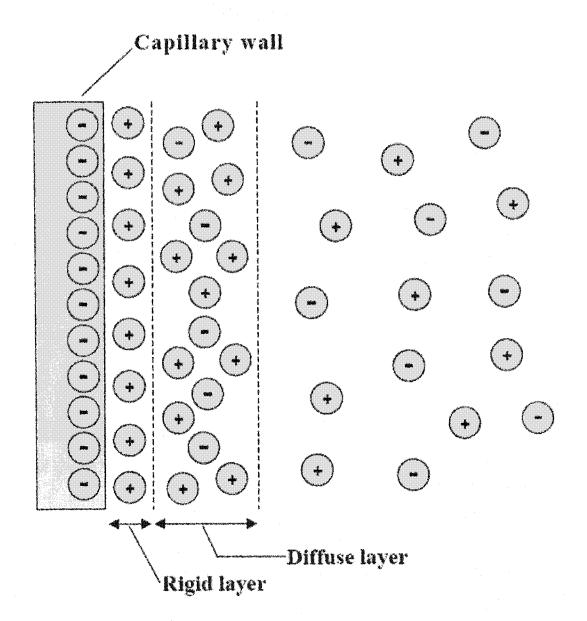


Figure 2. Stern's model for the double-layer charge distribution at a negativelycharged capillary wall, resulting in generation of zeta potential and EOF. (called zeta potential) near the capillary wall. Stern's model for an electrical double layer comprises a rigid layer of adsorbed molecules on the capillary wall and a diffuse layer, where ion diffusion can take place. The closest layer to the surface is called "Inner Helmholtz" or "Stern Layer" and the second more diffuse layer is called "Outer Helmholtz Plane" or the diffuse layer. The zeta potential is the potential difference between the capillary and solution. The potential of the solution drops exponentially by moving away from the capillary surface. The zeta potential is a function of the nature and concentration of the ions in the diffuse layer. For example, a negatively charged surface and a positively charged solution result in a positive zeta potential. In this case, the solution bears a slightly positive net charge and, therefore, will tend to flow towards the cathode end of the capillary.

When a voltage is applied across the capillary, cations in the diffuse layer move toward the cathode, pulling the bulk solution along with them [see Figures 3(a) and 3(b)]. Neutral molecules also migrate along with the buffer as a result of EOF [4]. The result is a net bulk flow in the direction of cathode with an electroosmotic flow velocity described by the following equation:

$$v_{\rm EOF} = \left(\frac{\varepsilon_0 \varepsilon \zeta}{4\pi\eta}\right) E$$

where:

80

 v_{EOF} = electroosmotic flow velocity (bulk flow velocity)

= dielectric constant of vacuum

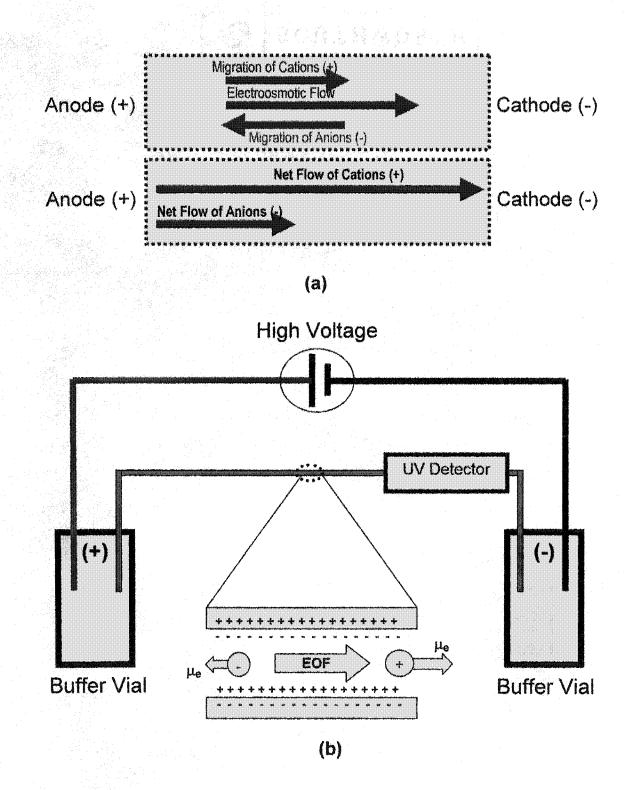


Figure 3. Schematic diagrams of: (a) electroosmotic and electrophoretic migration components in a capillary, and (b) electroosmotic flow (EOF) in a capillary.

 ε = dielectric constant of the buffer solution

 ζ = zeta potential

E = electric field strength

The term inside parentheses corresponds to the electroosmotic flow mobility, μ_{EOF} . The relationship between electroosmotic flow velocity and electroosmotic flow mobility ($\upsilon_{EOF} = \mu_{EOF} E$) is similar to the relationship between migration velocity and electrophoretic mobility (V= $\mu_e E$). The primary parameters affecting EOF mobility are the zeta potential value, the dielectric constant, and the viscosity of the buffer solution. In summary, EOF is essentially the result of an electrical potential difference on the capillary surface where the ions in the diffuse layer experience a force parallel to the surface.

The zeta potential is proportional to the charge density on the capillary wall, which itself is highly pH dependent. So, EOF mobility changes with the buffer pH and is larger at higher pH. At low pH values the EOF decreases due to protonation of the silanol groups and reduced attraction between the positively charged solutes and the capillary wall. The EOF can even approach zero at very low pH values. At high pH (pH > 7), the EOF mobility is sufficiently large that even anions are swept towards the cathode. Thus, the measured migration velocity of a solute may not be directly related to its electrophoretic mobility but instead, depends on a combination of both its electrophoretic mobility and EOF mobility. The solute's apparent electrophoretic mobility (μ_e) derived from its

measured migration velocity is the sum of its electrophoretic mobility (μ_e) and EOF mobility (μ_{EOF}), as indicated below:

The apparent electrophoretic mobility (μ_a) may also be described as follows:

 $\mu_a = (IL) / (tE) = I / (tV)$

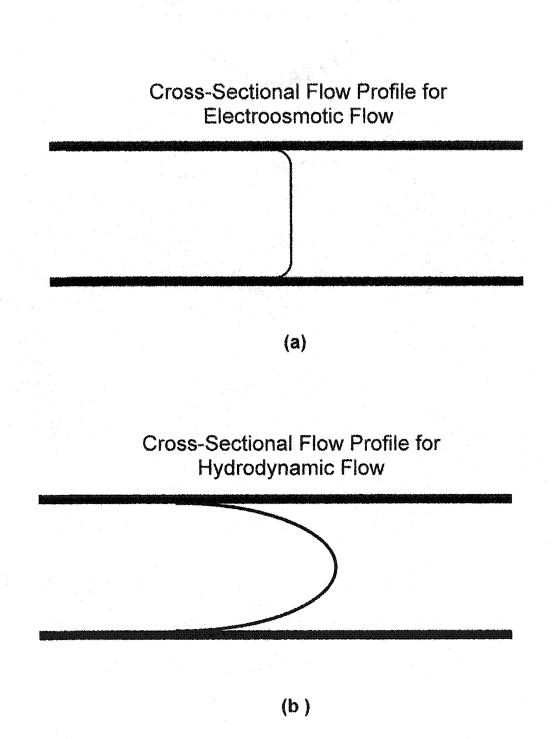
Where:	V = applied voltage	E = electric field
	t = migration time	L = total capillary length

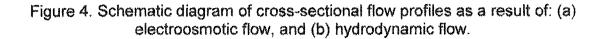
I = effective capillary length

Since samples are usually introduced at the anode side of the capillary, and EOF moves from the anode to the cathode, cations have $\mu_e > 0$, neutrals have $\mu_e = 0$, and anions have $\mu_e < 0$. As a result, cations migrate faster than the EOF, anions migrate more slowly than the EOF, and neutrals migrate with the same velocity as the EOF [see the schematic diagrams of Figures 3(a) and 3(b)].

1.1.3. EOF Flow Profiles

As shown schematically in Figure 4, EOF produces a flat flow profile [see Figure 4(a)], versus a pressure-driven or hydrodynamic flow, which is a parabolic flow [see Figure 4(b)]. EOF has a flat, plug-type flow profile because its driving force (charge on the capillary wall) is uniformly distributed along the capillary. This feature implies that there are no pressure drops and the flow velocity is uniform across the capillary. This observation is different from pressure-driven flow





(e.g., HPLC), in which pressure-driven forces at the column walls produce a pressure drop across the column, resulting in parabolic flow profile. The flat flow profile of EOF minimizes band broadening and narrows the detection zone, leading to high separation efficiencies that enable separations based on minute mobility differences.

1.1.4. CE Capillary Properties

The capillaries used in CE are normally made of fused silica covered with an external polyimide protective coating to give them bending flexibility and strength. Capillaries are usually 25-100 cm long and have volumes on the order of a few μ l. A small portion of this coating is removed to form a window for detection. In commercial CE instruments, the capillary is held in a cartridge to protect the delicate detection window. The window is aligned at the optical center of the detector.

The inner surface of the capillary can be chemically etched and modified by covalently bonding certain molecules. When the modifier is adsorbed on the wall, the capillary is referred to as coated capillary, while a capillary with a covalently attached substance to the wall is called covalently modified. These coatings should be stable over a wide range of pH values. The coatings are used for a variety of purposes such as to reduce sample adsorption or to change the ionic charge of the capillary wall (i.e., change the zeta potential).

1.2. Capillary Electrochromatography (CEC)

Capillary electrochromatography (CEC) is a variant of CE where the capillary is covalently modified. CEC is useful for separation of a wide range of analytes, including small ions, basic compounds, proteins, and peptides. The CEC separation mechanism is due to the combined effects of: (i) chromatographic partitioning, and (ii) electrophoretic migration (or based on the combined features of both HPLC and CE [5]).

CEC offers the high efficiency of CE combined with the high selectivity of micro-HPLC. CE is only capable of separating charged species via their different electrophoretic mobilities and cannot resolve neutral species. Micro-HPLC, on the other hand, produces high selectivity in a wide range of applications, including analyses of mixtures containing neutral components, due to the variety of available stationary phases. Since the mobile phase in micro-HPLC is driven through the column by pressure, resulting in a parabolic flow profile, the column efficiency is typically lower than that of CEC. CEC typically employs columns similar to those used in micro-HPLC, but the mobile phase is driven by an applied electrical voltage, as in CE.

CEC can be performed in a standard CE instrument using a micro-HPLC column (employing an electrophoresis capillary packed with or attached to a chromatographic medium). As described before, CEC separation takes place because of both electrophoretic and chromatographic phenomena. CEC can be implemented in two different types of capillaries: (i) packed column (PC-CEC)

that utilize stationary phases like HPLC, and (ii) open tubular (OTCEC) [6]. In OT-CEC, the stationary phase is attached to the capillary inner wall, while in PC-CEC the solid packed material is held in by frits that act as a stationary phase. In this study, the results of OT-CEC experiments are presented and discussed.

In CEC, packed columns offer faster separation times than HPLC. The CE capillaries used in CEC are packed with the HPLC packing material, and an electrical voltage is applied across the capillary in order to generate an electroosmotic flow (EOF). The EOF transports solutes through the column towards the ultra-violet (UV) light detector. Both differential partitioning and electrophoretic migration of the solutes occur during their movement towards the UV detector, leading to CEC separations of solutes.

Electrochromatography has a plug-like flat flow profile, similar to the flow profiles observed in CE. The plug-like flow in both open and packed capillaries is more uniform than the parabolic laminar flow of a pressure-driven system like HPLC. The beneficial plug flow profile of EOF reduces flow-related band broadening normally associated with pressure-driven parabolic flow. Since flows are electroosmotically and not pressure driven, small-diameter particles can be used in order to achieve very high separation efficiencies.

The primary analytical parameters in CE and CEC are very similar, including migration time, mobility, and dispersion. The migration time of the sample refers to the time required for the sample to migrate from the injection point to the point of detection (usually a UV absorbance detector). Migration time

as well as other important CEC experimental parameters (such as peak width and area) must be known in order to determine the mobility of the sample in different capillaries [7].

1.2.1. CEC Apparatus

Operation of a CE system involves application of a high electrical voltage (5 kV - 30 kV) across a narrow-bore (25 µm - 100 µm) capillary, which results in electrical currents in the range of $10 - 100 \mu$ A [see the schematic diagrams in Figures 1 and 3(b)]. The capillary is filled with a suitable buffer, which conducts current through the inner bore. The capillary ends are placed into buffer reservoirs, and the capillary is filled with an identical buffer. Electrodes made of an inert material such as platinum are also inserted into the buffer reservoirs to complete the electrical circuit for current flow. A small volume of sample is injected into one end of the capillary. The sample may be injected into the capillary either electrokinetically or hydrodynamically. After the buffer reservoir is replaced, an electric field is applied and the separation process is performed. The capillary passes through a detector, usually a UV absorbance device, at the opposite end of the capillary (i.e., cathodic end of the capillary). Application of an electrical voltage causes movement of sample ions towards their appropriate electrode. The migration of cations results in an accompanying migration of buffer solution through the capillary, resulting in EOF.

As discussed earlier, the EOF is usually greater than the electrophoretic mobility of the individual ions of the sample in a bare capillary. As described in CE, both cations and anions can be separated in the same CEC run. Cations are attracted toward the cathode due to the electric field effects [Figure 3(a)]. While anions are electrophoretically attracted toward the anode, they are carried toward the cathode with the EOF of the buffer. Migration of cations is based on the charge-to-mass ratios, and the cations with the highest charge-to-mass ratios will migrate with the highest velocity, arriving first at the UV detector. Next, neutral components migrate with the same velocity as the EOF, and lastly, the anions migrate. The EOF is an essential feature of CEC and must be well controlled (e.g., at high pH values the EOF may be too great to allow sufficient separation of all components in a sample mixture).

1.2.2. Sample Injection

The sample solution is forced into the end of the capillary that is the farthest from the detector [see the schematic diagrams illustrated in Figures 1 and 3(b)]. Typical sample injection volumes are about 10-100 nl. There are two modes of sample injection; one is vacuum or pressurized injection and the other is injection of the sample by applying an electrical voltage, also known as electrokinetic sampling.

1.2.3. Detectors

The most commonly used detector is based on UV absorbance, which is standard on commercial CE instruments. Alternative detection modes available include fluorescence, laser induced fluorescence, and indirect detection methods. The coupling of CE to mass spectrometers is frequently used for detection and also obtaining structural information about the analytes.

1.2.4. Data Acquisition Device

The detectors can be interfaced to a data acquisition device (e.g., a computer) to calculate and store the results. Appropriate software (e.g., Chemstation) computes peak migration time, height, symmetry, peak width, and other useful information.

1.2.5. Separation Parameters

There are various experimental parameters that have to be considered and controlled in order to achieve optimum CEC separation results. The main parameters to be controlled are described below.

1.2.5.1. Applied Voltage

Separations are normally performed in the range of 10 - 30 kV [as indicated in Figure 3(b)]. Application of these voltages generates electrical currents in the range of 10 - 100 μ A. Higher applied voltages lead to faster

migration and higher EOF. Separation operations with currents beyond the above-mentioned range produce unstable and irreproducible conditions as well as analyte diffusion, resulting in band broadening. On the other hand, decreasing the applied voltage can lead to higher resolution due to reduced Joule heating, lower sample dispersion, slower migration of solutes, and more on--column interaction. However, the applied voltage cannot be too low and must be sufficiently high in order to establish reasonable ion velocities and stable (low noise) CEC currents. Constant-voltage and constant-current electrical sources are the most commonly used modes of operation used for CEC separation.

1.2.5.2. Capillary Temperature

Most separation processes are performed at room temperature. Higher temperatures usually produce undesirable band broadening. It is very important to have the capillary temperature controlled in order to avoid band broadening. Depending on the sample compounds, the capillary temperature can be adjusted to optimize the separation process. Excessive temperatures can cause uncontrolled changes in modified capillaries, buffer viscosity, sample chemical structure, and degrade the separation efficiency [8].

1.2.5.3. Capillary Length & Inner Diameter (i.d.)

Increasing the capillary internal diameter leads to greater detection sensitivity due to an increase in the effective path length for the sample. However, larger columns do not dissipate Joule heat as efficiently as smaller columns and can experience large radial temperature gradients that result in band broadening. Narrower capillaries have larger surface-to-volume ratios, so they dissipate Joule heat more efficiently [8]. On the other hand, the capillary i.d. cannot be made too small since it would result in substantial reductions in the electrical current, the capillary sample volume, and the resulting measurement sensitivity (thus, reduced signal-to-noise ratios).

1.2.5.4. Buffer Solutions

A separation process can be optimized by choosing an appropriate buffer. The buffer-detector compatibility must be taken into account in order to prevent UV absorbance near the sample detection wavelength. The buffer components should have low UV absorbance at the detection wavelength of the solute. The buffer pH value can also affect the electroosmotic flow. Buffer solutions with lower pH values result in decreased electroosmotic flow due to the protonation of silanol groups as shown in Figure 5. Higher buffer pH values lead to increased electroosmotic flow. Protonation of silanol groups can cause reduced attraction between the positively charged solutes and the capillary wall. The reagents used in the buffer preparation process should have high purity levels (to achieve controlled buffer pH and to prevent introduction of contaminants) and the buffer solution should be thoroughly degassed using an inert gas such as nitrogen or

helium. The buffer solution must be stored in a refrigerator at approximately 4°C in order to prevent bacterial growth.

1.2.5.5. Organic Modifier

Organic solvents such as methanol can be used to achieve better resolution by decreasing the zeta potential and changing the buffer viscosity, resulting in reduced EOF and increased migration time. The most commonly used organic solvents are methanol, 2-propanol, and acetonitrile. By adding organic solvents, the sample will spend more time in the capillary because of the decreased EOF.

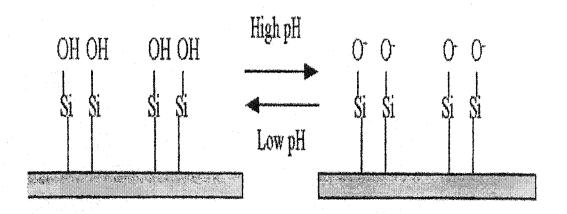


Figure 5. Illustration of the capillary inner surface termination at low and high pH values

1.2.6. Joule Heating

The capillary acts as an electrical resistor and generates heat by passage of an electrical current. The resulting temperature increase depends on the power dissipation (total power dissipation equals voltage squared divided by the capillary resistance: $P = V^2 / R$). Power dissipation is determined by the capillary dimensions, the buffer electrical conductivity, and the applied voltage. Joule heating increases with higher separation current. In general, an electrical current below 60 µA is preferred in order to limit the extent of Joule heating.

It is very important to utilize closed-loop capillary temperature control during the CEC separation process to maintain a controlled thermal environment and to reduce Joule heating. In order to achieve consistent and reproducible separations, the capillary temperature must be monitored and regulated in real time. The commercial CEC instruments are usually equipped with thermostats to achieve real-time capillary temperature monitoring and control.

1.3. CEC Columns

As mentioned earlier, there are two types of columns in CEC: (i) packed capillaries (PC-CEC), and (ii) open tubular (OT-CEC). The bare fused-silica capillary used in CE separation can cause irreversible adsorption of the sample to the wall, resulting in detrimental effects on analytical attributes, such as elution time and efficiency as well [5]. The main disadvantage of bare-silica columns in CE separation is the adsorption of positively charged particles to the SiO⁻

groups. This can cause a high EOF in the capillary such that the samples move rapidly towards the cathode without allowing sufficient time for separation. In order to overcome this problem, capillaries are usually coated and chemically modified for CEC applications. It has been shown that the modification material can be covalently bonded to the etched capillary wall [5]. The organic moieties that are typically attached include: octadecyl (C-18), C-8, diol, and cholesterol derivatives.

These different modifications can provide a wide variety of chromatographic separations [9]. For instance, a mixture of tetracyclines has been successfully separated on a C-18 etched and modified column. Proteins and peptides have been separated with diol and octadecyl modified capillaries. Both coating and modification diminish the electroosmotic flow and analyte adsorption to the inner wall [10]. Surface coatings and bondings should be stable over a wide range of pH values and organic solvents for many injections.

The column in PC-CEC is similar to an HPLC column. In OT-CEC, the stationary phase is bonded to the capillary inner wall. Due to the presence of electrically driven flow in CEC in contrast to the pressure driven flow in HPLC, the use of small particle sizes in packed capillary CEC is possible. This is due to the fact that in the pressure-driven flow in an HPLC column can drive out the small particles from the column. Using smaller particle sizes leads to higher efficiency [11]. Column packing can be achieved by using a high-pressure

packing technique through a pneumatic amplification pump, drawn packing, or electrokinetic packing.

As mentioned before, packed columns contain silica particles, which behave as a stationary phase. These particles can be much smaller than the particles in the HPLC columns due to the use of electrically induced flow [10]. The CEC columns are packed with particles as small as $1.5 \mu m$. Packed columns have shown very good separation properties and are very versatile. However, there are some difficulties associated with the packing process. The most important issue is that the frit has to be sufficiently strong to hold the packing material in place, and porous enough to let the analyte and mobile phase pass through [12]. Another problem is bubble formation during operation, which leads to an unstable separation process.

Open tubular columns are made of fused silica in which the stationary phase is bonded to the inner walls of the capillary. OT-CEC capillaries overcome the problems of packed columns such as bubble formation [13]. In open tubular columns, the solutes have to travel across the capillary and interact with the stationary phase in order to achieve separation [6] (since the stationary phase is attached to the capillary wall). The main drawbacks of OT-CEC are its small capacity for sample analysis due to the low column surface area and the relatively long distance that the sample has to travel in order to interact with the bonded moiety. For samples with more chemical affinity to the stationary phase, this interaction leads to adsorption of the sample to the wall, resulting in band

broadening. To prevent this effect, columns with smaller internal diameters (i.d.) are preferred [14]. In order to increase the effective inner surface area of column, the capillary can be chemically etched. The fused silica capillaries used in this study were etched using an ammonium hydrogen difluoride (NH₄HF₂) etchant.

The chemically etched surface can be modified with appropriate organic moieties. The inner wall bonded stationary phases can be hydrophobic or hydrophilic. For a specified set of experimental conditions, etched capillaries give higher resolution and a longer retention time compared to fused-silica capillaries due to enhanced interactions between the solute and the bonded phase [5,15]. Retention time in etched modified capillaries depends on the organic moiety bonded to the surface. The separation process is due to the differences in electrophoretic mobility and solute / bonded phase interactions (chromatography). Another possible analysis using the OT-CEC technique is separation of enantiomers by modifying the fused-silica capillary inner wall using chiral selector moieties such as cyclodextrin or cellulose derivatives [16].

1.3.1. Different Stationary Phases in CEC

There are several different types of bonded stationary phases in CEC, each providing a unique set of properties. A partial list includes:

Hydrophobic:

Octadecane (C-18)

Hydrophilic:

Diol

Liquid Crystals:

Cholesteryl undecanoate 4-cyano-4'- n-pentoxybiphenyl

1.4. Liquid Crystals

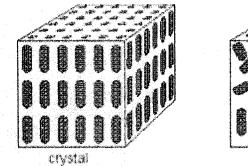
Liquid crystals are materials comprising a state of order between crystals and liquids, having imperfect molecular orientations and positions. Thus, they could behave like a liquid, and at the same time, have anisotropic properties like crystals (see Figure 6). Whereas plastic crystals have a predominantly positional order, the liquid crystal properties are more like a liquid than a solid. The physical properties of the system vary with the average alignment. If the liquid crystal alignment is significant, the material is very anisotropic. Otherwise, the material behaves very isotropically. These materials were first discovered by Freidrich Reinitzer in 1888. While working with an organic compound called cholesterol benzoate, he noticed two material phases. At the first temperature (145.5°C), the compound was cloudy like milk, and at a slightly elevated temperature, (178.5°C) the compound turned into a clear liquid [17]. Liquid crystal molecules are free to move for certain distance, so they have to align themselves along a particular axial orientation. The main reasons for formation of liquid crystals are as follows:

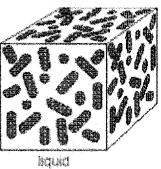
- 1. A simple geometrical form of molecules, which allows a closer fitting of the molecules in a mesophase (monophilic liquid crystal).
- 2. An intramolecular contrast, which allows microseparation of molecules (amphiphilic liquid crystals).

1.4.1. Various Types of Liquid Crystals

Different types of liquid crystal materials include nematic and smectic species, as described below.

Nematic liquid crystals: The simplest liquid crystalline phase is the nematic phase, in which there is no positional ordering between the molecules but the molecules tend to point in the same direction.





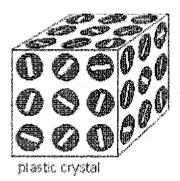
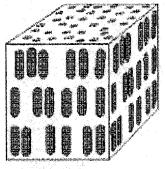


Figure 6. Orientation order in crystals, liquids, and plastic crystals.

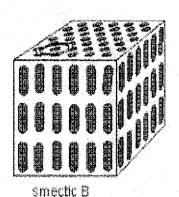
Smectic liquid crystals: The word "smectic" is derived from the Greek word for soap. Smectic liquid crystals have layered structures and posses the highest axial alignment. In this state, the molecules maintain the general orientation order of nematics, but also have tendency to align themselves in layers or planes. The smectic phase is more "solid-like" than the nematic form. There are two different smectic phases:

- The "A" phase where molecules are aligned in a direction perpendicular to the plane.
- The "C" phase where the alignment is at a certain angle to the plane.

In both A and C phases, the molecules move randomly within each plane. Many other smectic phases have already been discovered. Figure 7 shows different phases of nematic and smectic structures.



smectic A



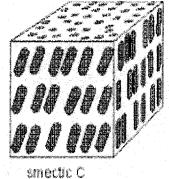


Figure 7. Structural picture of nematic and smectic liquid crystal.

1.4.2. Liquid Crystal Uses and Applications

Liquid crystal materials include a wide range of chemical structures and physical properties, with a variety of applications.

Typical chemical structures of liquid crystals are:

- Cholesterol ester
- Phenyl benzoates
- Surfactants
- Paraffines
- Glyco lipids
- Cellulose derivatives

Typical applications are:

- LCD displays
- Dyes (cholesterics)
- Advanced materials
- Membranes
- Temperature measurement by changing colors
- Solvents for GC, NMR

1.4.3. Liquid Crystals in Chromatography

Liquid crystals have been widely used in capillary chromatography (CEC) applications. The retention characteristic of these stationary phases are different from the widely used C-8 and C-18 bonded phases due to the more ordered

nature of liquid crystal molecules. Liquid crystal materials used in chromatography separation have high thermal stability and low vapor pressure. Therefore, they are good candidates as stationary phase materials. Liquid crystal stationary phases were first utilized in GC applications. These materials can be deposited or directly coated onto the columns [18]. These materials have been used for separation of various isomers (cis and trans) in GC applications. In HPLC applications, the liquid crystal stationary phase has to be bonded since the coating can otherwise be removed under high-pressure conditions [19]. The development of successful covalently bonded liquid crystal stationary phases can have important implications in CEC. This research work extended the application of liquid crystals to the CEC area as a stationary phase due to the unique properties of liquid crystal as a bonded stationary phase material.

Liquid crystals demonstrate a different selectivity than the C-18 polymeric phase due to their structural order and microstructure (nematic and smectic). They have more shape selectivity than a polymeric material. These bonded liquid crystals on the inner surface of columns form 'slots'. Depending on their shape and size, solutes that diffuse into these slots are subsequently separated [20]. Separations of the solutes in these capillaries are shape and size dependent. Planar, flat, and thin solutes have shown longer separation times than the larger and bulkier solutes [21]. Cholesteryl 10-undecanoate has demonstrated very promising results as a bonded stationary phase in CEC.

1.4.3.1. Liquid Crystal Bonded Phase

The most commonly used material in chromatography columns is silica due to its favorable properties, such as its superior stability, low cost, and availability in different sizes. The bonding of an organic molety as a stationary phase depends on the properties of the support material [22]. Various methods have been tried to attach liquid crystal molecules to the inner surface of the capillary. One of the more successful methods is based on organosilane chemistry. A silanization reagent is synthesized by reaction between a liquid crystal compound, which contains double bonds with a chloro-organosilane. The bonded phase is then obtained by reaction of the silanization reagent with the silica support. A liquid crystal compound, 4-(allyloxy)benzoyl-4methoxy phenyl, was employed to synthesize a bonded phase using this reaction [23]. Figure 8(a) shows the schematic diagrams of the bonding reaction of [4-(allyloxy) benzoyl]-4methoxy phenyl to silica. The stationary phase is attached to the silica surface by a siloxane linkage, i.e., Si-O-Si-C. However, a direct Si-C linkage is more desirable for a stable bonded phase.

Another method involves a silicon hydride intermediate formed by chlorination of the silica surface and immediate reduction with an inorganic hydride, mostly LiAIH₄. A bonded phase prepared by Sandoval et al. was found to be hydrolytically stable at low pH values [24]. In order to achieve optimum results, very dry conditions are required. Another method to prepare liquid crystal bonded stationary phases involves silanization followed by a hydrosilation

reaction. In the silanization step, the silanols on the silica surface are converted to silicon hydrides through reaction with triethoxysilane (TES). A silicon hydride monolayer is formed. The hydrosilation step involves a reaction between silicon hydride and a terminal olefin in the presence of a Spiers catalyst, which is hexachloroplatinic acid. This reaction process produces a direct Si-C bond, which is highly stable. Figure 8(b) is a schematic diagram of the capillary wall surface reaction for Si-C bonded layer formation.

2. Experimental Procedures

2.1. Materials Used in This Study

The solutes used in this study were: theophylline and 7-(2,3dihydroxypropyl)-theophylline (dyphylline) purchased from Aldrich (Milwaukee, WI), aminophylline and nortriptylline purchased from Sigma Chem. (St. Louis, MO). Figure 9 shows the molecular structures of the solutes. The liquid crystal used for the bonded stationary phase in the cyano pentoxy capillary was purchased from EM Industries (Hawthorne, NY). Table 1 provides a complete listing of the materials used in this research project.

2.1.1. Buffers and Related Materials Used in this Study

The buffers used in these experiments had pH values in the range of 2.14 to 8.14, as outlined below:

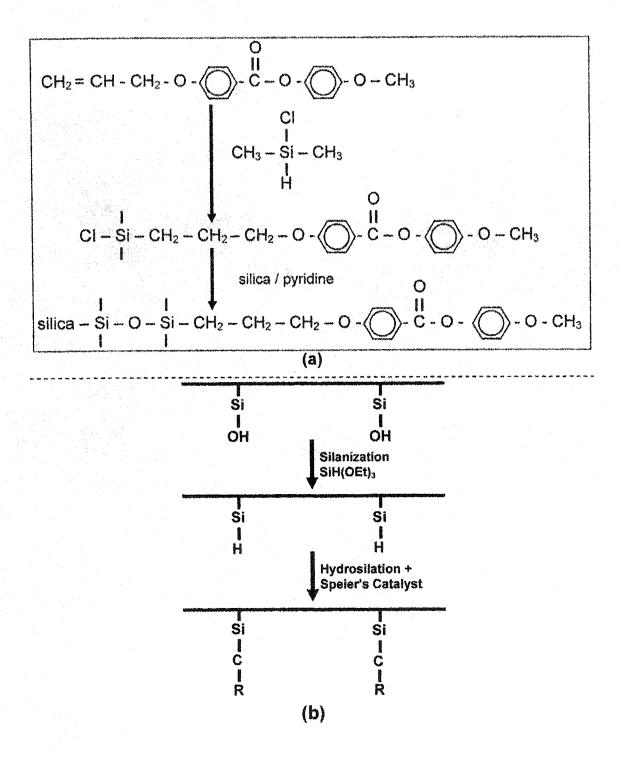
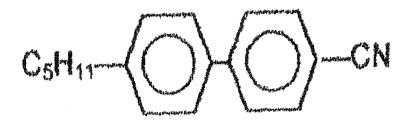


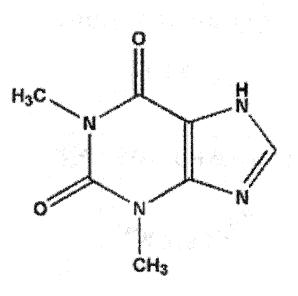
Figure 8. Schematic diagrams of: (a) the bonding reaction of [4-(allyloxy) benzoyl]-4methoxy phenyl to silica, and (b) the capillary wall surface reactions.

- pH= 2.14, 0.3 M phosphate; phosphate was from 85% H₃PO₄ (Fischer scientific, Pittsburg, PA) and 0.19 M Tris (Sigma, St Louis, MO, USA).
- pH= 3.00, 0.300 M citric acid and 0.25 M β-Alanine (Sigma, St. Louis, MO, USA).
- 3. pH= **4.41**, 300 mM acetic (Aldrich, Milwaukee, WI, USA) and 375 mM γ amino butyric acid (Sigma, St. Louis, MO, USA).
- pH= 7.06, 300 mM Mops [3-(N-morpholinopropane sulfonic-acid)] and
 215 mM Imidazole (1,3- Diaza-2,4- cyclopentadiene).
- pH= 8.14, 0.1 M Tris (Sigma, St. Louis, MO, USA) and 0.15 M Boric acid (Baker Analyzed reagent).

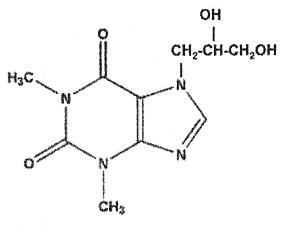
Deionized water (DI water) was obtained from a Milli-Q water purification system (Millipore Corp., Bedford, MA, USA) and was filtered through a 0.20 μ m Nylon 66 membrane (Altech Assoc., Deerfield, IL, USA). The buffers were filtered through a 0.22 μ m nylon membrane, degassed with helium for 15 minutes before use, and diluted to a 1:10 volume ratio by deionized water.



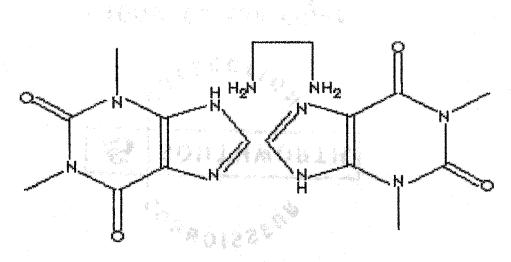
(a) 4-cyano-4'-n-pentoxybiphenyl



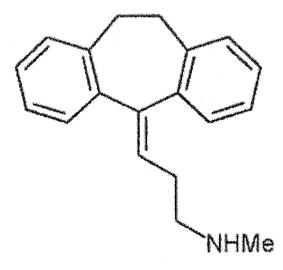




(c) Dyphylline



(d) Aminophylline



(e) Nortriptylline

Figure 9. Structural drawings of the materials used in this study: (a) 4-cyano-4'-npentoxybiphenyl liquid crystal used for the bonded phase; (b) Theophylline; (c) Dyphylline; (d) Aminophylline; and (e) Nortriptylline.

Table 1. List of materials	used in this study with their	chemical abstract service	
(CAS) registry numbers.			

Name	Source	CAS Registry Number
β-Alanine	Sigma	[107-95-9]
GABA	Sigma	[56-12-2]
Acetic acid	Aldrich Chemicals	[64-19-7]
Ammonium hydrogen difluoride	Aldrich Chemicals	[1341-49-7]
Citric acid	Sigma	[77-92-9]
Phosphoric acid	Fischer Scientific	[7664-38-2]
Tris	Sigma	[77-86-1]
GABA	Sigma	[56-122]
MOPS		
Imidazol		[61H5008]
Methanol	General Chemicals	[67-56-1]
Theophylline	Aldrich Chemicals	[58-55-9]
Dihydroxy-theophylline	Aldrich Chemicals	[479-18-5]
Aminophylline	Sigma	[317-34-0]
Nortriptylline	Sigma	[894-71-3]

. As

2.1.2. Organic Modifier

Various buffers (pre-mixed using a volume ratio of 1:10 buffer mixed with DI water) were prepared through additional mixing with methanol used as an organic modifier. The methanol volume ratios were in the range of 10% to 50% (10%, 20%, 30%, 40%, and 50%). The buffers without methanol as well as those with different methanol ratios were used in the migration experiments in order to study the impact of methanol as an organic modifier. The samples were labeled in glass vials and refrigerated at 4°C for subsequent use in the CE experiments. Before each run, the buffer-methanol mixtures were sonicated using an ultrasonic bath for 10 minutes at room temperature to remove any bubbles.

2.1.3. Etching Material

Ammonium hydrogen-difluoride, NH₄HF₂, used to etch the inner wall of the capillary, was purchased from Aldrich and triethoxysilane used to prepare the hydride intermediate was purchased from United Chemical Technologies (Bristol, PA, USA). Hexachloroplatinic acid and t-butyl peroxide were used as catalysts in the hydrosilation reaction and were purchased from Aldrich.

2.1.4. Capillaries

The capillary tubing (375 μ m O.D. X 50 μ m i.d.) for the preparation of etch-modified capillaries was purchased from Polymicro Technologies, (Phoenix,

AZ, USA). Two etch-modified capillaries and an unetched bare silica capillary were used in this study; these capillaries are listed below:

- 4-cyano- 4 pentyloxy- biphenyl capillary (etch modified column)
- C-18 capillary (etch modified column)
- Bare fused silica capillary

2.2. Capillary Modification Processes

The etch-modified capillaries were prepared using a process sequence reported by Pesek and Matyska [13]. The specific etch process sequence used in this project is described below.

2.2.1. Etching Process

Two 50 µm bare (fused silica) capillaries were connected in the GC oven. The capillaries were filled with concentrated HCl from a plastic vial by applying 40 psi nitrogen pressure. The capillaries with HCl were heated at 80°C overnight. The capillaries were flushed with distilled water, acetone, and diethyl ether. The capillaries were subsequently dried with nitrogen gas for an hour. A 5% (w/v) saturated solution of ammonium hydrogen fluoride in methanol was used as an etching material. About 1 mL of this solution was used to fill the capillaries and treat them for an hour. Methanol was removed by using a uniform nitrogen flow through the capillaries for 5 minutes. The capillaries were then sealed at both ends by rubber corks and the rest of the capillaries were colled and wrapped with aluminum foil and placed in a GC oven. The capillaries were heated at 300°C for 3 hours (without any gas flow) and then at 400°C for 1 hour in the presence of nitrogen flow. The capillaries were washed with methanol and dried with nitrogen flow for 4 hours. The etched capillaries were checked under a light microscope to detect any blockage.

2.2.2. Modification of Etched Surface

The etched capillaries were preconditioned by using 0.1 M NaOH solution at ambient conditions for 20 hours. They were rinsed with deionized water and flushed with 0.1 M HCI. Following the last step, they were rinsed again with deionized water and dried with nitrogen flow. After following all these steps, the capillaries are preconditioned and ready for modification. The capillaries were prepared to undergo silanization by washing with dioxine for 10 minutes and then treated with 1.2 mM TES in 8.4 mL dioxane at 90°C for 90 minutes. The formation of the hydride layer was done in this step. The capillaries were then washed with dioxane and THF, each for 2 hours at room temperature.

The monomeric stationary phase is bonded to the inner wall of the capillaries via two steps of silanization and hydrosilation, as shown below in Figure 10. Performing these two steps is necessary for attachment of organic moleties to the silica surface [25].

Silanization:

 $\begin{array}{c|c} H^{*} & | & | \\ -Si-OH + (OEt)_{3}Si-H \longrightarrow -Si-O-Si-H + 3EtOH \\ | & | & | \end{array}$

Hydrosilation:

$$\begin{array}{ccc} \text{cat.} & | \\ \text{-Si-H} + \text{R-CH=CH}_2 & \longrightarrow & \text{-Si-CH}_2\text{-CH}_2 \\ | & | \\ \end{array}$$

cat. = free radical initiator (t-butyl peroxide)

or

cat. = Spiers catalyst

Figure 10. Silanization/ Hydrosilation reaction scheme.

40

and the second second

2.2.3. Bonded Material to the Etched Capillary

The modification of the capillary inner wall by etching is performed in order to increase the surface area for better bonding of the stationary phase [13]. There are two types of capillary modifications: (i) neutral hydrophilic polymer modification comprising adsorption of molecules to a capillary wall via hydrophobic interactions; and (ii) covalently bonded coating with specific chemical bonds to the capillary wall. The neutral polymer coating decreases the EOF by shielding surface charge (SiO⁻) and increasing viscosity. Liquid crystals such as cholesteryl moleties and cyano biphenyles show different degrees of association compared to C-18 capillaries due to the liquid crystal properties such as temperature sensitivity. Their structure can radically change by temperature elevation (the cyano molecules turn from the solid state to the nematic phase at 48°C).

2.2.3.1. Bonding of the 4-cyano-4'- n-pentoxybiphenyl

All of the glassware used in this bonding procedure was washed with deionized water and dried in an oven. About 7.5 mL of distilled toluene was placed in a 50 mL three-necked flask. One opening of three-necked flask was connected to a thermometer and sealed with parafilm. Another neck opening was closed with a stopper and sealed with parafilm as well. A magnetic stirrer bar was inside the flask. Then, 1.1g of 4-cyano-4'- n-pentoxybiphenyl was added to 7.5 mL of toluene while stirring. After it had dissolved, 40 µL t-butyl peroxide

41 × 41

(catalyst) was added to the mixture and it was heated to 70°C for 1 hour. The liquid was passed through the capillary at 100°C, 70 psi for 5 days. After this step, toluene was run through the capillary overnight and dried by nitrogen flow. A 10 cm segment was cut off from both ends of the capillary. Figure 11 shows the cyano pentoxy bonding process.

 $= Si - H + C_5 H_{11}O - O - O - O$

Probable mechanism

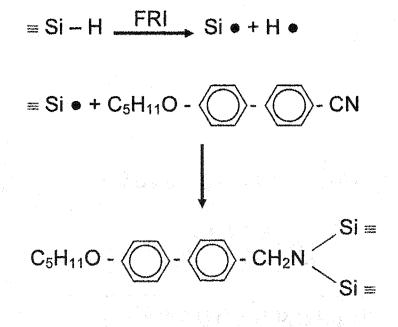
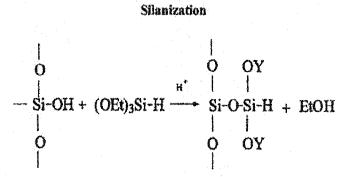


Figure 11. Reaction scheme for synthesis of cyano bonded phase using free radical initiator.

2.2.3.2. Bonding of C-18 (Octadecane) Stationary Phase

As discussed in the in the section above, the silanization / hydrosilation method was used to bond a C-18 moiety as a stationary phase to the capillary inner surface. Figure 12 shown below describes the reaction steps and final attachment of a C-18 moiety to the capillary [21]. The silanization process covalently attaches a silicon hydride layer to the reactive silanol groups [25]. In this reaction, HCI has been used as a catalyst. Finally, C-18 is bonded to the capillary surface through the hydrosilation process, as shown in Figure 12. The octadecane (C-18) bonded stationary phase is a hydrophobic material and shows different separation properties compared to the liquid crystal bonded phase which is more hydrophillic.



Y = Si or H depending on the extent of crosslinking

Hydrosilation

$$= Si-H + R-CH = CH_2 \xrightarrow{cat.} = Si-CH_2 - CH_2 - R$$

where cat = catalyst, typically hexachloroplatinic acid or free radical initiator.

Figure 12. Schematic drawing of C-18 capillary bonding.

2.2.4. Preparing the Capillary Detection Window

The capillary was shortened to the appropriate length with a capillary cutter. The desired position of the detection window was measured and marked. A glass block with tiny grooves was heated by a flame. When the marked area on the capillary gets hot, the coating melts. The capillary was then wiped and cleaned gently with methanol and deionized water and was ready to be inserted in the capillary cassette. The capillaries were equilibrated by forcing buffer for 5 minutes and flushing with deionized water for 5 minutes as well.

2.2.5. Sample Preparation

All of the samples analyzed in this project are solid powders and watersoluble. About 1 mg of the sample was dissolved in 1mL of Tris buffer (pH = 2.14) using an ultrasonic bath. Samples were stored in labeled vials in a refrigerator as a stock solution. During the experimental work, the samples were diluted (1:5 volume ratio) with Tris buffer (pH=2.14) and run on each of the capillaries.

2.3. Experimental Overview

This research project focuses on capillary electrochromatography analyses of several xanthine-based pharmaceutical compounds such as theophylline, dihydro-theophylline, aminophylline, and a tricyclic antidepressant drug called nortriptylline. Moreover, comprehensive experimental work was performed in order to investigate the migration characteristics of three different type of capillaries. The CEC migration experiments were conducted in the C-18 and cyano pentoxy capillaries, which were chemically, etch and modified in order to perform in the OTCEC format. The same solutes were also studied using unmodified bare silica capillary. The matrix of the experimental conditions was the same for all of the capillaries in order to directly compare the resulting data.

Additional experiments were conducted in order to determine the effects of controlled variations in pH values and methanol as an organic modifier in different volume ratios, as well as different applied voltage polarities (+25 kV and --25 kV). Each experiment was performed twice for a any given set of experimental conditions in order to observe and ensure experimental reproducibility. Figure 9 shows the molecular structures of the samples. Buffers with five distinct pH values, ranging between 2.14 and 8.14 were used in these experiments. For various experiments, the buffer was mixed with 10% to 50% (volume ratio) methanol as an organic modifier.

The electrochromatographic peaks from various experiments were collected, tabulated, and analyzed in order to determine the effects of various experimental conditions, including the buffer pH values, methanol (organic compound) concentrations, and injection polarity on the peak signal profiles and amplitudes (including migration time and width) for various compounds in different types of capillaries.

The study involved using the open tubular approach to CEC (OTCEC), where the capillaries were chemically etched and modified by silanization with TES (tri-ethoxy silane), followed by hydrosilation where the organic moiety (liquid crystalline material and C-18) were attached to the capillaries inner surface. The liquid crystal used in this study was 4-cyano- 4' n-pentoxybiphenyl. Figure 8 shows the structure of this liquid crystal.

2.3.1. Chromatographic Migration of Samples

Various solutes were tested using the cyano-pentoxy and C-18 modified capillaries in order to determine their separation capabilities. The same solutes were also tested in a bare silica capillary to compare the migration characteristics of these three capillaries (etch modified capillaries vs unetched bare silica capillary). The comparisons were performed for various sets of experiments, with each set conducted under identical experimental conditions. After the capillaries were installed in the CE instrument, data acquisition was performed. The retention times of the samples were measured individually. For each specific experiment, the sample was run twice through each capillary and the average of two data points was used to study the performance data and trends. The results were shown in the electrochromatogram form, which is a plot of the UV detector absorbance (mAU) versus time (minutes). Electrical currents passing through the capillary were measured in all experiments in order to confirm normal CE operating conditions. Therefore, we were assured that even the CE experiments

without significant solute peaks had been performed with non-zero electrical current flows. See the experimental results tabulated in Tables 2 through 25 in Appendix I.

2.3.2. Experiment Conditions

Conditions: A voltage of ±25 kV was applied during all the migration experiments. Sample injections were performed for 3 seconds at 50 mbar. The capillaries were preconditioned with buffer and deionized water before each run. The multi-step capillary washes were the same throughout the entire series of experiments: water / methanol / water / buffer. Each of the four samples was run through the capillary for 40 minutes. The detection wavelength for theophylline, dihydroxy- theophylline, and aminophylline was at 270 nm. A different wavelength of 254 nm was used for nortriptylline detection. The geometrical dimensions of the capillaries used in this study are summarized below:

- Bare capillary: L= 58.2 cm l= 48.6 cm i.d.= 50 μm
- C-18 capillary: L= 50 cm l=41.5 cm i.d.= 50 μm
- Cyno pentoxy capillary: L= 33.4 cm l= 24.9 cm i.d.= 50 μm

As described below, four different materials belonging to two families of solutes were evaluated in this research study.

2.3.2.1. Xanthine Family of Drugs

The xanthines / methylxantines family of drugs are commonly used as heart and central nervous system stimulants. Xanthine is a purine base that can be found in most body tissue and fluid. Four important methylxanthine compounds are caffeine, theophylline, dyphylline and aminophylline, which are water-soluble. Major sources of these methylxanthine drugs are coffee, cocoa, cola, black teas, and chocolates.

Caffeine was first found to be helpful for asthmatic patients but had some unpleasant side effects. Other derivatives were quickly produced in hope of minimizing side effects and maximizing the airway relaxing effects. Theophylline and dyphylline are used as a pharmaceutical agent. The drug is used mainly as a bronchodilator in asthma related conditions. Aminophylline differs in its structure ([theophylline]₂ethylenediamine) from theophylline; it contains ethylenediamine and more water molecules so it works in the same way as theophylline and has most of its properties but tends to be less potent and shorter acting than theophylline. Aminophylline and dyphylline are essentially a theophylline derivative, as indicated in the structural drawing of Figure 8.

2.3.2.2. Tricyclic Antidepressants (Nortriptylline)

Nortriptylline is a tricyclic antidepressant used to treat depression, migraine, and panic disorder. This class of drugs has been developed by modification of the central ring in the phenothiazine molecule. Nortriptylline (C₁₉H₂₁N•HCl) is one of the anti-depressant drugs and is a derivative of dibenzocycloheptene. The nortriptylline molecule has a --C-C- bridge and nitrogen atom of the phenothiazine ring replaced by a carbon double bond (=). For the structural diagram of the nortriptylline molecule, see Figure 9.

2.4. Instrumentation

2.4.1. Gas Chromatography Oven

Both the etching and modification processes of the capillaries were done using an HP-5890 (Hewlett-Packard, Model# 5890) GC oven. The GC was modified to allow placement of fused silica capillaries. Temperature was in the range of 300°C to 400°C in the GC oven, as outlined before in the etching section. A thick-walled glass tube was used as a reservoir to protect all of the reagent tubes for safety reasons. One end of the capillary was placed in the reagent tube and other end was placed in a small collection tube, also made of glass. Nitrogen gas was used to force reagent material from the capillary inlet that was in the reagent tube, to the outlet end of the capillary, which was in the collection vial. A nitrogen flow process was performed to dry the capillaries.

2.4.2. Capillary Electrophoresis

Capillary electrophoresis was performed using an HP^{3D} CE (Waldbronn, Germany) equipped with diode-array detection and the experimental data were acquired using Agilent Chemstation software (HP Chemstation), illustrated in

Figure 13. This CEC instrument offers all the benefits of HPLC tools, including reproducibility. The main features and benefits of this CEC instrument are:

- Easy to use: Single sample carousel, offers random vial access, and ideal for method development.
- Automated quantitative analysis.
- Superior diode-array on-capillary detection.
- High-pressure application: Only Agilent (HP) CE instruments can apply pressures up to 12 bar on both ends of the capillary, High pressure is also useful for rapidly flushing the column.

2.5. Data Analysis

After installing the capillaries in the capillary cassette of the CE instrument (HP 3D), various measurements were performed and the resulting data were collected. For each set of experiments, the retention or migration time of the solute was measured. As mentioned before, for each set of experimental conditions, each sample was injected and run through the capillaries twice to check the reproducibility (the average of two data points was used to study the performance trends). Each experiment was conducted at both +25 kV and -25 kV. Figures 15 through 37 show the plots of UV absorption vs migration time of the solutes in the electrochromatography format, as measured by the HP Chemstation software.

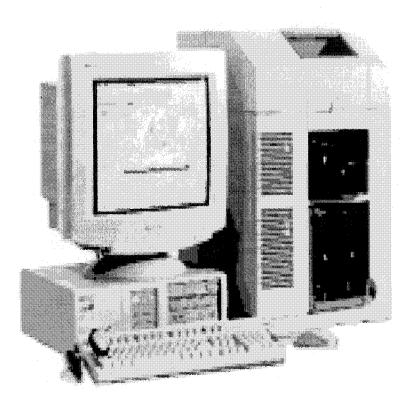


Figure 13. HP 3D CE system with HP Chemstation (See Figures 1 and 3 for related schematic diagrams).

2.6. Capillary Preconditioning

The bare silica capillary was preconditioned with 0.1 M sodium hydroxide (NaOH) for approximately 20 hours, and then manually washed via a syringe with Milli-Q water and, finally, treated with several buffer washes before each sample injection into the capillary. The two modified capillaries (cyano pentoxy and C-18) were also conditioned with buffer for 5 minutes followed by a Milli-Q water wash, before the start of each electrophoretic experiment.

2.7. Materials Characterization of Bonded Phase

2.7.1. SEM Analysis

Scanning electron microscopy (SEM) is a unique technique for characterization of the inner surface of a capillary to obtain surface roughness images and information. It has been used to study the surface microstructure of the etch-modified bonded phase. SEM is used in order to obtain both quantitative and qualitative data about the capillary surface morphology.

2.7.2. DRIFT Spectroscopy Analysis

DRIFT spectroscopy has been used in previous studies to confirm the presence of the bonded phase. The organic moiety attachment was investigated by a Mattson Instruments Infinity Series FTIR[™] (Madison, WI, USA). The spectral range was between 4000 cm⁻¹ to 450 cm⁻¹ using 400 scans or 1000 scans with an MCT detector. For the detection of the organic moiety on the

capillaries, the coatings were stripped, they were then crushed, and finally mixed with 5% spectral grade KBr. This mixture was processed into a fine powder. A pure sample of KBr was run to produce a background signal. The spectrum of the crushed sample was collected. The C-H bond stretching between 2800 and 3000 cm⁻¹ reported in the literature proves that the cyano liquid crystal has been properly attached to the silica surface via silanization. However, DRIFT spectroscopy of the cyano pentoxy stationary phase was not done due to an insufficiency of this capillary. Instead, to confirm the cyano stationary phase bonding, the electroosmotic flow measurement with DMSO as a marker was performed.

2.7.3. Electroosmotic Flow Measurements in Modified Capillaries

The EOF of the cyano pentoxy capillary was measured in previous studies by using DMSO (dimethylsulfoxide) as a neutral marker. The EOF of the modified capillary was determined by meauring DMSO migrations at pH values of 2.14, 3.00, 3.70, 4.41, 6.00, and 8.19. As discussed earlier, the buffer pH value will affect the electroosmotic flow rate and direction. The higher pH buffers will increase the electroosmotic flow rate because there is more dissociation of SiOH groups on the inner surface of the capillary to SiO⁻⁻. The increase of negative charge leads to an increase of Zeta potential which itself increases the electroosmotic flow. In the cyano capillary at low buffer pH (between 2 and 4), there is anodic EOF. It changes to cathodic flow above pH = 4. These results

indicate that there are some other species besides the silanol groups on the capillary wall that are affecting EOF. Photoelectron spectra of etched fused silica capillaries with organic moieties attach to the etched surface have been reported [26]. The spectra showed the presence of fluorine and nitrogen peaks besides the Si and O peaks from the silanol groups. The presence of F and N species is due to the residues left on the silica matrix by the etching agent ammonium hydrogen difluoride. Nitrogen species are responsible for the anodic electroosmotic flow at low pH [27].

3. Results and Discussions

3.1. Capillary Modification Process

3.1.1. Etching

The etching process is performed to increase the effective inner wall surface area. The freshly drawn fused silica capillary wall has a relatively smooth inner surface. Thus, the roughening of the inner wall is performed as a method to increase the surface area [28]. It has been reported that it is difficult to coat an unetched silica surface with a uniform layer of coating [29]. Various etching methods have been developed for glass capillaries such as etching with ammonium hydrogen difluoride. When the etching material passes through the bare capillary at an elevated temperature, ammonium hydrogen difluoride dissociates to gaseous hydrogen fluoride and ammonium species. The ammonium gas dissolves the silica surface, producing silicon tetrafluoride. Upon

cooling, the silica is redeposited on the etched surface. This redeposition is not uniform and results in a needle-like rough surface with a much larger effective surface area. It has been reported that such as etching process can increase the surface area by a factor of about 1,000 [30].

The columns prepared with this etching process have many advantages. These capillaries resist the adsorption of basic molecules and have shown very good solute peaks along with reproducible retention times after multiple injections. The increased surface roughness in etched capillaries can be clearly seen in the scanning electron micrographs (SEM) as shown in Figure 14. The surface morphology and roughness pattern is both time and temperature dependent [31]. When the capillary is heated at 300°C for 3 hours (Figure 14.A), sharp needle-like extensions are formed. When the capillary is further heated to 400°C for 1 hour (Figure 14.B), a more uniform and wavy pattern is obtained, which is also more stable. Therefore, the capillary surface morphology could be tailored in a reproducible manner by controlling the etch time and temperature.

3.1.2. Bonded Layer

Figures 11 and 12 illustrate the silanization / hydrosilation reactions used for attachment of cyano pentoxy and C-18 stationary phases. The silanol groups on the silica surface are converted to a silicon hydride intermediate, upon reaction with TES. This hydride layer is modified with the specific organic moiety

55 (Carlor Carlor Carlo

using a suitable catalyst, such as Spier's catalyst for the C-18 column and t-butyl peroxide for the cyano pentoxy column.

3.2. Chromatographic Studies of Solutes

Several solutes were tested on two different types of etch-modified capillaries: (i) C-18 capillary and, (ii) Cyano pentoxy capillary. The same samples were also tested on a bare silica capillary. The results of various types of capillaries were subsequently analyzed and compared. The comparisons were done under identical conditions over a wide range of experimental parameters.

3.2.1. Migration Study of Theophylline

The OTCEC and CE migration of theophylline in two different types of capillaries at different pH values and various methanol modifier volume ratios (v/v %) was studied. The experimental conditions used were as follows: Applied voltage= ± 25 kV, sample injection for 3.0 s at 50 mbar, and UV detection wavelength of 270 nm. Tables 2 through 7 in Appendix I tabulate the measurement results (peak height in mAU, migration time in minutes, peak width (or capillary efficiency) in minutes, and peak area in mAU.sec). Each table lists the electrochromatographic results for a given applied voltage polarity (either +25 kV or -25 kV) in a specific capillary type (one of three types of capillaries), for pH values of 2.14, 3.0, 4.41, 7.06, and 8.14, as well as for



A. 300°C for 3 Hours

B. 300°C for 3 hours, 400°C for 1

hour

Figure 14. SEM micrographs of the etched capillary surface.

methanol organic modifier volume ratios in the range of 0% (no methanol) to 50%. The blank table positions without any data entries represent CEC measurements without any observable peaks (all of those conditions not yielding a peak did have stable and finite electrical current flows).

Figures 15 to 21 show some select representative CEC results for theophylline for various experimental conditions (see the figure captions for details of the specific experimental conditions). Moreover, Figures 38 through 43 illustrate various plots of migration time vs either methanol volume ratio (in volume ratio %) or vs pH value for various experimental conditions (most of these figures show families of plots). Moreover, Figure 44 shows the peak width (in minutes) for the pH value having yielded the greatest number of successful measurements (pH = 7.06). The capillary efficiency is determined based on the peak width in minutes. Thus, narrower widths with less tailing are preferred in terms of enhanced separation capabilities.

Based on the experimental data tables for theophylline in different capillaries, some specific behaviors and trends could be recognized. Good theophylline electrochromatographic migration was achieved in the cyano pentoxy modified capillary at a pH value of 7.06, +25 kV applied voltage, and with different methanol (v/v %) volume ratios. The migration studies in the cyano pentoxy capillary showed good peak shapes without much band broadening up to a 50% volume ratio of methanol. As expected, the migration time for theophylline was longer at maximum methanol volume ratio (50%); this behavior

is due to the lower EOF rate with higher organic composition. The theophylline studies in the cyano pentoxy capillary at pH values of 2.14, 3.0, and 4.41, and for an applied voltage of -25 kV, showed some measurable CEC peaks, although not at all methanol composition ratios, but with good peak shape and no bandbroadening. The best migration of the same solute in the C-18 modified capillary was obtained at pH values of 7.06 and 8.14 and with a positive applied voltage of +25 kV. The peak sharpness of the C-18 capillary was less than that of the cyano pentoxy capillary. At lower pH values (i.e., 2.14 and 3.0) there were no observable peaks in the C-18 capillary even with the negative injection (-25 kV), although finite and stable electrical currents were measured in all such experiments. In the bare silica capillary, the best theophylline migrations results (based on peak shape and width) were obtained at pH values of 4.41 and 7.06, although in most cases, elctrochromatogram peaks with different methanol volume ratios were observed at pH = 4.41 (+25 kV). Good peak shape was observed at pH= 4.41 and +25 kV.

The sample migration order in the two types of modified capillaries and the bare capillary at pH = 7.06, +25 kV, and no methanol were as follows. The theophylline elution time was shorter in the cyano pentoxy capillary (1.73 min) compared to the C-18 capillary (8.17 min) and the bare silica capillary at (9.81 min). Since the cyano pentoxy capillary with L=33.4 cm & I= 24.9 cm was shorter than the C-18 capillary with L=50 cm & I= 41.5 cm compared with the bare capillary with L= 50 cm, I= 41.5 cm, we could already expect a shorter migration

time of the solute in the cyano modified capillary. Comparing the peak widths, the cyano modified capillary showed superior electromigration properties. The C-18 capillary showed some tailing for theophylline elution. This indicates that the solutes have more interactions with the C-18 bonded phase, leading to longer retention and, perhaps slower mass transfer. The peak sharpness degraded with higher methanol volume ratios, perhaps due to more interactions with the few remaining silanols. As shown in Figure 44, the bare silica capillary had superior peak sharpness compared to the cyano and C-18 etch-modified capillaries.

3.2.2. Migration Study of Dyphylline (Dihydroxy-Theophylline

The OTCEC and CE migration of dihydroxy-theophylline in two different types of capillaries at various pH values and for a range of methanol modifier volume ratios (v/v %) was studied and analyzed. The specific experimental conditions were: Applied voltage= ± 25 kV, sample injection for 3.0 s at 50 mbar, and UV detection wavelength of 270 nm.

Tables 8 through 13 in Appendix I tabulate the measurement results (peak height in mAU, migration time in minutes, width or capillary efficiency in minutes, and peak area in mAU.sec) for dihydro-theophylline. Each table lists the electromigration results for a given applied voltage (either +25 kV or -25 kV) in a specific type of capillary, for pH values of 2.14, 3.0, 4.41, 7.06, and 8.14, as well as for methanol organic modifier volume ratios in the range of 0% (i.e., no methanol) up to 50%. The blank table positions without any data entries

60³

represent the CEC measurements without any observable peaks (all of those conditions not yielding a peak did have stable and finite electrical current flows; thus, the results are real and reproducible).

Figures 22 through 23 show some select representative CEC results for dihydroxy-theophylline under various experimental conditions (see the figure captions for details of the experimental conditions). Figures 45 through 50 illustrate various plots of migration time vs either methanol volume ratio or vs pH values for a wide range of experimental conditions. Moreover, Figure 51 shows the peak widths (in minutes) for the pH value having yielded the greatest number of successful measurements (i.e., pH = 7.06).

Based on the data tables for dihydroxy-theophylline in different capillaries, some specific behaviors and trends were recognized. Good dihydroxy-theophylline migration properties were achieved in the cyano pentoxy modified capillary at a pH value of 7.06 and a positive applied voltage of +25 kV, for various methanol (v/v %) compositions. The sample in the cyano pentoxy capillary gave a narrow peak width without band broadening, up to 50% methanol in the buffer. The sample migration time for dihydroxy-theophylline was longer for the highest methanol volume ratio (50%), due to a lower EOF. Migration studies of dihydroxy-theophylline in the cyano pentoxy capillary at pH values of 2.14, 3.0, and 4.41, and with an applied voltage of -25 kV showed some measured CEC peaks (although not at all methanol compositions); these peaks displayed good shape and no band broadening. The best electromigration

results (based on peak width and shape) for this solute were obtained in the C-18 modified capillary at pH values of 7.06 and 8.14, and for an applied voltage of +25 kV.

The peak sharpness in the C-18 etch modified capillary was not as good as that of the cyano pentoxy capillary. At lower pH values of 2.14 and 3.0, there were no observable peaks in the C-18 capillary, even with the negative applied voltage (-25 kV). The best dihydroxy-theophylline migration result in the bare silica capillary were obtained at pH values of 4.41 and 7.06; however, the experiments performed at pH = 4.41 resulted in the greatest number of elctrochromatogram peaks at different methanol volume ratios. Good peak sharpness was achieved in the bare silica capillary at pH = 4.41 and with a +25 kV applied voltage.

The sample migration order in the etch-modified capillaries and bare silica capillary at pH = 7.06, +25 kV, and no methanol were as follows. The dihydroxy-theophylline elution time was shorter in the cyano pentoxy capillary (1.17 min) compared to the C-18 capillary (7.69 min) and unetched bare silica capillary (9.33 min). The shorter migration times of solute in the cyano modified capillary are partially due to the shorter capillary length. The cyano pentoxy capillary with L=33.4 cm & I= 24.9 cm was shorter than the C-18 capillary with L=50 cm & I= 41.5 cm, and the bare silica capillary with L= 50 cm, I= 41.5 cm.

A comparison of the peak widths measured in the three types of capillaries indicated superior behavior for the cyano modified capillary compared

to the C-18 capillary (the dihydroxy-theophylline peaks showed some tailing in the C-18 modified capillary). This behavior is due to increased interaction of the solutes with the C-18 bonded phase, leading to longer retention; the peak sharpness is degraded by adding more methanol. The bare silica capillary yielded some solute peaks at pH = 7.06 for various methanol ratios (0% or no methanol, 20%, 40%, 50%). The best peaks for the bare silica capillary were obtained at pH = 4.41; these peaks also displayed good capillary efficiencies. A comparison of the peak widths of the three types of capillaries at the same pH value (Figure 51) indicates that the bare silica capillary provided the best peak sharpness, followed by the cyano pentoxy modified capillary, and lastly the C-18 modified capillary.

3.2.3. Migration Study of Aminophylline

The OTCEC and CE migrations of Aminophylline in the two different types of capillaries were studied at different pH values and for various methanol modifier volume ratios (v/v %). The experimental conditions were as follows: applied voltage = ± 25 kV, sample injection for 3.0 s at 50 mbar, and UV detection wavelength of 270 nm.

Tables 14 through 19 in Appendix I tabulate the measurement results (peak height in mAU, migration time in minutes, width (in minutes), and peak area (in mAU.sec). Each table lists the migration results for a given applied voltage (either +25 kV or -25 kV) in a specific capillary type, for pH values of

2.14, 3.0, 4.41, 7.06, and 8.14, as well as methanol organic modifier volume ratios in the range of 0% (no methanol) to 50%. The blank table positions without any data entries represent measurements without any observable solute peaks (all of those conditions not yielding a peak did have stable and finite electrical current flows).

Figures 24 through 31 show some select representative CEC results for aminophylline for various experimental conditions (see the Figure Captions for details of the experimental conditions). Figures 52 through 56 illustrate various plots of migration time vs either methanol volume ratio or vs pH for various experimental conditions. Moreover, Figure 57 shows the capillary peak width (in minutes) for the pH value having yielded the greatest number of successful measurements (pH = 7.06).

Based on the experimental data (migration time, peak width, methanol%) tables for aminophylline in different type of capillaries, some specific behaviors and trends were recognized. Good aminophylline migration behavior was achieved in the cyano pentoxy modified capillary at pH = 7.06 and with an applied voltage of +25 kV, for different methanol (v/v %) compositions. The migration experiments in the cyano pentoxy capillary showed good peak symmetry and negligible band broadening, up to 50% in the buffer. As expected, the migration time for aminophylline was longer at maximum methanol volume ratio (50%) dilution due to lower EOF. Migration studies of aminophylline in the cyano pentoxy capillary at pH = 2.14, 3.0, and 4.41, and with an applied voltage

of –25 kV showed some CEC peaks (although not at all methanol compositions); these peaks displayed good peak symmetry and no band broadening. The best migration results (based on peak width and shape) for the same solute in the C-18 modified capillary were obtained at pH values of 7.06 and 8.14, and with an applied voltage of +25 kV. The peak sharpness of the collected peaks from the C-18 modified capillary was less than that of the cyano pentoxy capillary. At lower pH values 2.14 and 3.0, there were no peaks in the C-18 modified capillary even with a negative injection voltage (-25 kV). The best migration results (based on peak width) of aminophylline bare silica capillary were obtained at pH values of 4.41 and 7.06; however, more successful measurements were made at pH = 7.06 for different methanol compositions. Good peak sharpness was achieved in the bare silica capillary at pH values of 4.41 and 7.06, and an applied voltage of +25 kV.

The aminophylline elution order in the two types of etched modified capillaries and the bare silica capillary at pH= 7.06 with 10% methanol modifier and +25 kV applied voltage (experimental condition) were as follows. The migration time in the cyano pentoxy capillary was shorter (3.39 min) compared to the C-18 capillary (8.81 min) and the bare capillary (11.04 min). The cyano pentoxy capillary with L = 33.4 cm & I = 24.9 cm was shorter than the C-18 capillary with L= 50 cm & I = 41.5 cm and the bare silica capillary with L = 50 cm & I = 41.5 cm. Therefore, the solute migration time in the cyano modified capillary was expected to be shorter compared to the C-18 modified capillary. The longer

migration time of the bare silica capillary compared to the C-18 modified capillary is due to the higher solute and affinity in the bare silica capillary.

Figure 57 plots the peak width of the solute in the three different capillaries at pH= 7.06 and +25 kV. The cyano modified capillary showed higher efficiency compared to the C-18 modified capillary where the aminophylline peak showed some tailing in the C-18 modified capillary. This implies that that the solutes have increased interactions with the C-18 bonded phase, leading to longer retention time and reduced efficiency; the peak sharpness is degraded by adding more methanol due to poor mass transfer or interactions with silanols. The bare silica capillary showed some migration peaks at pH = 7.06 with various methanol compositions (no methanol, 20%, 30%, 40%, and 50% volume ratios of methanol). The best capillary efficiencies (based on peak width) were obtained in the bare silica capillary at pH= 7.06 and +25 kV. By comparing the efficiency results of all three capillaries at the same pH (7.06) value, the bare silica capillary yielded the best peak sharpness, followed by the cyano pentoxy modified capillary, and lastly the C-18 modified capillary.

3.2.4. Migration Study of Nortriptylline

OTCEC and CEC migrations of nortriptylline were studied in three different capillaries at various pH values and a wide range of methanol modifier volume ratios (v/v %) at a detection wavelength of 254 nm. The specific experimental

conditions were: applied voltage= ± 25 kV, sample injection time of 3.0 s at 50 mbar, and UV nm.

Tables 19 through 24 in Appendix I tabulate the migration measurement results (peak height in mAU, migration time in minutes, width (in minutes), and peak area in mAU.sec). Each table lists the migration results for a given applied voltage (either +25 kV or -25 kV) in a specific capillary type, for pH values of 2.14, 3.0, 4.41, 7.06, and 8.14, as well as for methanol organic modifier volume ratios in the range of 0% (no methanol) up to 50%. The blank table positions without any data entries represent CEC measurements without any observable solute peaks (all of those conditions not yielding a peak did have stable and finite electrical current flows).

Figures 32 through 37 show some select representative electromigration results for nortriptylline under various experimental conditions (see the Figure Captions for details of the experimental conditions). Figures 58 through 63 illustrate various plots of migration time vs either methanol volume ratio or vs pH for a wide range of experimental conditions. Figure 64 shows the peak width (in minutes) for the pH value having yielded the greatest number of successful measurements (i.e., pH = 7.06).

Based on the measured data for nortriptylline for migrations in different capillaries at the same pH, some specific trends and behaviors (refer to the above-mentioned tables and figures) can be identified. Good nortriptylline migration (based on peak shape and width) was achieved in the cyano pentoxy

modified capillary at pH= 2.14, 3.0, and 4.14 at +25 kV, with different methanol (v/v %) ratios as an organic modifier. Migration in the cyano pentoxy capillary at pH = 3.0 and +25 kV showed better peak width and symmetry at 50% methanol volume ratio compared to the no methanol (0%) condition. As expected, the migration time for nortriptylline was longer at maximum methanol volume ratio (50%) due to lower EOF; the higher methanol ratios produced narrower peak width. The best migration results of the same solute in the C-18 modified capillary were obtained at pH values of 3.0 and 4.41, and an applied voltage of +25 kV, although the pH = 4.41 condition resulted in higher efficiency. However, the cyano pentoxy modified capillary can be considered as the preferred capillary for nortriptylline analysis, having produced better CEC Peaks. Measurement data were collected at pH values of 7.06 and 8.14, in the C-18 modified capillary and at an applied voltage of +25 kV. There were no observable peaks in the C-18 capillary with a negative applied voltage (-25 kV). The greatest numbers of successful measurements for nortriptylline analysis in the bare silica capillary were obtained at pH values of 2.14, 3.0, and 4.41. In the bare silica capillary and for different methanol composition, the pH = 4.41 and +25 kV condition produced the greatest number of successful elctrochromatograms and the highest efficiency, compared to the pH values of 2.14 and 3.0 and +25 kV. Good peak shapes were obtained in the bare silica capillary at pH values of 4.41 and 7.06. and for +25 kV applied voltage.

The following nortriptylline elution order was observed in the two types of modified capillaries and the bare silica capillary. The migration time in the cyano pentoxy capillary at pH = 4.41 and +25 kV with 10% methanol modifier was shorter (2.87 min) compared to the C-18 capillary (9.55 min) and bare silica capillary (5.72 min). The solute migration time was shorter in the cyano-modified capillary compared to the C-18 capillary. The cyano pentoxy capillary with L = 33.4 cm & I = 24.9 cm was shorter than the C-18 capillary with L = 50 cm & I = 41.5 cm and the bare silica capillary with L = 50 cm & I = 41.5 cm, Based on a comparison of the migration results obtained with the C-18 modified and bare silica capillaries, the bare silica capillary performed much better; the C-18 CEC peaks displayed broadening and tailing.

Figure 64 plots the peak widths of various measurements performed in the two different types of capillaries. As shown, the cyano modified capillary produced better efficiency compared to the C-18 capillary; the nortriptylline peaks displayed some tailing in the C-18 modified capillary. This result indicates that the solutes have more interaction with the C-18 bonded phase, leading to longer retention and reduced efficiency. The peak sharpness is degraded by adding more methanol (higher methanol volume ratios) due to additional interaction, possibly with the few remaining silanols. The bare silica capillary produced some observable peaks with good efficiency at the pH value of 4.41 with various methanol compositions (no methanol; 20%, 30%, 40%, 50% methanol). A comparison of the measured peak width results (at the same pH value of 4.41

and +25 kV) obtained in the three different capillaries indicates that the bare silica capillary offers the best peak sharpness (i.e., highest efficiency), followed by the cyano pentoxy modified capillary, and lastly C-18 modified capillary.

Figures 32 and 33 show impurities resolved by C-18 and cyano pentoxy etched modified capillaries that are not seen in a bare capillary. These results show importance and capabilities of etched modified capillaries.

3.3. Overview of Xanthine Family of Drugs Migration Studies

Theophylline, dihydroxy-theophylline (dyphylline), and aminophylline are in this group of pharmaceutical drugs and have similar molecular structures. Each of these compounds was tested both at +25 kV and -25 kV applied voltages in order to observe both anodic and cathodic migration patterns. The results of this work indicate that theophylline in the C-18 and cyano pentoxy etch-modified capillaries at buffer pH=7.06 and 8.14 with +25 kV applied voltage shows well-behaved and symmetrical electrochromatogram peaks. By adding methanol as an organic modifier, the electroosmotic flow was diminished in the C-18 and cyano pentoxy capillaries. Theophylline migration time in C-18 at +25 kV and pH=7.06 is around 8 minutes, whereas at the same pH and applied voltage in the presence of 50% methanol the peak migration time increases to 27 min. The same capillary (C-18) at pH=8.14 and +25 kV showed a theophylline elution time of approximately 6.6 minutes; adding 40% methanol resulted in a solute migration time of 10.30 min in the capillary. Similarly, for dihydroxy-theophylline

at +25 kV and pH=7.06, the migration time was measured at 7.50 min (0% methanol), while it was shortened to 5.82 min at pH= 8.14 due to a higher EOF. Few migration peaks were observed with a negative applied voltage in the C-18 and cyano pentoxy capillaries at pH = 7.06 and 8.14 (although the electrical current flow was stable and finite).

3.4. Overview of Tricyclic Antidepressant (Nortriptylline) Migration Studies

Nortriptylline was successfully eluted in both the C-18 and cyano capillaries using a pH value of 4.41 and +25 kV applied voltage. The elution time at pH= 4.41 and +25 kV was the shortest in the cyano capillary, followed by the C-18 and bare silica capillaries. However, the cyano modified capillary produced higher efficiencies compared to the C-18 capillary, since the peaks in the C-18 capillary displayed some tailing. There are structural differences between the two etch modified capillaries; the cyano pentoxy stationary phase is a nematic liquid crystal whereas the C-18 stationary phase is simply a long-chain hydrocarbon molecule. Since these two capillaries are two different classes of materials with different structures, they offer different migration selectivities. Moreover, the molecular size and polarity of the solutes are considered important parameters affecting the migration process.

3.5. Effect of pH on Migration Behavior

In order to achieve optimum CE performance, various experimental conditions such as the applied voltage, capillary i.d., and pH must be optimized and controlled. It is necessary to control the buffer pH value in order to achieve good migration results with high resolution. In order to study the effects of pH on solute migration time and peak shape, various experiments were performed over a wide range of pH values. For instance, Figure 38 shows the migration results for theophylline with the bare silica capillary at buffer pH values in the range of 2.14 to 8.14. At low pH values of 2.14, 3.0, and +25 kV, the electroosmotic flow is very small due to protonation of the silanol group. At buffer pH values above 4.41, there is increased electroosmotic flow due to deprotonation of the silanols (negatively charged). Therefore, shorter migration times are expected at higher pH values, whereas longer migration times can be expected for pH values below 4.41. At a low pH value and +25 kV applied voltage, the resulting migration performance of the etch-modified capillaries was poor, with few or no resulting peaks. The optimum pH value for the migrations of theophylline, dihydroxytheophylline, and aminophylline in the bare silica capillary was determined to be 4.41 and +25 kV. The pKa values of these three samples (all from the xanthines family) are between 7.0 and 8.0. These compounds are positively charged at pH values of 2.14, 3.0, and 4.41. Since migration of the solutes in the bare silica capillary is based on the electroosmotic flow and electrophoretic migration, the pH value will have a direct effect on the migration time.

For the cyano pentoxy and C-18 etch-modified capillaries, the optimum pH value for the migrations of theophylline, dihydroxy-theophylline, and aminophylline was found to be at 7.06 and +25 kV applied voltage, based on the greatest number of successful measurements at pH= 7.06 with different methanol % as well as peak shape and width. Figure 42 shows the effect of pH on migration time for theophylline in the cyano pentoxy capillary at +25 kV with 10% methanol modifier. At low pH values of 2.14 and 3.0, no peaks were observed in the cyano pentoxy capillary with an applied voltage of +25 kV. With a -25 kV voltage, the observed peaks were due to a change in the direction of electroosmotic flow. As mentioned above, there is anodic flow at low pH values and the solutes move in the opposite direction of detector, which is the reason for lack of observed peaks. On the other hand, a reverse polarity of -25 kV resulted in measured peaks at the detector because of the strong anodic EOF, which was greater than the cathodic migration of the presented charged analytes.

4. Conclusions

The main objective of this research project was to determine the migration properties of selected basic pharmaceutical compounds in chemically etched and modified capillaries as well as a bare silica capillary. Moreover, this study assessed the ability of the CE and CEC techniques to analyze xanthine and tricyclic pharmaceutical compounds used in numerous medical applications. The effects of the specific capillary type, pH value, applied voltage (±25 kV), and methanol composition (% v/v) as an organic modifier on migration time and peak shape / width were studied through detailed experiments performed with each compound (see Tables 26 and 27 for the summary descriptions, ranges, and values of the experimental parameters in this study). The optimal conditions for migration of each sample were determined. The etch-modified capillaries were used in the open tubular electrochromatographic (OTCEC) analysis mode. Two different types of etch-modified capillaries were used in these studies: a cyano pentoxy modified capillary and a C-18 modified capillary. The bare silica capillary used in this work was etched and unmodified. The combination of etching and modification of the capillaries increased the effective surface area and facilitated more solute-bonded phase interactions. This observation was confirmed through comparative studies of the migration time as well as peak width and shape from cyano pentoxy and C-18 modified capillaries as well as bare silica capillary.

The synthesized liquid crystal capillary was previously characterized by FTIR studies. The C-H stretching bands observed in the FTIR spectra confirmed

the liquid crystal was bonded as a stationary phase to the etched surface but the surface coverage of the bonded phase could not be ascertained. Since the monomeric C-18 (octadecane) moiety is much longer than the bulkier cyano pentoxy moiety, it is assumed that the two moieties would have different surface coverage values. It is also important to note that these two bonded moieties show different affinities with respect to molecular polarity. The octadecane (C-18) stationary phase is more hydrophobic compared to the cyano pentoxy (liquid crystal) moiety, which is a hydrophilic material. Thus, cyano pentoxy is expected to have more interaction with a protonated solute at low buffer pH values (below 4) than the C-18 modified capillary. This may be ascertained by capillary efficiency based on peak width and shape.

The electroosmotic flow for pH values below 4.0 is anodic and becomes cathodic at pH values above 4.0. Anodic flow has been previously studied and confirmed in bare etched and etch-modified capillaries. For etch-modified capillaries, the number of silanol groups greatly decreases after formation of the hydride layer on the capillary wall. The chemical etch process performed on the capillary inner wall with ammonium hydrogen difluoride (NH₄HF₂) chemical etchant leaves ionic NH₄⁺ residues in the silica matrix of the capillary wall. These residual ions can cause anodic electroosmotic flow in the etch-modified capillary. The EOF depends on the buffer pH value, which can be adjusted to optimize the migration process.

Effects of the organic modifier in the mobile phase with various controlled volume ratios of methanol were studied. The higher methanol volume ratios resulted in longer migration times for the solutes. The use of methanol as an organic modifier in the bare silica capillary was also studied in this research work. As shown in Table 2, the greatest numbers of successful measurements were obtained at pH values of 4.41, 7.06, and 8.14. As the methanol volume ratios are raised, the elution times for all compounds were increased, and the peaks became broader due to the longer time for the solute to pass through the capillary.

The solute migration times in the cyano pentoxy modified capillary were the shortest, possibly due to the shorter column length (50 cm vs 33 cm). Both the C-18 and cyano pentoxy modified capillaries demonstrated well-behaved migration performance based on their peak shape and width at the same buffer pH (7.06) and +25 kV applied voltage. As outlined in Tables 2 through 18, the optimum migration conditions for theophylline, dihydroxy-theophylline, and aminophylline include the buffers with the pH values above 4.0 (pH = 4.41, 7.06, 8.14) and +25 kV and different methanol modifier (v/v %). These compounds have pk_a values in the range of 5,2 to 8.0. These results indicate better electrochromatographic performance for these materials at pH values near their pk_a value (see Tables 28 and 29 for the summary results).

The migration results for nortriptylline show that the best buffer pH values producing the greatest number of successful analyses are pH = 2.14, 3.0, and

4.41. Nortriptylline is compound with pK_a value of 9.7, indicating that the molecule is strongly basic and it is more likely to accept protons in a low pH value environment. By evaluating the CEC peak shapes and migration times of nortriptylline outlined in Tables 19 through 24, for pH = 4.41 and +25 kV, the migration time in the C-18 modified capillary was longer than in both bare silica and cyano pentoxy modified capillaries. As indicated in Table 21, there was slight peak tailing in the C-18 capillary, and such peak asymmetry could be improved by increasing the methanol volume ratio (see Tables 28 and 29 for the summary results).

This study demonstrates the valuable properties of chemically etched and modified capillaries in the open tubular format (OTCEC). These favorable characteristics are due to both the etching process used to increase the effective surface area and the modification process forming a hydride layer on the capillary inner surface and bonded with a specific moiety. The chemical modification of the capillary inner wall was done through silanization and hydrosilation. In this work, the unique characteristics of the liquid crystal material as a stationary phase in CEC were demonstrated for various pH values (2.14 through 8.14) and applied voltages (+25 kV and -25 kV) at room temperature. Compared to the bare silica capillary, the etch-modified capillaries are capable of resolving the sample and any residual impurities with excellent migration peak (time, width, and shape) measurement reproducibilities. The etch-modified capillaries (cyano pentoxy and C-18) are capable of providing enhanced

analytical reproducibility (in terms of peak width, peak shape, and detection of sample impurities) compared to the bare silica capillary. Therefore, the etchmodified capillaries are the preferred candidates for analyzing the compounds evaluated in this study. Based on the capillary efficiency analysis data, the cyano pentoxy etch-modified capillary demonstrated superior performance (i.e., less tailing and more peak symmetry) compared to the C-18 etch-modified capillary.

Further studies would be useful to observe the effects of different applied voltages, electrokinetic injection (injection by voltage) instead of pressure injection, and temperature on migration and efficiency. In particular, the temperature studies should include the cyano pentoxy modified capillary due to the temperature sensitivity of liquid crystals.

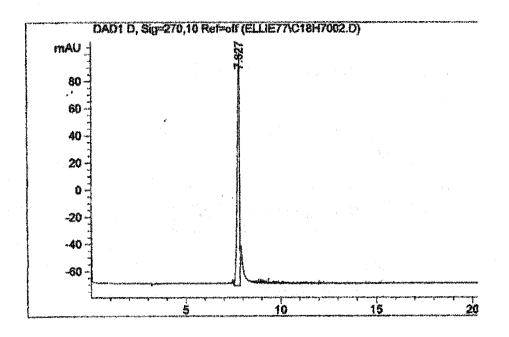


Figure 15. Migration of theophylline in C-18 modified capillary: pH=7.06, no methanol, +25 kV; migration time in min.

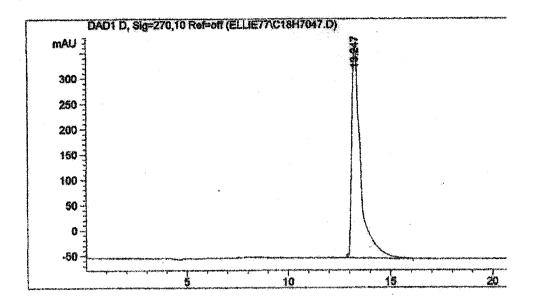


Figure 16. Migration of theophylline in C-18 modified capillary: pH=7.06, 30% methanol, +25 kV; migration time in min.

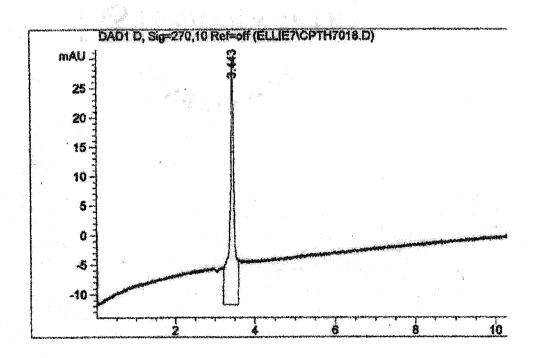


Figure 17. Migration of theophylline in cyano pentoxy modified capillary: pH=7.06, 10% methanol, +25 kV; migration time in min.

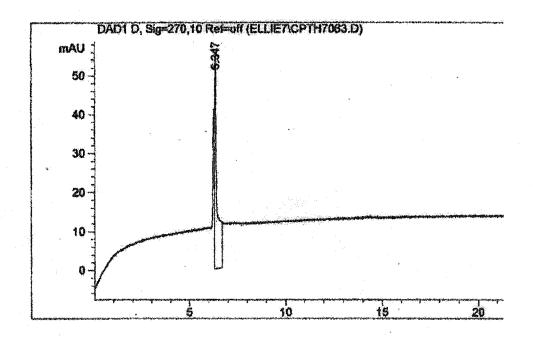


Figure 18. Migration of theophylline in cyano pentoxy modified capillary: pH=7.06, 40% methanol, +25 kV; migration time in min.

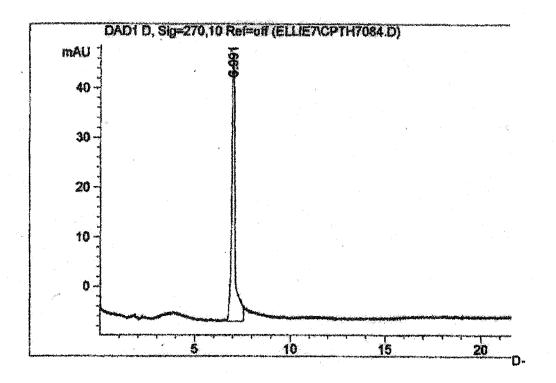


Figure 19. Migration of theophylline in cyano pentoxy modified capillary: pH=7.06, 50% methanol, +25 kV; migration time in min.

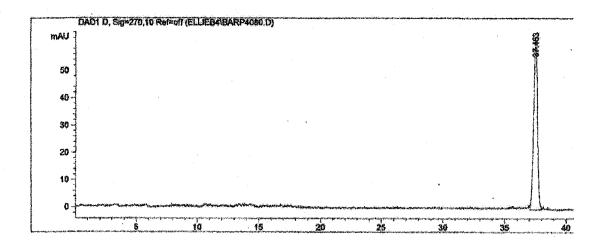


Figure 20. Migration of theophylline in bare silica capillary: pH=4.41, 50% methanol, +25 kV; migration time in min.

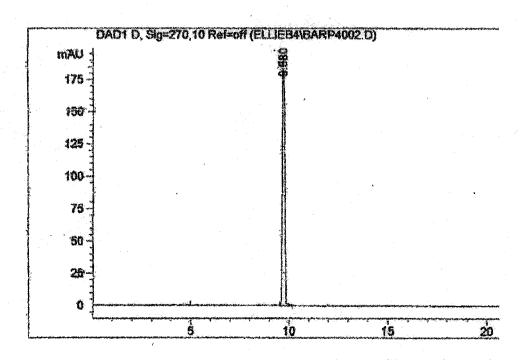


Figure 21. Migration of theophylline in bare silica capillary: pH=4.41, no methanol, +25 kV; migration time in min.

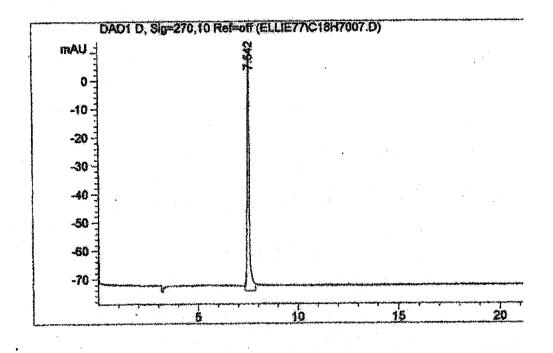


Figure 22. Migration of dihydroxy-theophylline in C-18 modified capillary: pH=7.06, no methanol, +25 kV; migration time in min.

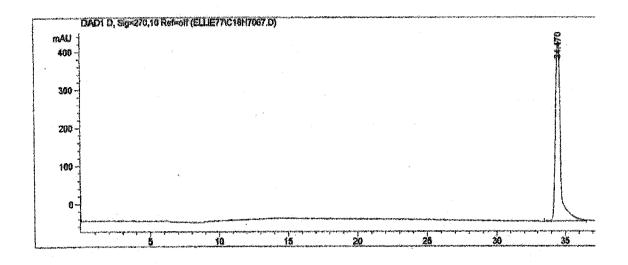


Figure 23. Migration of dihydroxy-theophylline in C-18 modified capillary: pH=7.06, 40% methanol, +25 kV; migration time in min.

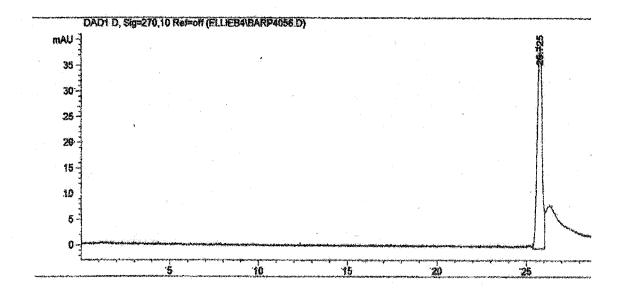


Figure 24. Migration of aminophylline in bare silica capillary: pH=4.41, 30% methanol, +25 kV; migration time in min.

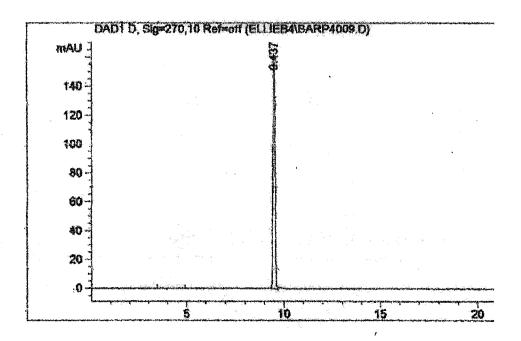


Figure 25. Migration of aminophylline in bare silica capillary: pH=4.41, no methanol, +25 kV; migration time in min.

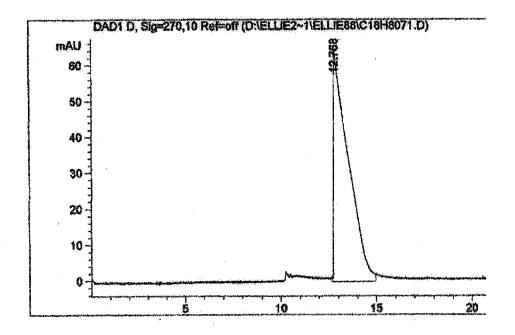


Figure 26. Migration of aminophylline in C-18 modified capillary: pH=8.14, 40% methanol, +25 kV; migration time in min.

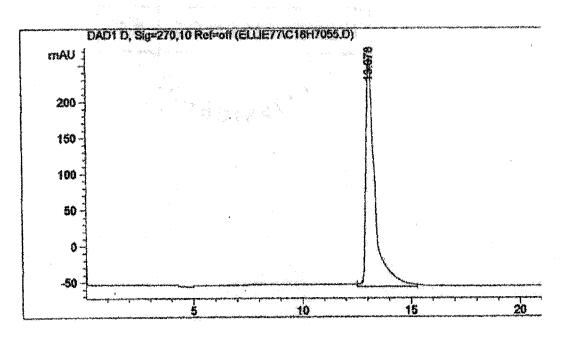


Figure 27. Migration of aminophylline in C-18 modified capillary: pH=7.06, 30% methanol, +25 kV; migration time in min.

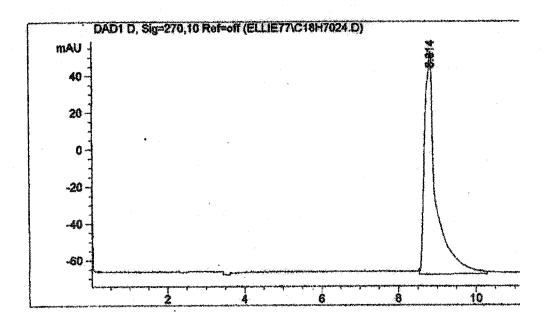


Figure 28. Migration of aminophylline in C-18 modified capillary: pH=7.06, 10% methanol, +25 kV; migration time in min.

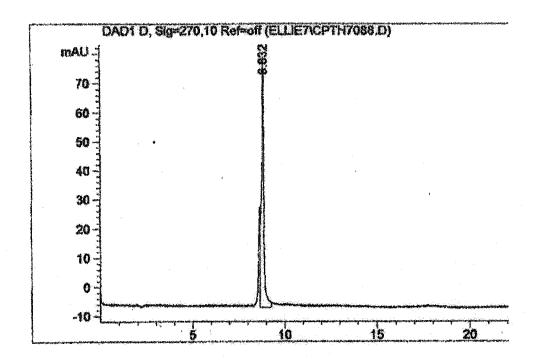


Figure 29. Migration of aminophylline in cyano pentoxy modified capillary: pH=7.06, 50% methanol, +25 kV; migration time in min.

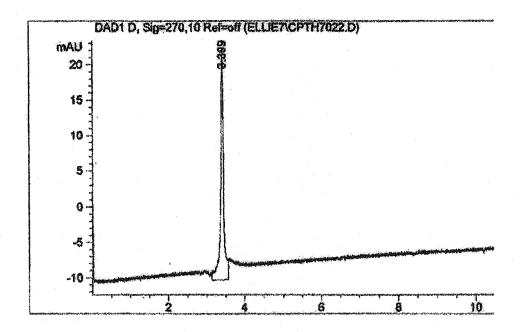


Figure 30. Migration of aminophylline in cyano pentoxy capillary: pH=7.06, 10% methanol, +25 kV; migration time in min.

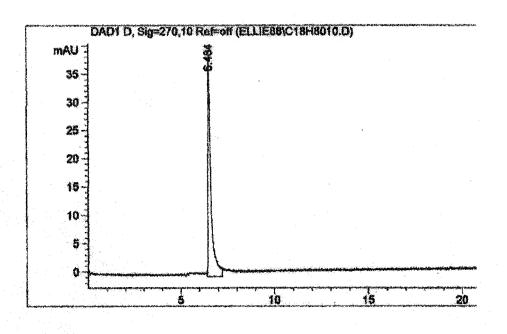


Figure 31. Migration of aminophylline in C-18 modified capillary: pH=8.14, no methanol, +25 kV; migration time in min.

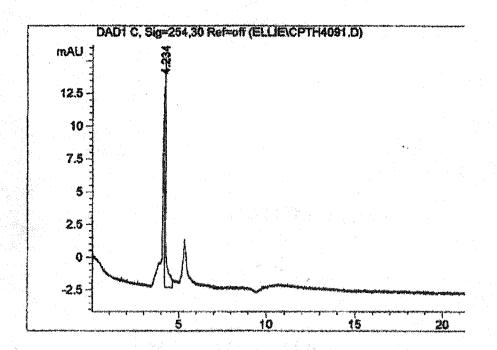


Figure 32. Migration of nortriptylline in cyano pentoxy modified capillary: pH=4.41, 50% methanol, +25 kV; migration time in min.

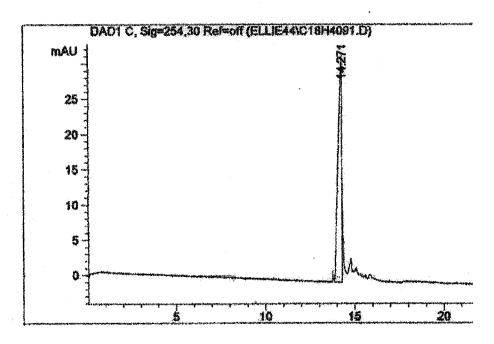


Figure 33. Migration of nortriptylline in C-18 modified capillary: pH=4.41, 50% methanol, +25 kV; migration time in min.

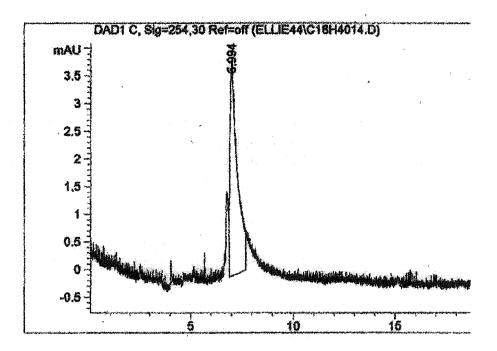
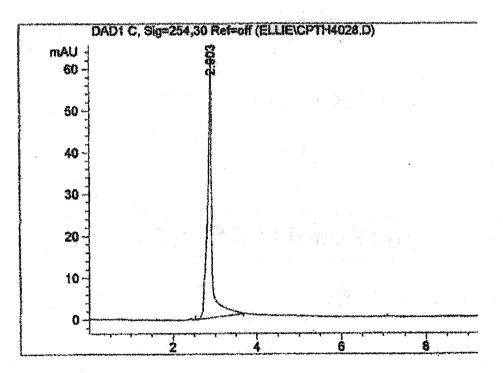
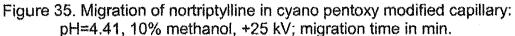


Figure 34. Migration of nortriptylline in C-18 modified capillary: pH=4.41, no methanol, +25 kV; migration time in min.





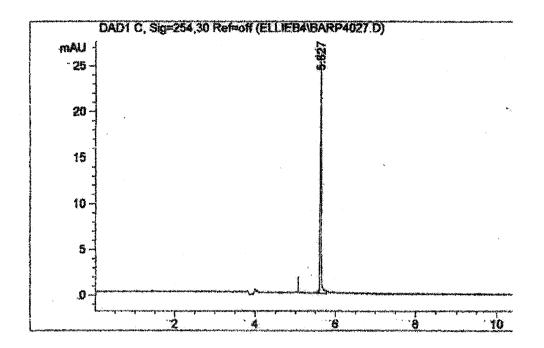


Figure 36. Migration of nortriptylline in bare silica capillary: pH=4.41, 10% methanol, +25 kV; migration time in min.

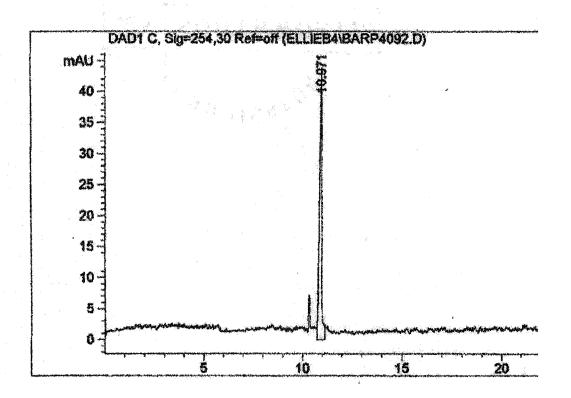


Figure 37. Migration of nortriptylline in bare silica capillary: pH=4.41, 50% methanol, +25 kV; migration time in min.

Note: In Figures 38 through 64 below, the trend lines are mostly obtained using the 2nd order through 5th order polynomial curve fits ('Poly'). Some other trend line curve fits are linear ('Linear') and exponential ('Expon.'), as indicated (all curve fits performed using Microsoft Excel).

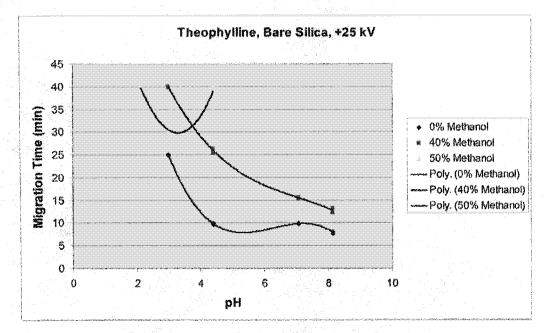
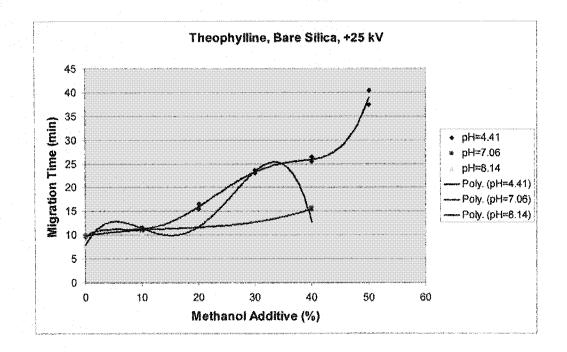
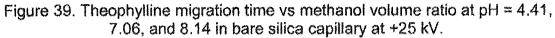


Figure 38. Theophylline migration time vs pH for methanol volume ratios of 0%, 40%, and 50% in bare silica capillary at +25 kV.





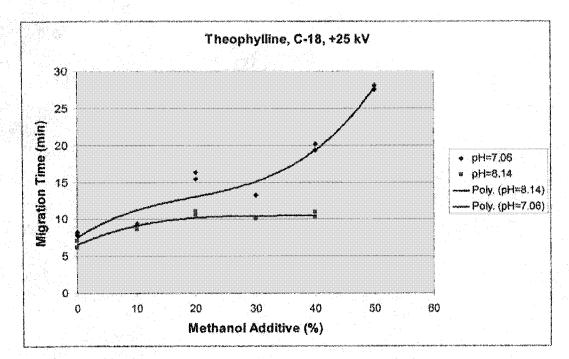


Figure 40. Theophylline migration time vs methanol volume ratio at pH = 7.06, and 8.14 in C-18 modified capillary at +25 kV.

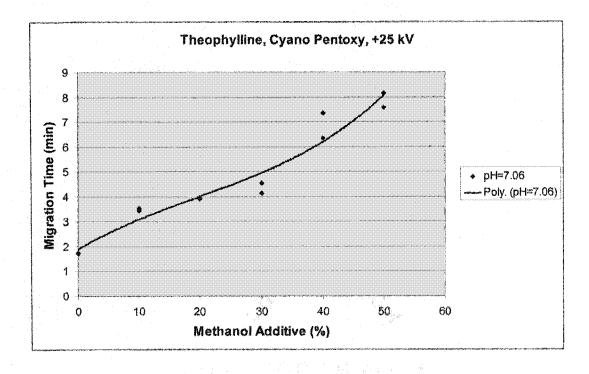


Figure 41. Theophylline migration time vs methanol volume ratio at pH = 7.06 in cyano pentoxy modified capillary at +25 kV.

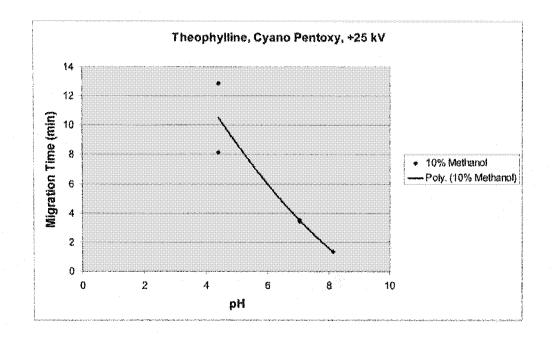


Figure 42. Theophylline migration time vs pH for methanol volume ratio of 10% in cyano pentoxy capillary at +25 kV.

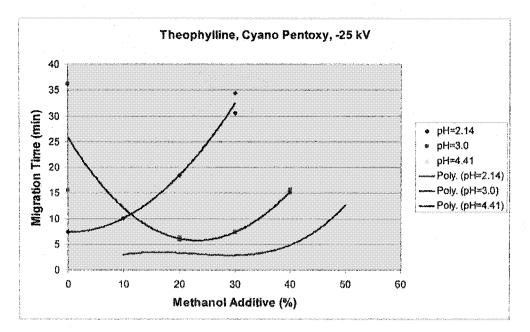


Figure 43. Theophylline migration time vs methanol volume ratio at pH=2.14, 3.0, & 4.41 in cyano pentoxy modified capillary at -25 kV.

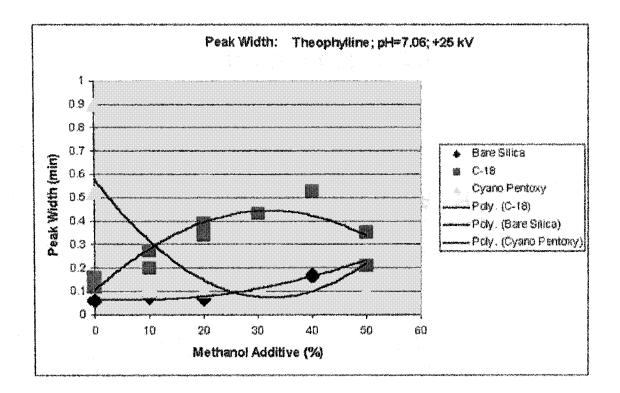


Figure 44. Capillary efficiency for theophylline vs methanol volume ratio for bare silica, C-18 modified, and cyano pentoxy modified capillaries at pH=7.06 and +25 kV.

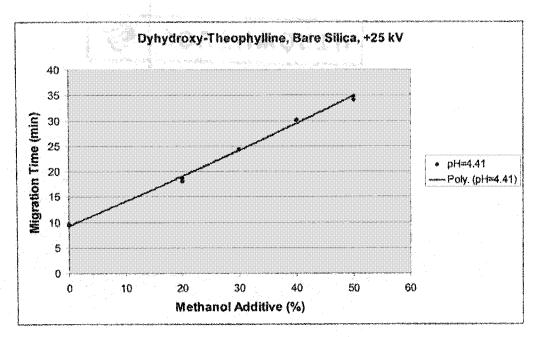
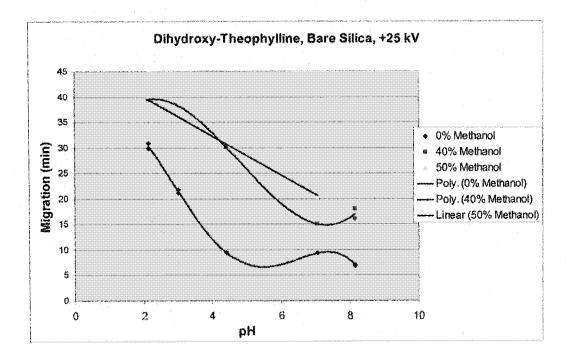
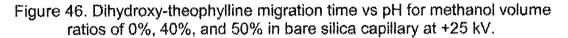


Figure 45. Dihydroxy-theophylline migration time vs methanol volume ratio at pH of 4.41, in bare silica capillary at +25 kV.





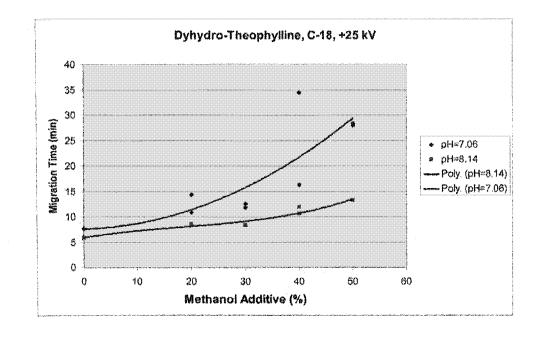


Figure 47. Dihydroxy-theophylline migration time vs methanol volume ratio at pH= 7.06, 8.14 in C-18 modified capillary at +25 kV.

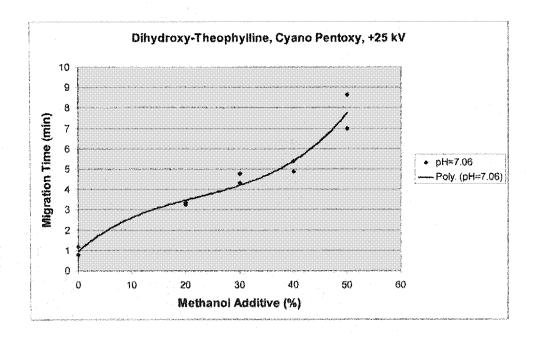


Figure 48. Dihydroxy-theophylline migration time vs methanol volume ratio at pH=7.06 in cyano pentoxy modified capillary at +25 kV.

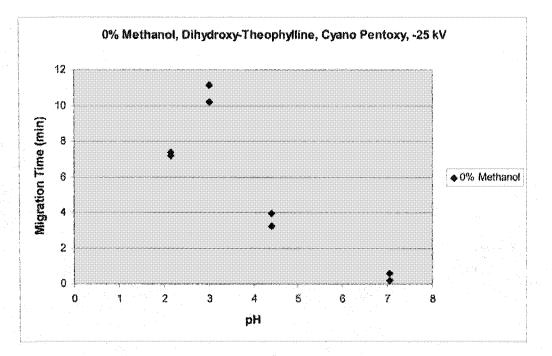
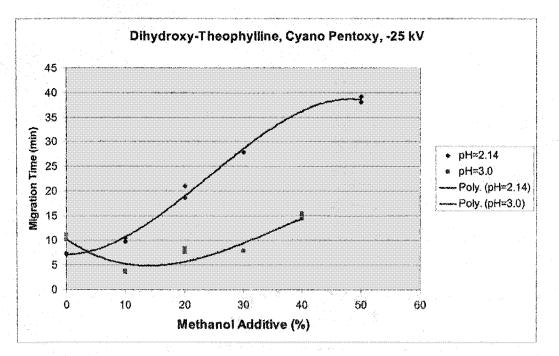
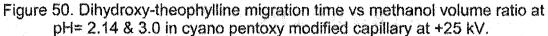
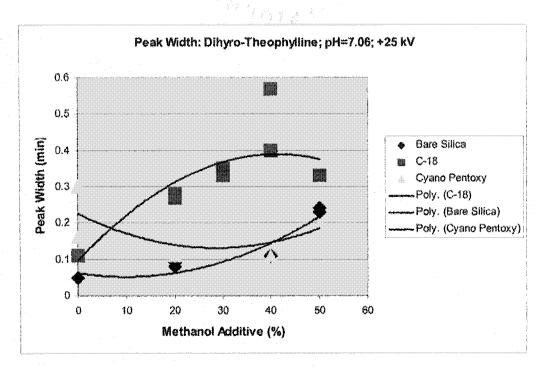


Figure 49. Dihydroxy-theophylline migration time vs pH for methanol volume ratio of 0% in cyano pentoxy modified capillary at -25 kV.







2011年初的主義議会 13

Figure 51. Peak width for dihydro-theophylline vs methanol volume ratio for bare silica, C-18 modified, and cyano pentoxy modified capillaries at pH=7.06 and +25 kV.

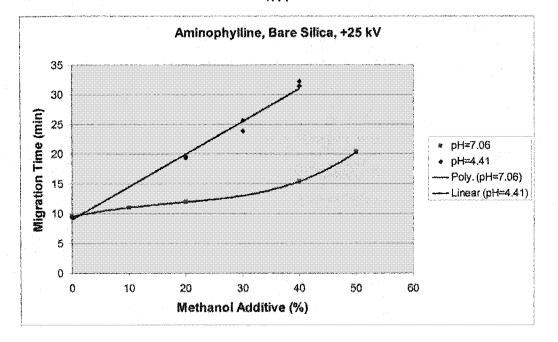


Figure 52. Aminophylline migration time vs methanol volume ratio at pH = 4.41and 7.06, in bare silica capillary, at +25 kV.

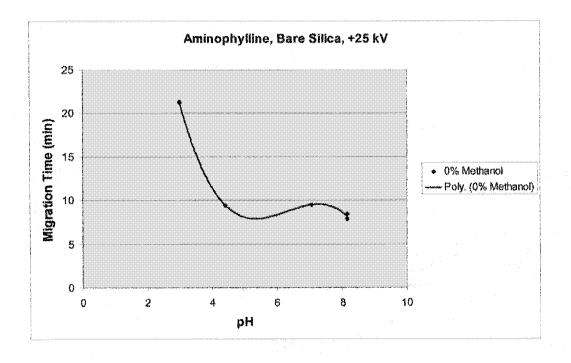


Figure 53. Aminophylline migration time vs pH in the range of 2.14 to 8.14 in bare silica capillary at +25 kV (no methanol modifier).

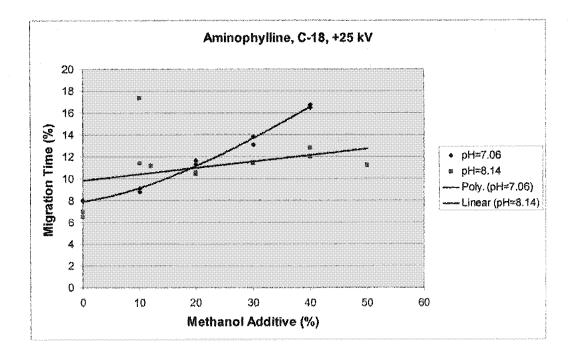


Figure 54. Aminophylline migration time vs methanol volume ratio at pH of 7.06 and 8.14, in C-18 capillary at +25 kV.

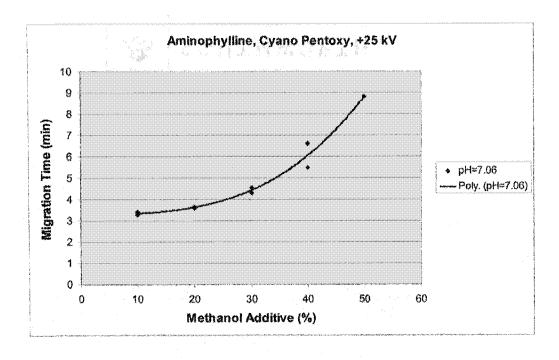


Figure 55. Aminophylline migration time vs methanol volume ratio at pH of 7.06, in cyano pentoxy capillary at +25 kV.

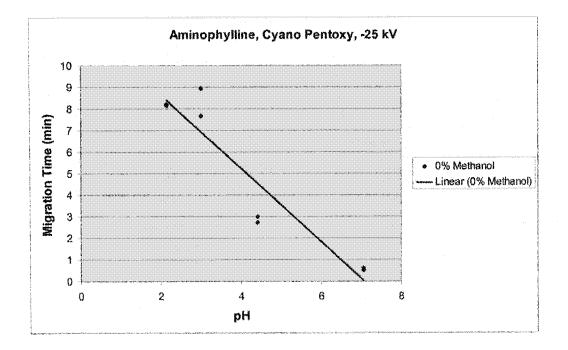


Figure 56. Aminophylline migration time vs pH in the range of 2.14 to 8.14 in cyano pentoxy capillary at -25 kV (no methanol modifier).

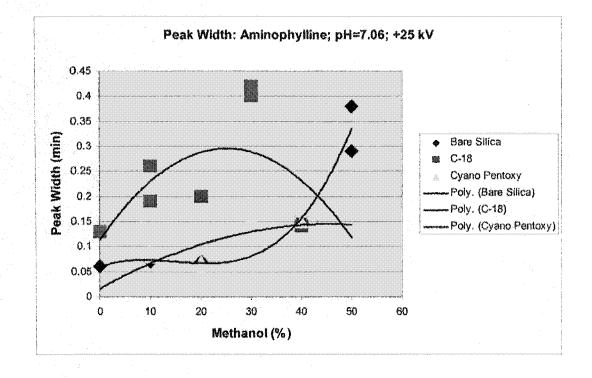


Figure 57. Peak width for aminophylline vs methanol volume ratio for bare silica, C-18 modified, and cyano pentoxy modified capillaries at pH=7.06 and +25 kV.

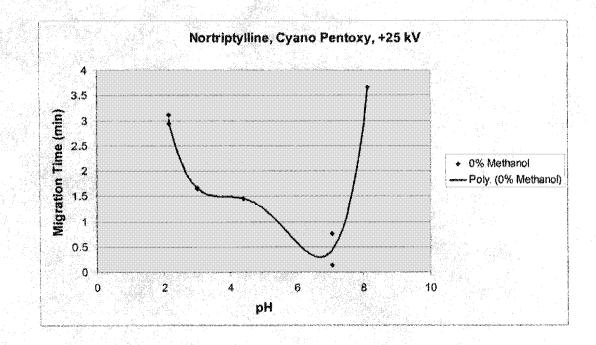


Figure 58. Migration time vs pH for nortriptylline in cyano pentoxy capillary at +25 kV (no methanol modifier).

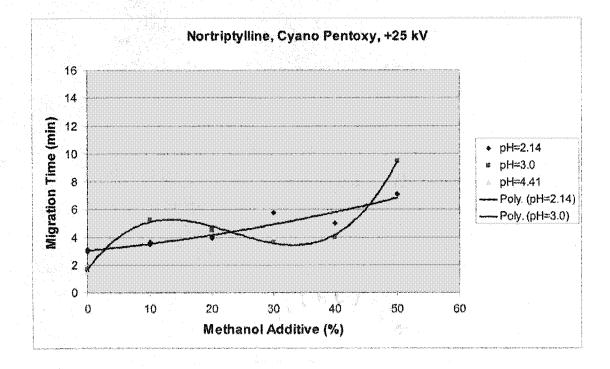


Figure 59. Nortriptylline migration time vs methanol volume ratio for pH = 2.14, 3.0, and 4.41, in cyano pentoxy capillary at +25 kV.

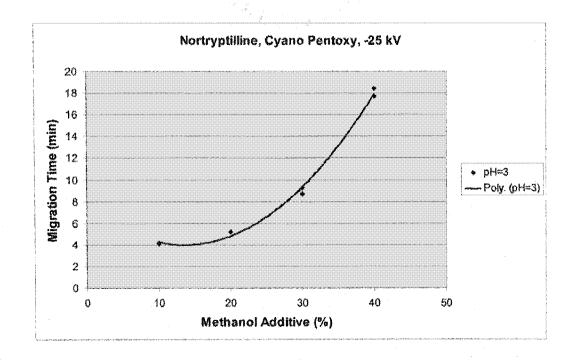


Figure 60. Nortriptylline migration time vs methanol volume ratio for pH = 3.0, in cyano pentoxy capillary at -25 kV.

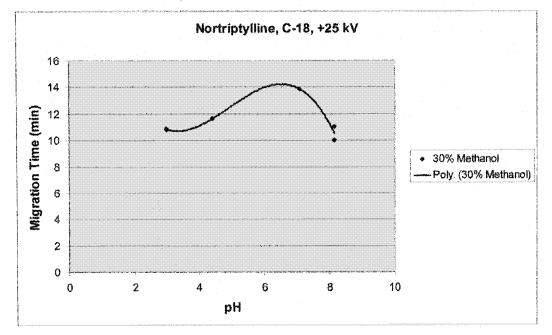


Figure 61. Nortriptylline migration time vs pH in the range of 2.14 to 8.14 with 30% methanol volume ratio in C-18 capillary at +25 kV.

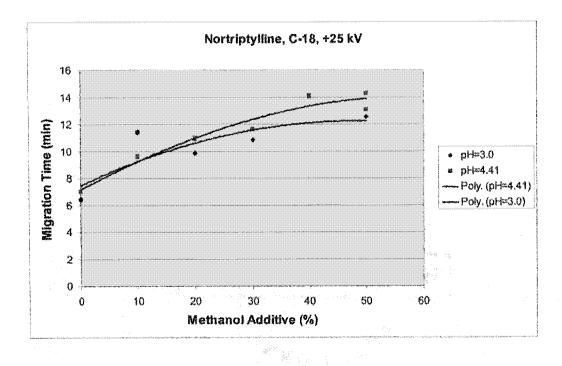


Figure 62. Nortriptylline migration time vs methanol volume ratio at pH of 3.0 and 4.41, in C-18 capillary at +25 kV.

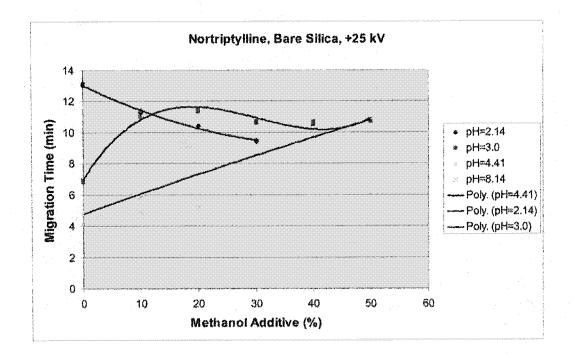


Figure 63. Nortriptylline migration time vs methanol volume ratio at pH = 2.14, 3.0, and 4.41, in Bare Silica capillary at +25 kV.

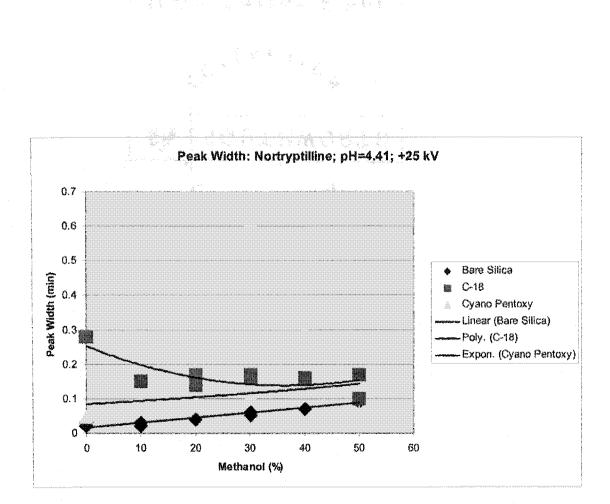


Figure 64. Capillary efficiency for nortriptylline vs methanol volume ratio for bare silica, C-18 modified, and cyano pentoxy modified capillaries at pH=7.06 and +25 kV.

References

- 1. Hjerten, S., Chromatogr. Rev. 1967, 9, 122-219.
- 2. Heigher, D. N., High Performance Capillary Electrophoresis. Hewlett-Packard Company, 1992.
- **3.** Pesek, J. J., Matyska, M. T., Swedberge, S., Udivar, S., Protein and Peptide Separation on High Surface Area Capillaries. Electrophoresis. 1999, 20, 2343-2348.
- **4.** Baker, D. R. Capillary Electrophoresis, Wiley-Interscience Publication, New York, 1990, Chapter 1.
- 5. Pesek, J.J., Matyska, M. T. Electrophoresis, 18, 1997, 2228-2238.
- 6. Pesek, J.J., Matyska, M.T., Sentellas, S., Galceran, M.T., Chiari. M., Pirri. G., Multimodal Open-tubular capillary electrochromatographic analysis of amines and peptides, Electrophoresis. 2002, 23,2982-2989.
- 7. Terabe, S., *et al.* Separation of highly hydrophobic compounds by cyclodextrin-modified micellar electrokinetic chromatography. J. chromatography. 1990, 516, 23-31.
- 8. Heiger, D., Majors, R. E., Lombardi, R. A. LC-GC., 15,1, 1997,14-23.
- 9. Pesek, J. J., Matyska, M. T. J.Chromatography. A, 1996, 736, 313-320.
- **10.** Schweitz, L., Anderson, L.I.; Nilsson, S. Anal. Chemistry., 69, 1997,1179-1183.
- 11. Pretorius, V., Hopkins, B. J., Schieke, J. D. J. Chromatography. 1974, 23.
- 12. Yan, C., Schaufelberger, D.; Erni, F. J. Chromatogr. A, 670, 1997, 15-23.
- 13. Pesek, J. J., Matyska, M. T. J of Chromatography. A, 1996,736, 255-264.
- 14. Pesek, J. J., Matyska, M. T., Mauskar, L., J of Chromatography. A, 1997, 763, 307-314.

- **15.** Pesek, J.J., Matyska, M.T., Muley, S.Synthesis and characterization of chemically bonded liquid crystal stationary phase for HPLC, Chromatographia. 2000, 52, 439-444.
- 16. Francotte, E., Jung, M., Chromatographia. 1996, 42,521-527
- **17.** Collings, P. J. Liquid Crystals: Natures delicate phase of matter, Princeton University press, 1990, Ch 1,2.
- 18. Witkiewicz, Z. J. Chromatography., 251, 1982, 311-337.
- Catabay, A., Okumura, C., Jinno, K., Pesek, J. J., Williamsen, E., Fetzer, J. C., Biggs, W. R. Chromatographia., 47, 1998, 13-19.
- 20. Pesek, J. J., Williamsen, E. J. Trends in Anal. Chem., 11,7,1992, 259-266.
- 21. Sandoval, J. E., Pesek, J. J., U. S. Patent 5 326 738, 1994.
- 22. Pesek, J. J., Vidensek, M. A., Miller, M. J. Chromatogr, 556, 1991,373-381.
- 23. Pesek, J. J., Cash, T. Chromatographia, 27(11;12), 1989, 559-563.
- 24. Sandoval, J.E., Pesek, J.J. Anal. Chem., 61,1989, 2067-2075.
- 25. Pesek, J.J., Matyska, M. T., James. S., J of Liquid Chromatogr, 25, 18, 2002, 2749-2765.
- 26. Pesek, J.J., Matyska, M.T., Katrekar, A. Anal Chem., 71,24,1999, 5508-5514.
- 27. Matyska, M.T., Pesek, J.J., Yang, L., J. Chromatogr., A. 887,2000, 497.
- 28. Lipsky, S. R., McMurray, W.J., Hernandez, M., Purcell, J. E., Billeb, K. A., J. Chrom. Sci. 1980, 18, 1.
 - 29. Watanabe, C., Tomita, H. J. Chromatography. 1976, 121.

- **30.** Onuska, F. J., Comba, M. E., Bistricki, T., Wiliknson, R. J. J. Chromatography 1977, 142, 117.
- **31.** Pesek, J. J., Matyska, M. T., Cho, S. J. Chromatography. A, 1999, 845, 237-246.

Appendix

Area	Width	Migration	Peak Height	Methanol	10 262. 162 8 - 14 COLOUR OF FLATFIC & COLOUR SALES
(mAU.sec	(min)	Time (min)	(mAU)	(%)	pH
				0	2.14
				0	2.14
				10	2.14
				10	2.14
				20	2.14
	al an 1975 in surface provide state of the			20	2.14
al Philippine in globallo a che dila banda anna 14 mar 1866 da balando can	nove nevel gen than and a site distance and the fore is a distant. Guide at the distance of the distance of the	and the constraint of the design of the d		30	2.14
**************************************	e erenten en en le fanger og lakas fan Sie Bindin er fanger men en die die bieder	an kana kanan manan menangkan manipaken kanan bahan kanan	a cana a sananan a sanan an angan an angan an angan an angan an angan angan angan angan angan angan angan angan	30	2.14
1999 - 1997 - 1997 - 1999 - 19 - 19 - 19	and and a set of the set	airean inagan ann in agus ann an	an in the second and an an in the second	40	2.14
	n for fan de frankeren fan ferste fan ferste fan ferste fan ferste ferste ferste ferste ferste ferste ferste fe	interneting of the second s	антаналтын алартын улаан талар та Талар	40	2.14
5453.04	0.4	39.23	183.6	50	2.14
5568.10	0.41	40.11	183.8	50	2.14
ของอากแสมวิทยากสาวเรื่องสาวเรื่องสาวเรื่องส าวเป	apenining to our or or so that the second and the second are		en aleman an ann an		and a start of the
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec	(min)	Time (min)	(mAU)	(%)	pH
67.2	0.18	24.98	4.32	0	3
67.3	0.19	24.9	4.35	0	3
				10	3
		1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -		10	3
		a historia da antica da cara de terra de la districa da de la desta de la desta de la desta de la desta de la d	1	20	3
				20	3
n gala ningan ng mangan ng man-nin ng min ng minakat katalan ng mangan ng mangan ng mangan ng mangan ng mangan Ng mangan ng			4970 a 194 parts - 1 a 10	30	3
under an single geschlenen die Werkler felder sollten der Proketischen werklande in versichen der Sollten mehr				30	3
33.8	0.13	40.03	4.11	40	3
33.62	0.1	39.87	4.07	40	3
1018.24	0.22	30.7	61.48	50	3
1010.2	0.22	30.18	59.78	50	3
1013.2	0.20		39.10		
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec	(min)	Time (min)	(mAU)	(%)	pH
2540.38	0.16	9.9	248.61	0	4.41
1655.2	0.14	9.68	190.17	0	4.41
934.29	0.12	11.66	111.21	10	4.41
599.09	0.11	10.91	84.86	10	4.41
377.10	0.16	16.48	37.17	20	4.41
282.8	0.13	15.39	32.9	20	4.41
640.52	0.2	23.55	37.6	30	4.41
618,7	0.19	23.01	38.25	30	4,41
860.9	0.24	26.38	47.31	40	4.41
821.14	0.24	25.44	45.5	40	4.41
1362.5	0.27	37.46	61.82	50	groups and appropriate program and the system of
1.002.03	U.2.1	J (40	01.02	ov	4.41

Table 2. Theophylline Migration in Bare Silica Capillary (+25 kV)

out of the second s	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mAU)	Time (min)	(min)	(mAU.sec)
7.06	0	47.4	9.81	0.06	188.45
7.06	0	41.1	9.85	0.058	160.82
7.06	10	38.92	11.14	0.076	193.96
7.06	10	38.45	11.02	0.072	182.58
7.06	20	70.91	11.61	0.067	325.37
7.06	20	70.84	11.66	0.068	332.26
7.06	30				
7.06	30	nonentario en esta en en esta e			
7.06	40	98.09	15.68	0.17	1266.78
7.06	40	95.36	15.38	0.16	1171.8
7.06	50		1997 Contraction of the second se		
7.06	50		******		alla de la canada de la calencia de
24.1181.118.5.5.0000.02007.1.1.0.1800.0.100					
	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mĀU)	Time (min)	(min)	(mAU.sec)
				nere esta aneira da a constructiva esta de la construcción de la construcción de la construcción de la constru	and a second
8.14	0	75.25	8.1	0.14	846.48
8.14 8.14	COMPARING STATES OF A COMPANY AND A STATES		8.1	0.14	846.48 2048.66
CONTRACTOR OF THE PARTY OF THE	0	75.25	a second and a second	CONTRACTOR AND A DESCRIPTION OF A DESCRI	CARLOW AND
8.14		75.25 85.1	7.6	0.14	2048.66
8.14 8.14	0 0 10	75.25 85.1 42.9	7.6 10.34	0.14 0.16	2048.66 561.98
8.14 8.14 8.14	0 0 10 10	75.25 85.1 42.9 32.69	7.6 10.34 12.47	0.14 0.16 0.21	2048.66 561.98 543.44
8.14 8.14 8.14 8.14	0 0 10 10 20	75.25 85.1 42.9 32.69 44.67	7.6 10.34 12.47 12.19	0.14 0.16 0.21 0.27	2048.66 561.98 543.44 987.46
8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 0 10 10 20 20	75.25 85.1 42.9 32.69 44.67 48.1	7.6 10.34 12.47 12.19 11.3	0.14 0.16 0.21 0.27 0.25	2048.66 561.98 543.44 987.46 984.14
8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 0 10 10 20 20 30	75.25 85.1 42.9 32.69 44.67 48.1 28.7	7.6 10.34 12.47 12.19 11.3 27.3	0.14 0.16 0.21 0.27 0.25 0.52	2048.66 561.98 543.44 987.46 984.14 1292
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 0 10 10 20 20 20 30 30	75.25 85.1 42.9 32.69 44.67 48.1 28.7 41.69	7.6 10.34 12.47 12.19 11.3 27.3 19.45	0.14 0.16 0.21 0.27 0.25 0.52 0.98	2048.66 561.98 543.44 987.46 984.14 1292 3507
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 0 10 10 20 20 20 30 30 40	75.25 85.1 42.9 32.69 44.67 48.1 28.7 41.69 80.62	7.6 10.34 12.47 12.19 11.3 27.3 19.45 13.19	0.14 0.16 0.21 0.27 0.25 0.52 0.98 0.51	2048.66 561.98 543.44 987.46 984.14 1292 3507 3354
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 0 10 10 20 20 20 30 30 40 40	75.25 85.1 42.9 32.69 44.67 48.1 28.7 41.69 80.62	7.6 10.34 12.47 12.19 11.3 27.3 19.45 13.19	0.14 0.16 0.21 0.27 0.25 0.52 0.98 0.51	2048.66 561.98 543.44 987.46 984.14 1292 3507 3354
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 0 10 10 20 20 30 30 30 40 40 50	75.25 85.1 42.9 32.69 44.67 48.1 28.7 41.69 80.62	7.6 10.34 12.47 12.19 11.3 27.3 19.45 13.19	0.14 0.16 0.21 0.27 0.25 0.52 0.98 0.51	2048.66 561.98 543.44 987.46 984.14 1292 3507 3354

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Theophylline migration in Bare Silica capillary: L = 58.2 cm; I = 48.6 cm; injection 3 sec at 50 mbar; i.d. = $50 \mu \text{m}$; detection wavelength = 270 nm.

Area (mAU.sec	Width	Migration	Peak Height	Methanol	
TROTTO IN THE REPORT OF THE PARTY OF THE PAR	<u>(min)</u>	Time (min)	(mAU)	(%)	pH
6777.24	0.25	27.37	372.72	0	2.14
6440.68	0.23	29.02	334.18	0	2.14
an an on the same relation of the same of the same				10	2.14
neralisteligtererisfictenier Altyreed (1000-1552) Unarfyl (100-16-10	al (P. 15). Sport faile in an ann an 1996 i Martin a Brain ann an 1997 an an 1996 ann an 1997 an 1997 an 1997 a	**************************************		10	2.14
###\$\$\$################################	an the second state of the state of the state of the second state of the state of the state of the state of the		n ja jung di se di sa mang si sa sa mani sa jang seritera seritera se	20	2.14
			ton un ministration of the second second second	20	2.14
1155 March Madach (1570) 1670 Million (1670) 1670 Million (1670) 1670 Million (1670) 1670 Million (1670) 1670 M		1/12/14/2 2010/07/17/17/17/17/17/17/17/17/17/17/17/17/17		30	2.14
a jaho tuku - yyyakénya kuto a jakato na kato di kuto takat kakata kakata kakata kakata kakata takat terjak				30	2.14
				40	2.14
				40	2.14
		0.0.5 W	**************************************	50	2.14
1944-1960 Tuber with the state of the state		energias a miseo instituta das das desarranses en anteresto das	^{2,222,1} 2461.0 ¹ 1111.0 ¹ 28.0111770.0 ¹ 11.0111.01111.01111.01111.01111.01111.01111.01111.01111.01111.01111.01111		2.14
Area (mAU.sec	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
ารระบบสี่งและสารางการการสาราชาว	ingen fer vorde ferre an grad over an dorfte market for	หมาย และสมมาร์ และสมมาร์ เสราย เป็นสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวส	กระหว่างหมายของ ระหางมายให้เหม่าระหว่างทำไปของไปประก	0	3
	ter namaren ur andere un alternisten de	alije je na najali je na jedita je na na na na se na jedita je na jedita na najali je i setila na posta na	99999 2999 7989 1999 1997 - 1997 - 1997 - 1997 1997 19	0	3
ala mahang mang mang mang mang mang mang mang m	Marin na managana na managa	1940 - Constanting and Saman Constanting and Saman Saman 1941 - Constanting and Saman	100 - 201 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 100 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 -	10	3
19989-978-1997-999-999-999-999-999-999-999-999-99	~~~~~~	***************************************	999-9 10000-0-10-0-10-0-0-0-0-0-0-0-0-0-0-0-0	10	3
aren allan esen arteka esen arteka allan esen arteka allan esen arteka arteka esen arteka arteka arteka esen a			99 Que 1999 il cale a 2004 D' a a additiona a la fai da and anna a fai anna anna anna anna anna ann	20	3
₹₩₽₽₩₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽		******	nagalan dan dan kanana dan kanan dan kanan dan dan dan dan dan dari kanan dan dari kanan dan dan dan dan dan da	20	3
ֈՠֈֈ֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎֎			*******	30	3
ĨĨŎĸĦŎĊŦŔġĸŧĸĸġĔŧĊŦŀŧġĸijŊŚĿĿĦĨŔŖŦŢĸĿŦŦĿĸŖĊſſĿĊĬŎŎ		۲۵۰۰ - ۲۹۰۰ - ۲۹۰۰ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۲۹۹۹ - ۱		30	3
en an	1999 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -			40	3
Nga chariye ayaanayaa aa gagaya hari oo ahiyo o gayaaniiyi ah qaxaa		2014/11/11/11/2014/01/11/2014/2014/2014/		40	3
an nganga ngapan ngan ngangan ngangan ngangan ngangapan ngangapan ngangapan ngangapan ngangapan ngangapan ngang				50	3
				50	3
	BARLAL	8.81	De als Unitedat		
Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
(1170.360				0	4,41
		er fold Maan to more tanaba in aan yn faantagelen en y brûnt fenengen dem yn tald bêre aan en se binn me'n n		0	4,41
****		%.~.86.~.8		10	4.41
initikuutusti on tahantituti mahaani apana apana apanaani kuu	an an thai fa din 11 airean da dh' na maria t da gun 1,00 Alan (i 1 - 2 - 2 - 1 da Alan Ala).	**************************************	an a sea a sea F	10	4.41
an a			uddiaed faighth a fire a fire in the entry of samely gamely fire proton games in other stars.	20	4.41
สารการเสียงเหตุสาราชาวาร	1967-007-007-0020-0420-04400-0460-0460-0460-0460-046		ole 1 w/14/14/14/1-5-5404-64/14/44-1-1-10044/1/5011/5-9855/-55/1775-7824797978-784798	20	4.41
און איז		กกระสะแรงสระสราชการกระกามการแก่ง เกมาราชการสราชสระชาน เสมาร์ เสราะสระชาน เม	uliphinisti di unha tampanat shire cariteran'i saurane ne musikan kasapanan ma	<u>20</u> 30	4.41
alation makes ar scale that it liter was an even to an even motion	1929 Mallania y dy dy 199 ang malanika (1996 na hari na hayan na	1971-1971 - 1971 - 1971 - 1971 - 1971 - 1971 - 1971 - 1971 - 1971 - 1971 - 1971 - 1971 - 1971 - 1971 - 1971 - 1 1971 -		30 30	4.41
sanlak with sizes if the top of a chiral sa error site freedow in monoir terrolative thes				30 40	4.41
	1947 - 1947 -	an a	*****		
200 - Mar Tayof St Tayor - To - St Tayof Strong Tayof St	e-yasenser-semana	** ***********		40	4.41
and a constant of the second secon	**************************************		สหาราชการสาวสาวานการสารสารสารสารสารสารสารสารสารสารสาร	50 E0	4.41
		TANNAL DIS ANALY ATTAIN ATTAIN ATTAIN AND A ALL A DATA A		50	4.41

Table 3. Theophylline Migration in Bare Silica Capillary (-25 kV)

pH	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
7.06	0	งด <i>ามมาสถานสถานสถานสถานสถานสถานสถานสถานสถาน</i> สถาน การการการการการการการการการการการการการก	มมหลงสมเดนต่าวของมหายสาวข้างประกาศที่การประกาศตั้งจะจะสำนั		และการสะสร้างและสาท เกษต อาณาสารสราชสราชสรีต
7.06	0		i ali fu a defendari i al sero de narro da	an a	an a
7.06	10		aden Merikanan menjari kara kana kana kerangkan kana kana kana kana kana kana kan		1999 - 1995 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -
7.06	10		n fan de feldere en ander son de fan 'n gebruikte in teren teren in de fendere in de fendere fendere in de fen		
7.06	20	and the address of the state of the			
7.06	20				
7.06	30				
7.06	30				
7.06	40				
7.06	40				
7.06	50				
7.06	50	****	an ann an tha	1987 (Strand) - State	
pH	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
8.14	0	indin ana manakan karang mananan ana minang makanan	an an an an an de an thair an t		งสระสรรณหนึ่งการเราะรางการการเราะการการการการการการการการการการการการการก
8.14	0	กลังการการการการการการการการการการการการการก			998,994,494,698,998,998,999,999,999,999,999,999,999
8.14	10	น้ำมีการการการการการการการการการการการการการก		***************************************	
8.14	10	9-10-10-10-10-10-10-10-10-10-10-10-10-10-		,	9779 - GARLEAN AND AND AND AND AND AND AND AND AND A
8.14	20	an 1999 in the Carlon Carlo	1998 - MENDERA MANDEL ANGELER AND ENTRY ENTRY ENTRY AND THE TANK OF FRANK EN	994 m 4 m 5 m 7 m 7 m 7 m 7 m 7 m 7 m 7 m 7 m 7	and devision data wanne a line of a stranger and a stranger and a stranger and a stranger and a stranger at a s
8.14	20	nania Manjara manana ang kanana na kana n	an 1999 - California California (California)	and a second	an a
8.14	30	มีมีขัดของสังทัศนิสา (จัดเสรียน (จาก) (การการการการการการการการการการการการการก	8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		nie war gemeiningen eine feine weiten gelegend were seine steren weiten einen konstanten seinen.
8.14	30	99999999999999999999999999999999999999		an a	1991 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -
8.14	40	n fer felfen er en	2	n in faith an an tha gail an an tha gaile an	
8.14	40				
8.14	50			*********	
8.14	50	**************************************			
	anna an				

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Theophylline migration in Bare Silica capillary: L = 58.2 cm; I = 48.6 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 270 nm.

Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mAU)	(%)	pH
				0	2.14
			9 1000 B B B B Good Hand Hand and an and a state of the s	0	2.14
and configer to constrain a point of a first state of the			9 99 waaren 79 97 97 97 97 97 97 99 98 99 99 99 99 99 99 99 99 99 99 99	10	2.14
			ан алаланда алалан алан тайн тайн тайн тайн тайн тайн тайн та	10	2.14
International design and a solution of the sol			Delanter and references and references and references and references and references and references and reference	20	2.14
				20	2.14
an na mana an			andere aller er eller der et alle for son under er under er under er under er under er andere andere andere and	30	2.14
an gan balan gan gan gan gan gan gan gan gan gan g	2 19 19 19 19 19 19 19 19 19 19 19 19 19			30	2.14
Holden marketin an followin litter from its strater or the institution				40	2.14
	auto autori in anti anti anti anti anti anti anti		****	40	2.14
andar naroljevlje valitina internatioati na teknji na teknji orati da 1960 ti	an a	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		50	2.14
interd o to detablished an orthographic sector and only in the sector of			\$99999964956954914955946495946495994444959546995969959	50	2.14
9889919494979194999999999999999999999999		*****	4 aðhriftatharðar frærriðiðað í ari 1,291 júnar 174 í 176 í 171 af 191 i 171 af 191 i 171 af 191 i 171 af 191 i	***************************************	1994 B FLEI FLEI - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1
Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
				0	3
				0	3
and in out the substitution population statics to a substitution of				10	3
er i yn ar fan felyn fyn ryfner yn fel yn felyn yn ar fel yn grefor yn ar yn ar felyn yn yn ar felyn yn yn ar f	Granie izm do dialization managene grand sont grand sont gangere	***************************************		10	3
a da da manana ana ana ana ana ang ang ang ang an	10000000000000000000000000000000000000	*****		20	3
an a	alla hanna alla ann ann ach a rith agus an ann ann ann ann ann ann ann ann ann	81227 2017 WHITE IS NOT THE REPORT OF THE REPORT OF THE PARTY OF THE	*********************	20	3
			nen alle anne alle anna de la service de La service de la service de	30	3
ann - ann a 1998 a' ann a tha an 19 an 29 an 29 an 29 an 29 an 20 an 1997 an 20 an 20 an 20 an 20 an 20 an 20 a	reality and a real and a second and a second state of the second state of the second second second second second			30	3
	and definition for an example of the second s	**************************************		40	3
ythije é na vita na meint a cine na Bhailte i dé ait i régendation i philiphi finn vitaina	Propagality and a substance of the substance of			40	3
nair a dh'adha aige tallan ann ann "a dharan tallanair.		eregenstermen i hans bis tig hen bis en i hande stade förstade "Kildeli" to at Portade av Better		50	3
nna o ma 4. mar a fision a fision a fisiona a fisiona a fision a fi				50	3
zine ande en eine striketing men einer er en besekten moneren en men de mellen.		*************		1994 an	
Area	Width	Migration	Peak Height	Methanol	*****
(mAU.sec	(min)	Time (min)	(mAU)	(%)	pH
		NO peaks		0	4.41
					4.41
		1986 - 1986 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -		10	4.41
		99-1 997 - 1998 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1996		10	4.41
	1998 (1998-1919) - Frank I. An	20-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-	erentaensee vegengenetetiensjogaansek alaaiste, te stillerlikteriiter inigenaa	20	4.41
12/19/07.471.4017.1017.1717.7717.4717.0717.1717.1			6 - 17 - 19 - 19 - 19 - 19 - 17 - 17 - 17	20	4.41
				30	4.41
a in the second seco				<u> </u>	4.41
	1999 1999 1999 1999 1999 1999 1999 199		árszre ertitezőkese estette paraitet kört altákoratas költ altakoratas altak araditat		4.41
1947 - Harris Martin, 1 1947 - Harris Martin, 1947 - Harris Martin, 1947 - Harris Martin, 1947 - Harris Martin, 1947 - Harris Martin, 1	v. approximation of the second states and the second states and	0106120900000000000000000000000000000000		40	4,41
	9.704 from House contained and a factor of the second second second second second second second second second s	antine frances from the second state of the second state of the second state of the second state of the second	2011 MILL - 100 MIL - 100 MILL - 100 MI	40 50	4.41
		ANTER LANDER DE LA COMPANY AND AND ANTER AND ANTER AND ANTER ANTER ANTER ANTER ANTER ANTER ANTER ANTER ANTER AN	1999 District (1997) III III III III III III III III III I	50 50	4.41
		CAN WHITE A PROPERTY OF A DESCRIPTION OF A	ารกระวงหลายความการสายและและรอบจะรอสะระ		4,41

Table 4. Theophylline Migration in C-18 Capillary (+25 kV)

Methanol	Peak Height	Migration	Width	Area
(%)	(mÃU)	Time (min)	(min)	(mAU.sec)
0	291	8.17	0.16	3988
0	171	7.82	0.12	1345
10	171	9.09	0.27	3685
10	204	9.41	0.2	3176
20	208	16.36	0.39	6635
20	229	15.38	0.34	6345
30	415	13.24	0.43	12677
30	496	13.21	0.43	14915
40	7.1	19.3	0.53	323
40	4.2	20.16	0.53	190
50	1.94	27.57	0.21	35.77
50	2.19	28.08	0.35	66.6
	an a	an da jaga kanangan da saga kanang kanang da saga k		in the participation of the second second state of the second second second second second second second second
Methanol	Peak Height	Migration	Width	Area
(%)	(mĀU)	Time (min)	(min)	(mAU.sec)
0	48.23	7.09	0.22	779
0	52.04	6.16	0.14	599
10	41.36	8.67	0.22	747
10	43.3	8.74	0.24	861
20	41.1	10.54	0.31	1097
20	40.41	10.99	0.33	1141
30	65.98		0.38	2132
30	35	10.032	0.39	1148
			a second a second s	
40	3.05	10.26	0.08	19.74
WAY AND	3.05 2.66	10.26	0.08	<u>19.74</u> 22.5
40	COLLECTION OF THE PROPERTY OF	AND TABLED OF ANTHER AND TRATEGORY COMMENSATION OF ANTION		1975 To series the second s
	(%) 0 0 10 10 20 20 20 30 30 40 40 40 40 50 50 50 50 Methanol (%) 0 0 10 10 20 20 20 30 30 40 40 40 40 40 40 40 40 40 4	(%) (mÂU) 0 291 0 171 10 171 10 204 20 208 20 208 20 208 30 415 30 496 40 7.1 40 4.2 50 1.94 50 2.19 Methanol Peak Height (%) (mAU) 0 48.23 0 52.04 10 41.36 10 43.3 20 40.41 30 65.98	(%) (mAU) Time (min) 0 291 8.17 0 171 7.82 10 171 9.09 10 204 9.41 20 208 16.36 20 229 15.38 30 415 13.24 30 496 13.21 40 7.1 19.3 40 4.2 20.16 50 1.94 27.57 50 2.19 28.08 Methanol Peak Height (mAU) Migration Time (min) 0 48.23 7.09 0 52.04 6.16 10 41.36 8.67 10 43.3 8.74 20 40.41 10.99 30 65.98 10.034	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Theophylline migration in C-18 etch modified capillary: L = 50 cm; I = 41.5 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 270 nm.

Methanol	and the second second second reprint second reprint second s		Width	Area
(%)	(mĀU)		(min)	(mAU.sec)
0		**************************************	- 19 - 19 - 19 - 19 - 19 - 19 - 19 - 19	
0				
10				
10				
20				
20				1001-001-001-001-001-00-00-00-00-00-00-0
30		1		
30				
40		1949 (1949) (1947) (194		
				and a second state of the second s
a an a star an		10-1404-1401-1914-1914-1914-1904-1914-191		1998 - C.
50	n se	anala ana ang ang ang ang ang ang ang ang an		ŊŊŢġĦĿŦŊŊĿţŎŎĸĸĸĸĸġĸĸĹĸĸĬġĬĸĊŊĬĿĬĔĬĬĬĬŦĸIJĿĬĿĬĿĬĸ
Methanol	Peak Height	Migration	Width	Area
	(mAU)	Time (min)	(min)	(mAU.sec)
Frankersen an der der der seinen bei die seine der der seine der der seine der seine der seine der seine seine				
A REAL PROPERTY AND A REAL		анневала-долгоналан такиеван оролорууна такиеван оролоруу ал	"	**************************************
	na ijanju jani muje en ne energin ne ne v tentov nemetri na mora.	1979 - 2710 - 2717 - 27		
and the second	an na shi na manan na manan na a san na san san	29-29-29-29-29-29-29-29-29-29-29-29-29-2	an in the second s	20 Mart 1970 - South State - The South State - Sta
	ng provinský se na na provinské na provinské se na provinské výskou stali v stalovana stála 1996 – 1994 stra pr	******	te al fright for the second	
20	9 May 28 years in Sanar Barlanda (1929) I a Barat an Ian aidin Sanar an Arthogo (1929) I a B	nie dziedzie die - auffekteinie innefer draggie nete, op of te oppektentie eine date date date date date date d	1	
30		#15#50##111#1#1#1#1#1#1#1#1#1#1#1#1#1#1#		
30				
40	999 - 1999 - 1999 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -			
40				
50				
50				10 (110) (0
Methanol	Peak Height	Migration	Width	Area
(%)	(mAU)	Time (min)	(min)	(mAU.sec)
0			20070701-0-0170001-070-00-0-0000-0-0000-0-0000-0-0000-0-0000-0-	
0				
10				
10				
20			101111111111111111111111111111111111111	
20				
30			2011(1)111(1)11(1)24(6-17)1(1)-1707-15-17E-1-7E-1-7E-1-7E-1-7E-1-7E-1-7E-1	יישטער מערייט איז אינעראין איז
30				eront tanonanja da da ada da da da da da da da da da d
40			1010111-1112-0-12-0-1-0-1-0-1-0-1-0-1-0-	
	I			
40				and and the second data and the second data of the second data and the second data and the second data and the
40 50 50		200000103000001000000000000000000000000		anderstand of the second date of the second s
	Methanol (%) 0 0 0 0 0 0 0 0 10 10 20 20 30 30 30 30 30 30 40 40 50 50 Methanol (%) 0 10 20 20 30 30 0	Methanol (%) Peak Height (mAU) 0 0 0 0 10 10 10 20 20 20 30 30 30 30 30 30 30 30 30 30 40 40 50 50 50 50 Methanol (%) Peak Height (mAU) 0 0 10 10 20 20 30 30 40 40 40 50 50 50 50 50 50 50 50 50 50 50 0 0 0 0 0 0 0 0 0 0 10 10 20 20 30 30 <td>Methanol (%) Peak Height (mAU) Migration Time (min) 0 - - 0 - - 10 - - 10 - - 10 - - 20 - - 20 - - 20 - - 20 - - 20 - - 20 - - 20 - - 30 - - 40 - - 50 - - 50 - - 50 - - 0 - - 10 - - 20 - - 20 - - 30 - - 30 - - 40 - - 50 - -</td> <td>Methanol Peak Height (mAU) Migration Time (min) Width (min) 0 </td>	Methanol (%) Peak Height (mAU) Migration Time (min) 0 - - 0 - - 10 - - 10 - - 10 - - 20 - - 20 - - 20 - - 20 - - 20 - - 20 - - 20 - - 30 - - 40 - - 50 - - 50 - - 50 - - 0 - - 10 - - 20 - - 20 - - 30 - - 30 - - 40 - - 50 - -	Methanol Peak Height (mAU) Migration Time (min) Width (min) 0

Table 5. Theophylline Migration in C-18 Capillary (-25 kV)

	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mAU)	Time (min)	(min)	(mAU.sec)
7.06	0	***************************************	No peak	a ann an ann ann ann ann ann ann ann an	an - 4 4
7.06	0	1997-1979-1979 - 1987 - 1987 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 199			
7.06	10				
7.06	10				
7.06	20				
7.06	20		1		
7.06	30				
7.06	30				
7.06	40				
7.06	40	2013 arriel a francésia (francésia de la francésia de la deservación de la deservación de la de la de la de la			
7.06	50				
7.06	50				
					B-wheeler and a state of the st
	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mAU)	Time (min)	(min)	(mAU.sec)
8.14	0				
8.14	0				
8.14	10				
8.14	10				
8.14	20				
8.14	20				
8.14	30	8.06	4.69	0.05	32
8.14	30	7.84	6.19	0.11	67.25
8.14	40				a Finan adam da national de la casa de la CELE FINADA CONTRACTO
8.14	40				
8.14	50		2.36		
8.14	50		2.32		
8.14 8.14	40 50				9 19 19 19 19 19 19 19 19 19 19 19 19 19

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Theophylline migration in C-18 etch modified capillary: L = 50 cm; I = 41.5 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 270 nm.

(min)	Time (min)	(mAU)	(%)	pH
			0	2.14
			0	2.14
			10	2.14
			10	2.14
			20	2.14
			20	2.14
			30	2.14
			30	2.14
			40	2.14
			40	2.14
			50	2.14
babatering the constraint of the state of the second		nam Mala na bara na ang mang mang kang pang na na sa	50	2.14
Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
0.032	0.059	2.7	www.up.com/internet.com/particle/internet/internet/internet/	3
	i da cilitarun a antistarun constante an solution an antista de la constantia de la constante de la constante e		0	3
	ander franken er en ster ett er en ster ster ster ster ster ster ster ster		10	3

		N 1. 200 P O. M.		3
and the second	Ling of a state of a line of the state of the stat	1999-1999 1999 1999 - Sandari Antonio A		3
ense ogen, is and the point of the point of the second of the		1994-1944 (Januar Sallander - Klauster Linner of Lander and Lander of Parks 1974) (1974) (1974) (1974) (1974)		3
99, 1, 4 , 449 429, 844 (14Prate 911/1-14)	2		30	3
#1911-1917-1919-1919-1919-1919-1919-1919	944 - 1444 - 1444 - 147 - 147 - 147 - 147 - 147 - 147 - 147 - 147 - 147 - 147 - 147 - 147 - 147 - 147 - 147 - 1			3
	na - 1919 ya kanal si wake Semana Sant Wake Zersian (serek Sendar Wirke 2021), "Siller V Sendar Territori, "Be	, , , , , , , , , , , , , , , , , , ,		3
**************************************		i nine i non manimum line a manimum ne na alterna enserada en esta a		3
	***************************************	99 - 92 - 9 - 9 - 9 - 9 - 9 - 9 - 9 - 9	50	3
Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
		an a		4.41
	and the second	an and the second se	AND	4.41
		and the second		4.41
CONTRACTOR AND A CONTRACT			when the second s	4.41
			and a subsection of the second state of the se	4.41
	eren an general and a second			4.41
				4.41
19. aliy an 19		94994999999999999999999999999999999999		4.41
1999 (1997) (1977) (197		an ya canana ya sana an mahao na kacana da an ina da an ina da an ina da an ina an ina an ina an ina an ina an	and a second	4.41
			and the second	4.41
-saads bird is mit Nixoo willowentaitet is vitte Weadersona		880	and a second difference of the second s	4.41
water and the second	2.7221620000100001000000000000000000000000	ante al la compara de la co		4.41
	(min) 0.032	Time (min) (min) Migration Width Time (min) (min) 0.059 0.032 Migration Width Time (min) (min) 0.32 0.032 Migration Width Time (min) (min) 13.48 0.52 5.58 0.18 8.13 0.15	(mAU) Time (min) (min) Peak Height (mAU) Migration Time (min) Width (min) 2.7 0.059 0.032 Peak Height (mAU) Migration Time (min) Width (min) 2.7 0.059 0.032 Peak Height (mAU) Migration Time (min) Width (min) 367 13.48 0.52 454 5.58 0.18 345 8.13 0.15	(%) (mAU) Time (min) (min) 0 0 0 0 0 10 0 0 0 0 0 10 0 0 0 0 0 0 10 20 0

Table 6. Theophylline Migration in Cyano Pentoxy Capillary (+25 kV)

	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mÁU)	Time (min)	(min)	(mAU.sec)
7.06	alimenta a series a s	83.51	1.73	0.52	3729
7.06	0	83.63	1.76	0.9	4551
7.06	10	35.23	3.52	0.13	321
7.06	10	41.02	3.44	0.1	319
7.06	20	15.16	3.9	0.1	157
7.06	20	18.16	3.94	0.11	163
7.06	30	65.98	4.12	0.12	678
7.06	30	60.99	4.55	0.13	653
7.06	40	25.11	7.36	0.47	1027
7.06	40	55.1	6.34	0.11	481
7.06	50	60	7.57	0.09	431
7.06	500	62.74	8.16	0.1	489
9411.0 <i>8-28-5-60001</i> 004088866	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mÃU)	Time (min)	(min)	(mAU.sec)
and the second s		and a state of the second		ana	an a
8.14	0	1	I	1	
8.14	0	มีหนังที่ได้ทำที่เรียง อยังได้แห่งจะหาง สาขารเราะที่สารุณจะสุด กลุ่งสุดจุด 35.00	2012/12/07-07/07/07/07/07/07/07/07/07/07/07/07/07/0		
8.14	INTERACTOR AND AND REAL TO THE REAL PROPERTY OF THE PARTY	805.52	1.34		1.2
8.14 8.14	0	805.52	1.3.34 	0.17	
8.14 8.14 8.14	0 10 10	an a		0.17	1.2
8.14 8.14 8.14 8.14 8.14	0 10	805.52 11.99	1.34 2.78		
8.14 8.14 8.14 8.14 8.14 8.14	0 10 10 20 20	an a			
8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 10 10 20	11.99			
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 10 10 20 20 30	an a	2.78	0.22	230
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 10 10 20 20 20 30 30	11.99	2.78	0.22	230
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 10 10 20 20 20 30 30 40	11.99	2.78	0.22	230
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 10 10 20 20 30 30 40 40	11.99	2.78	0.22	230
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 10 10 20 20 30 30 40 40 50	11.99	2.78	0.22	230

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- Experimental conditions for Theophylline migration in Cyano Pentoxy etch modified capillary: L = 33.4 cm; I = 24.9 cm; injection 3 sec at 50 mbar; i.d. = 50 μm; detection wavelength = 270 nm.

Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
<u>86.16</u>	0.11	7.36	11.96	and the second sec	2.14
OU. 1 (V.11		11.30	0	CONTRACTOR AND
1984	0.19	10.04	139	10	2.14
1984	0.19	10.04	and a second	COMPANY AND A	2.14
2890	0.19		130	10	2.14
		18.47	86	20	2.14
1653	0.39	18.46	48.56	20	2.14
1859	0.53	30.53	40.51	30	2.14
414	0.86	34.48	55.94	30	2.14
		สมหัสมระดังแล้วสารการการการการการการการการการการการการกา		40	2.14
				40	2.14
			1000-11-0-12-000-11-000-11-000-11-000-11-00-11-00-11-00-11-00-11-00-11-00-11-00-11-00-11-00-11-00-11-00-11-00-	50	2.14
				50	2.14
Area (mAU.sec	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
6050	0.36	36.27	201	0	3
6882	0.33	15.46	302	0	3
1948.2048 - 4		1999-1997 - Tanan Barran, 1997 - Tanahar Barran, 1997 - Barran Barra, 1997 - Barran Barra, 1997 - Barran Barra		10	3
งการกำนับสายสาขาง ๆ การสาขาง การสาขารสาขาง กำเหง ครองสาขาง -	nan maraka ina mana mana pana mana mana mana mana ma		******	10	3
4239	0.17	5.82	375	20	3
455	0.17	6.33	383	20	3
490	0.2	7.38	368	30	3
455(0.19	7.32	366	30	3
9783	0.42	15.62	326	40	- Š
1013(0.41	14.98	375	40	3
				50	3
			-	50	3
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec	(min)	Time (min)	(mAU)	(%)	
111140.000				0	pH
and a solid for a subsequence of the solid and solid and the solid solid solid solid solid solid solid solid so			an mana ang kana akan di kadi kana di kana kana kana kana kana kana kana kan	ananoran provident and a state state and	4.41
2.94	0.018	0.04	2.00	0	4.41
n station and a state end of the second state and the state of the state of the state of the state of the state	CONTRACTOR OF THE OWNER	2.81	3.28	10	4.41
3.82	0.02	3.05	3.63	10	4.41
2.94	0.013	3.46	3.03	20	4.41
2.7	0.018	3.13	3.36	20	4.41
	۲۰۰۰ ۲۵۰۰ ۲۵۰۰ ۲۵۰۰ ۲۵۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰	D D I I D - I D - I D - D - D - D -	** + + + + + + + + + + + + + + + + + +	30	4.41
م به او می وی	10110100000000000000000000000000000000	anarangan sarasan wan masar an amar makudi u miniminin 2 Ma 2		30	4.41
3332	0.16	4.84	322	40	4.41
357	0.16	4.89	327	40	4.41
623	0.21	12.75	465	50	4.41
656	0.21	12.52	469	50	4.41

Table 7. Theophylline Migration in Cyano Pentoxy Capillary (-25 kV)

and the second second second second

pH	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
7.06	0	an martin ann an an ann an an ann an ann an ann an a	ana metana interpreta da international de anter participan de la participan de la participan de la participan d		anda dan Melandi dalamin terta ora ati balin inalamindi da
7.06	0		naadaankan ar oo kasaadaan karada Constituti oo saadaan daaraa daa	rrestors No envolopistinte a restantadion in segalar juvilare dan	na Maretan, Alderijak Andreaki, provađan u Hanika († - 16. sje l.). na postan u sveto 200
7.06	10		an para ang ang ang ang ang ang ang ang ang an	o ing kanangkan di k	zelande mindelazo dilizio di sedenziale e los e
7.06	10		ar		fefdenninkterfördet Skindele närdadet vidadin Binlannah det er for normandrada
7.06	20	in dan balan karan manan kara manan kara kara kara kara kara kara kara	ananyang manang kang pang pang pang pang pang pang pang p		n 1996 harden meder Star vita har frankriken fan de frankriken fan de frankriken.
7.06	20				an a
7.06	30		- 1992 (1992) - Frankry (1992) - 1994 (1993) - 1994 (1994) - 1995 (1994) - 1995 (1994) - 1995 (1994) - 1995 (19		
7.06	30				
7.06	40				
7.06	40	a monta de restant de la manda de la fasta de la defensión de la defensión de la defensión de la defensión de l	istenistenisti openalisi sen nigeregi i openalitetasjon filominiki produktor	*********	erdetstöndintyttarförnantiskaldelissiftidistigarportförstönsing i sig
7.06	50	adi 1999 yang dali sina bernan da da pampi na panangan sa pang mang mang pang pang pang pang pang pang pang p	naman nar-harn sini mangani yanan kanahan katon maino ina jini ina sini ini ini ina sini angan kana kana kana k	Allina (seri-add).Marini Marine (di Vallari Astro-ada fanaling andara)	ridd i'r hydd yn y fan ddol fad ywraf an i byle. M yng i ornef ymd yn yng yr
7.06	50	๛๚๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	980-0-09 mproved a Salar S 1994 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	4449949749749749749749749749749749749749	a direction of the second s
pH	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
8.14	0				anno alanna anna anna an an an an an an an an a
8.14	0	****		******	
8.14	10	7.58	1.59	0.032	19.33
8.14	10		an a se an		0-20-20-000000000000000000000000000000
8.14	20				ŊĊĊġ <mark>ġĿĬĊĬĊĊ</mark> ŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎ
8.14	20	~~~~~	anaan maana dharaan dharaan ah adda go ar ahaan dharaan dharaan dharaan dharaan dharaan dharaan dharaan dharaan	Maffectarilletine - Million	-UMANJARAN LUMBER ALCOMPTIQUE AND
8.14	30				
8.14	30	Lan - Marketin and a same a same a		an na sana na s Na sana na sana n	anna - a na marana - a na marana - a na marana a na marana ana marana ana marana ana marana ana marana ana mara
8.14	40	****		******	ĸġĸĸĬijĸġśĸĸĔĸ ^ĸ ĸĔĸĊĸĊĊŎĸĸĬĔĊĊĬĿĿĬĸġĨĊĸĸġŎĸŢĬĊĬĸĸġĸĊġĊĊŢŎŎŢ
8.14	40				
8.14	50				5
8.14	50	***************************************			
8.14	50				

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- Experimental conditions for Theophylline migration in Cyano Pentoxy etch modified capillary: L = 33.4 cm; I = 24.9 cm; injection 3 sec at 50 mbar; i.d. = 50 μm; detection wavelength = 270 nm.

Area (mAU.sec)	Width	Migration Time (min)	Peak Height	Methanol (%)	~4
	(min)		(mAU)	เหตุการสถางออกจะออกเหตุกอง จ้างการหลังการส	pH
3751	0.31	30.88	174.88	0	2.14
4029	0.307	29.77	192.7	0	2.14
1979-1979-1994 - 1974 - 1976 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 19				10	2.14
al an far an	() 10 (10 ⁻¹ 10 ⁻¹) - 10 ⁻¹ 1		4+++1*++++2*+1*+1*+1*+1*+1*+1*+1*+1*+1*+1*+1*+1*+1*	10	2.14
	22473325824556666666661 ¹⁰ 5575687656666		af veð við falfar fan dalaff földir menn Flanaf blað fvar við af fra falst för vald fölg veðir földi andir fra	20	2.14
				20	2.14
*****		and the start of the		30	2.14
				30	2.14
6013.55	0.37	39.56	194.66	40	2.14
6012.77	0.36	39.54	192.46	40	2.14
2.32	0.55	42.62	491.33	50	2.14
1,91	0,54	40.15	461.61	50	2.14
Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
430.98	0.16	21.81	38.74	0	3
321.53	0.10	21.01	29.88	0	3
	V.IV		20.00	10	3
		*****	******	10	
Men ililapitisme providation patrice in a statement of the optical	nada ja ozgoli konstana i od na			ne se a la companya da a la companya da a companya da companya da companya da companya da companya da companya	3
na na an a	analansiasti ashida kashasati shida filasatini (ali ili) inco ishkilipata (dha		1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	20	3
n let n fanden fan nader et hierdûnaled hen niedenale i er kreisele kindlefe	ereddalaet op o galwyr o galwyf y yr yn ffonoldae alloffer i maai fero			20	3
*****				30	
arnia yana da kana martika kan'ara yana - ta'akir uniar - unionan at'a				30	3
a na mana ana ang kana ang ka				40	3
	0.04	AL TE		40	3
1019.9	0.24	31.75	58.02	50	3
907.3	0.23	30.95	55.42	50	3
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mĂU)	(%)	pH
867	0.13	9.5	103	0	4.41
739	0.13	9.46	97.841	Ő	4.41
nurana ayan katan kat	and the second	······		10	4.41
0.01 C 1888 - 1870 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 - 1970 -		angan menangan menangan kerakan dalah dalah dari bahan dara di Manadara dari Manadara dari Manadar dari Manada	********	10	4.41
186	0.15	18.61	16.78	20	4.41
234	0.15	18.14	20.95	20	4.41
20- 439	0.17	24.38	20.95	20 30	The sub-standard and the sub-standa
CONTRACTOR CON	EN ANTEREN MELANA ANTERE PROPERTY AND ANTERPROPERTY AND A DECEMPTOR AND A DECEMPTO A DECEMPTOR AND A DECEMPTOR	24.30	כיויין אוראיז איז איז איז איז איז איז איז איז איז	1997 1997 1977 1978 1979 1979 1979 1979	4.41
409	0.2	NAMES OF THE OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNE	24.75	30	4,41
801	0.27	30.08	34.71	40	4.41
772	0.27	30.2	33.38	40	4.41
1098	0.26	34.13	52.25	50	4.41
888	0.21	34.84	49.97	50	4.41

Table 8. Dihyroxy-theophylline Migration in Bare Silica Capillary (+25 kV)

Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mÃU)	(%)	pH
52.03	0.048	9.33	16.49	0	7.06
1990 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 	n teo kuti nga gangan gang teo teo kuti ni kuti	analannin mahananin yana ana ang ng naga ya naga ya naga yana ang naga yana ang naga yang naga yang naga yang n		0	7.06
		n a senangang ngan kang kurangan dan kang nga na kang dalam kang dalam kang dalam kang dalam kang dalam kang d	2009-2019-20-2019-2019-2019-2019-2019-20	10	7.06
				10	7.06
203	0.09	11.49	29.76	20	7.06
202	0.08	11.5	29.35	20	7.06
				30	7.06
				30	7.06
484	0.11	15.06	62.37	40	7.06
474	0.109	14.99	61.62	40	7.06
1677	0.24	19.8	92.19	50	7.06
1676	0.23	19.81	92.19	500	7.06
Area	Width	Migration	Peak Height	Methanol	1917 PORTO - 1919 PO
(mAU.sec)	(min)	Time (min)	(mÁU)	(%)	pH
245	0.08	6.9	46.57	0	8.14
239	0.074	**************************************	46.64	0	8.14
		nan Marana na manana manana mana mana mana ma	n-an in-an an a	10	8.14
9999-2019 9999 9999 9999 999 999 999 999 999 9		na a sua na mana na man Ina mana na mana	9.995.9159.9159.629.9199.829.929.929.929.929.929.929.929.929.9	10	8.14
259	0.07	7.73	52.43	20	8.14
266	0.05	7.99	61.38	20	8.14
321	0.07	8.99	60.83	30	8.14
JZ 1	1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2	entering of the second s			COLORDON CONTRACTOR OF THE OWNER
343	0.08	8.81	59.62	30	8.14
and a manufacture of the second s	0.08	8.81	<u>59.62</u> 52.49	<u> </u>	8.14
343			water construction and the construction of the second second second second second second second second second s	nna an anna an an an ann an ann an an an	8.14
343 922	0.25	16.02	52.49	40	CONTRACTOR OF A DESCRIPTION OF A DESCRIP

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Dihydroxy-Theophylline migration in B are Silica capillary: L = 58.2 cm; I = 48.6 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 270 nm.

Width	Migration	Peak Height	Methanol	
(min)	Time (min)	(mAU)	(%)	pH
na na mana ang ang ang ang ang ang ang ang ang	nener er er en	anun ammun an maran gun a manin ar ang burgha	0	2.14
			0	2.14
in an on an Brand on the States and States an	2000-2007 Contraction Contraction Contraction Contraction Contraction Contraction Contraction Contraction Contra	Vill 1996 Martin (VIII) A VIII A V	10	2.14
1993 B. 1996 B. 1997 B	an a	na ina mangalan sa mpalan ing ing kana di sana ing ang ang ang	10	2.14
	a allandi da antina da baran da baran da aya karandi di bada da bada a antina da baran da baran da baran da ba			2.14
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	anaannaa ahaan ahaan ahaan ahaan ahaa ah		and the second	2.14
			and the second descent of the second data was been as the second data and the second data as the second data as	2.14
		1927 - 122 FUTTUR 1864 - 2007 TOL - 200	and a region of a real manufacture grant descent the first of the real state of the second state of the second	2.14
*******	-2.5-2.5-2.5-2.5-2.5-2.5-2.5-2.5-2.5-2.5	1/1864/5908011/1 484/8001-040/11/104807400/11/018-400/11/18/80/800804/	Scitzer feis (escit eine sin einfranzeiten einen stehen betreben die bestehen die bestehen die bestehen die bes	2.14
	***************************************	Rear approximation had see and state and a second	and a terrary many many and a company of the contract of the second of the	2.14
an 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 19 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1	alla Mandalarin manga palan mengenerakan dari persekan dari pertakan dari pertakan dari persekan dari persekan	1992 - 1996 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	and a second	2.14
		a Shiru na Malanka a Malanka ing kanang k		2.14
An 1997 - Anna a' faile à rian a rèis mais des 1999 - 1999 - 1999	ander 1990 - 1990 - 1990 and 1	1994 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -		6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Width	Minration	Peak Heinht	Mothanol	
	Timo (min)			pН
<u>viiiiv</u>				
	00000-001 (1949-02-02)-0100-0101-010-010-0-0-0-0-0021-00-0-0222-010 10-00-22	64 - 1944 1959 1964 1964 1964 1966 1966 1967 1967 1967 1967 1967 1967		3
				3
		18,884,984,949,987,987,997,997,997,997,997,997,997,99	we want a second and a second	<u> </u>
		ar 144 alf ar 15 1501 in 16 1500 an faille an faille an faile an		3
	1999 - Sanadan Say Californi (1995) an direct fan Britan a sana (1976) - 1997) a se an an an an an an an an an	an a		3
	1994 (1920 - 1949 - 19 Jawa Angelo 1970 - 19 (19 (19 (19 (19 (19 (19 (19 (19 (19	en lånder med om refn. Da ut former i halte til støde som forste i forså afore var dynasiska ut forsø	an a	3
	· (1) Parties and a set of the particular state of the particular set of	800 001 000 000 000 000 000 000 000 000	CONTRACTOR OF CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR	3
				3
			CONTRACTOR OF THE OWNER OWNER OF THE OWNER O	3
ALL & B. B. B. M. B. B. M. B. M. S. M.	MI-161404-01-9819-14140-48548-0-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-			3
				3
	******		50	3
1				
(min)	Time (min)	(mAU)		pH
		*****	and a standard and an a standard standard and a standard standard standard standard standards and a s	4.41
			and a second	4.41
				4.41
	ar weeks a standard weeks with an international to be the weeks to a base of the first output to			4.41
				4.41
			20	4.41
			30	4.41
299822229-4-4-8262329-9-111-2-4269227-9994-948	**************************************	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	30	4.41
	₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩	8 8 4 4 4 5 5 5 6 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7	40	4.41
		***************************************	40	4.41
al han refer a land an	ŢĸĸĊŶŦŦĊŎŢŦĸĊŎŢŎŎŎŎĬŎŎŎĸĸĸŎĸĊĸŎŎŎĸŎŢŎĸŎŎĸŎŢŎĸŎŎŎĬŎŢŎŎĸŎŎŎŎĬŎŎŎŎŎŎŎŎŎŎ	la de la contra de l	50	4,41
			50	4,41
	1	Time (min) (min) Migration Width Time (min) (min) Migration Width Time (min) Width Width Width Wigration Width Wigration Width Wigration Width	(mAU) Time (min) (min) Peak Height (mAU) Migration Time (min) Width (min) Peak Height Migration Migration Width Peak Height Migration Width Width Migration Width Width Migration Width	(%) (mAU) Time (min) (min) 0

Table 9. Dihyroxy-theophylline Migration in Bare Silica Capillary (-25 kV)

pH	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
7.06	0	เพลางของสร้างส่วนของสามสามาร์สมาร์สารสารสารสารสารสารสารสาร	มาแล้งของสาวที่หนึ่งไม่หนึ่งที่มีการการการการการการการการการการการการการก	การสาวสาวการของสาวการสมุทราชสมุทราชสมุทราช	มากรรมการให้สมสาขาวงานสามาณกับสรรมสาขามสาขางที่ได้
7.06	0	neuronai anno anno anno anno anno anno anno	n garaitean ina an a	an a	***************************************
7.06	10	nan an	n a na ini na	an na haran ya ku na ku na ku	andernaan metalen operanter versien en e
7.06	10	PRESENTATION OF A DESCRIPTION OF A DESCRIPT	n yang bahar kanala da kananan dan yan kanya mang persang dilakan da kanan menangkan kanya kanya kanya kanya ka		sensitati sekan di sekana di sema pada da sekan se
7.06	20		alan na kana kana kana kana kana kana ka	มาก กระบาทสุขภาพันธุรรมสามารถสามารถสามารถสามารถสามารถสามารถ	n o 1997 - Generald State Gallin Grander (1997 - 1994) (1997 - 1997)
7.06	20	AAT WATER IN THE INTERNATION OF THE PARTY OF THE ATTACK STRUCTURE ATTACK ST	ann an		
7.06	30	an a she a dharan dha chun ba na dha ba chun ba chun ba tha she			
7.06	30				
7.06	40				
7.06	40				
7.06	50			And South a	
7.06	50				
		Peak			
	B.B	Listand	AAI manage di man	1051.441	
	- Methanol	neight	wigration	vviatn	Area
pH	Methanol (%)	Height (mAU)	Migration Time (min)	Width (min)	
<mark>рН</mark> 8.14				1	
	(%)			1	
8.14	(%) 0			1	
8.14 8.14	(%) 0 0			1	
8.14 8.14 8.14	(%) 0 0 10			1 1 1	
8.14 8.14 8.14 8.14 8.14	(%) 0 0 10 10			1 1 1	
8.14 8.14 8.14 8.14 8.14 8.14	(%) 0 0 10 10 20			1 1 1	
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	(%) 0 0 10 10 20 20			1 1 1	
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	(%) 0 10 10 20 20 30			1 1 1	
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	(%) 0 10 10 20 20 30 30			1 1 1	
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	(%) 0 0 10 10 20 20 30 30 30 40			1 1 1	Area (mAU.sec)

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Dihydroxy-Theophylline migration in B are Silica capillary: L = 58.2 cm; I = 48.6 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 270 nm.

рН	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
		anne a suite an anna an a			(IIIMO.Sec)
2.14	0	ana ang mangkana ang miningkan di miningkana ng miningkana ng mangkana ng mangkana ng mangkana ng mangkana ng m			(สาวจากราย)(()กลากการการการการการการการการการการการการกา
2.14	0	an fan fan skrien fan fan fan fan fan fan fan fan fan fa	1977 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -		
2.14	10		anan malamatan ang kanan mananan mananan kanan kana		
2.14	10	ยากจาก แก่การเหตุการและ เกิดการเหตุการการการการการการการการการการการการการก			1/2 i d∎to fetto fetto fetto attendo terro do constructo attendo terro do constructo do co
2.14	20	สระบาที ในสระบบและเหตุ สวระการทำสาราช เป็นสระบัง และสระบบและได้เป็นสร้างส่ง		1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 199	######################################
2.14	20	ananayatanan kasana kegintata ana ino yakata angintarita sa kina ai nata moroby doma		n mennen sin mennen mennen sin mennen sin serier sin serier sin sin serier sin sin sin sin sin sin sin sin sin	in menerikan serien serien dari kana dari menerikan serien serien serien serien serien serien serien serien se
2.14	30	2444444444444777445424777777484326777788472677788472677576745267777	192779,932779,02299,04000,050,000,000,000,000,000,000,000,0	and a subscription of the state	กษณะเป็นไปไปเป็นเป็นเป็นเป็นเป็นเป็นเป็นเป็นเป็นเป็
2.14	30			NADA-MANDONING CONTRACTION OF THE CONTRACT OF A STREET	
2.14	40			1994 - 1999 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	
2.14	40				
2.14	50			. 1999 1999 1999 1999 1999 1999 1999 19	
2.14	50	an a' an an an a' an	1979) W. M.	ne Mang Mang Long and a start of a	สราวรับประกาศที่สารระบบสระบาทการและสราชสระบาทสร้างกา
pH	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
3	0	19.57	33.56	0.27	446
3	Ō	21.17	38.31	0.36	662
3	10		ana ana ana amin'ny faritan'i Andrew ana ana ana ana ana ana ana ana ana an		
3	10		ala ya		
3	20	алыс акала та откольтатата чакік малінатізанна.	1944 - 1974 - 1974 - 1974 - 1974 - 1974 - 1974 - 1974 - 1974 - 1974 - 1974 - 1974 - 1974 - 1974 - 1974 - 1974 -		ann an Straight agus an Sanda an Sanda
3	20		anda laka afa dan sahara manyingki dari di katalar (si katalar (si katalar)	******	******
3	30				
3	30				###1#7;=====;###########################
3	40				an raw nang mananakan pangkabawa si kinin dadi wasari walan kawa na m
3	40		an a		
3	50		***********		****
3	50				
<u> </u>					
рН	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
4.41	0				
4.41	0				
4.41	10				
4.41	10				
4.41	20	na ya mananan dalama waka manana waka waka kibuda sekita na kata kibin kita kata na kata kata kata kata kata k			
4.41	20	an a			
4.41	30	\$	8.65 @ 254nm	a fefere netter opperationen alle er det sign for de la fefere de la ferencia de la ferencia de la ferencia de	\$1999 \$1997 \$1999 \$1999 \$1999 \$1999 \$1999 \$1999 \$1999 \$1999 \$1999 \$1999 \$1999 \$1999 \$1999 \$1999 \$1999 \$1999 \$1
4.41	30	ĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸ	8.92 @ 254nm		n da kanal manakati seta kemban kemban da kana kana kana kana kana kana kana
4.41	40	anna mainn ann ann ann ann ann ann ann ann ann	en norman fra mir an differ fa gollo da antina magazaren era	2 1 1 1 1 1 1 1	
4,41	40	a na			n o p opulación contracto a para con contracto de la contracto de la contracto. -
4.41			an a	********	ater por yo (Basilyoo Tyjalai dayla Bello ta Palanda ata di Unita na
4.41	50			900-000-000000000000000000000000000000	รูญรูเสารผู้(การปกิจจาก (การระบรรรมสายสายสายสายสายสาย -
• +.				andana ana mpina mpina pana ang mpina ina ang mpina ina ang mpina ina mpina ina mpina mpina ina mpina ina ina m	ingenering and an and a state of the second state of the

Table 10. Dihyroxy-theophylline Migration in C-18 Capillary (+25 kV)

a ga na an	Methanol	Peak Height	Migration	Width	Area
Hq	(%)	(mĂU)	Time (min)	(min)	(mAU.sec)
7.06	0	83.95	7.54	0.11	628
7.06	0	91.06	7.69	0.11	709
7.06	10		1999 (1999 - 1999 - 1997 (1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1 1997 (1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1	an a	SERVICE FILLE AND AND AND AND AND AND AND AND AND AND
7.06	10	an a	9 004-00-04870070'0-05-070-07-0-07044'0-182007-0-0-0-05000820'00''		
7.06	20	102	14.35	0.27	2082
7.06	20	107	10.86	0.28	2099
7.06	30	140	11.84	0.33	3473
7.06	30	151	12.47	0.35	3891
7.06	40	474	34.47	0.4	12154
7.06	40	25.44	16.24	0.57	1247
7.06	50	2.2	27.93	0.33	65.07
7.06	50	1.89	28.35	0.33	53.67
water and the merit strategy and the second strategy and t		1. 19 Martin Martin State S	anna mantana matana matana matana ana matana ana ana	1	
1	REAL AND A ST	Donk Unioht I	Blingenting	IAFE NOT	Area
	Methanol	Peak Height	Migration	Width	
рН	wethanol (%)	(mAU)	Time (min)	<u>(min)</u>	(mAU.sec)
pH 8.14	1			(min) 0.14	(mAU.sec) 615
	(%)	(mÁU)	Time (min)	<u>(min)</u>	(mAU.sec)
8.14	(%) 0	(mÁU) 60.13	Time (min) 5.89	(min) 0.14	(mAU.sec) 615
8.14 8.14	(%) 0 0	(mÁU) 60.13	Time (min) 5.89 5.84	(min) 0.14 0.14	(mAU.sec) 615 799
8.14 8.14 8.14	(%) 0 0 10	(mÁU) 60.13	Time (min) 5.89 5.84 8.46	(min) 0.14 0.14 0.17	(mAU.sec) 615 799 1125
8.14 8.14 8.14 8.14 8.14	(%) 0 0 10 10	(mAU) 60.13 80.28	Time (min) 5.89 5.84	(min) 0.14 0.14	(mAU.sec) 615 799
8.14 8.14 8.14 8.14 8.14 8.14	(%) 0 0 10 10 20	(mAU) 60.13 80.28 89.27	Time (min) 5.89 5.84 8.46	(min) 0.14 0.14 0.17 0.17 0.22	(mAU.sec) 615 799 1125
8.14 8.14 8.14 8.14 8.14 8.14 8.14	(%) 0 0 10 10 20 20	(mAU) 60.13 80.28 89.27 89.78	Time (min) 5.89 5.84 8.46 8.59 8.27 8.4	(min) 0.14 0.14 0.17 0.17	(mAU.sec) 615 799 1125 1165
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	(%) 0 0 10 10 20 20 30	(mAU) 60.13 80.28 89.27 89.78 96.89	Time (min) 5.89 5.84 8.46 8.59 8.27	(min) 0.14 0.14 0.17 0.17 0.22	(mAU.sec) 615 799 <u>1125</u> 1165 1527
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	(%) 0 0 10 10 20 20 30 30	(mAU) 60.13 80.28 89.27 89.78 96.89 97.97	Time (min) 5.89 5.84 8.46 8.59 8.27 8.4	(min) 0.14 0.14 0.17 0.17 0.22 0.23	(mAU.sec) 615 799 1125 1165 1527 1602
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	(%) 0 10 10 10 20 20 30 30 30	(mAU) 60.13 80.28 89.27 89.78 96.89 97.97 230	Time (min) 5.89 5.84 8.46 8.59 8.27 8.4 11.97	(min) 0.14 0.14 0.17 0.17 0.22 0.23 0.19	(mAU.sec) 615 799 1125 1165 1527 1602 2827
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	(%) 0 0 10 10 20 20 20 30 30 40 40	(mAU) 60.13 80.28 89.27 89.78 96.89 97.97 230 287.2	Time (min) 5.89 5.84 8.46 8.59 8.27 8.4 11.97 10.61	(min) 0.14 0.14 0.17 0.17 0.22 0.23 0.19 0.17	(mAU.sec) 615 799 1125 1165 1527 1602 2827 4087

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- Experimental conditions for Dihydroxy-Theophylline migration in C-18 etch modified capillary: L = 50 cm; I = 41.5 cm; injection 3 sec at 50 mbar; i.d. = 50 μm; detection wavelength = 270 nm.

Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mAU)	(%)	pH
ndalan kerden dagan kanan kerden distriktion manun di ku prodom unter a		en e	alla fallfilla, ana sina si ana si ana si ana ana ana ana ana ana ana ana ana an	0	2.14
and of a state of a state and a state of a st		699 / 149 / 1999 / 1999 / 1999 / 1999 / 1999 / 1999 / 1999 / 1999 / 1999 / 1999 / 1999 / 1999 / 1999 / 1999 / 1	A 66 A 66 A 1999 A 1	0	2.14
4944				10	2.14
				10	2.14
				20	2.14
				20	2.14
		an 1974 a tha ann an 1976 a		30	2.14
				30	2.14
				40	2.14
				40	2.14
				50	2.14
ndirinde der fan indistriktion de meriden fan in de seren	19. a.	ĸŦĨĨĊĹĴĬĔŢĸĸĨĨĔŦŦĨŎŦŦŶŎŔĹŒĿĸĿĊĬŎĿĬĬĬĔŎĹĬĬĸĸŶĬŎŔĿŒĊĬĬĬĬŎŦŎĊŎĬĬŎŎĸŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎ		50	2.14
serA	Width	Migration	Peak Height	Methanol	water particular and the constraint of the second
(mAU.sec	(min)	Time (min)	(mAU)	(%)	рН
• • • • • • • • • • • • • • • • • • •			1 (1.5.1) TO	0	3
	2011 19 19 19 19 19 19 19 19 19 19 19 19 1			0	3
Strend Statistical and two water in and the interior and a state of the state of the state of the state of the				10	3
		*********	22-10-10-10-10-10-10-10-10-10-10-10-10-10-	10	3
na Briddi Merry Banur (B. 2000) alife alife al mode y sura y sura y serverage a		1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -		20	3
daratel di Gubbi mellumunanda kunansu dangi pipupa du menunung			210-11220-12221-1222-120-200-100-100-100	20	3
14 (1921) - Marson Marson (1911) - Marson Marson (1911)	19 14 49 10 10 10 10 10 10 10 10 10 10 10 10 10			30	3
				30	3
๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	and a state of the	in an	alanan waara maa maa maa maa maa maa maa maa maa	<u> </u>	3
				40	3
an di kanggang menungkan dan di kanggan di ka	1 19 1 1 1 1 1 1		**************************************	50	3
	1			50	3
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mĂU)	(%)	pH
an a				0	4.41
\$257.577.777.4580.) #87743.57744753874749753444	lan ar feiliach a' feilinn fairlich a' an Anna a' an Ann	n on a set card for a set of a		0	4.41
and a first of the second s	ner manger i niel in feinigen eine Grindenisten selfen sin selfen ist met die Verlagen w			10	4.41
n, 1922, 922 × 203 − 202 − 204 × 4 − 4 − 4 − 4 − 4 − 4 − 4 − 4 − 4 −	an de antines en en al de la desendaria de la desta de la desenda de la desenda de la desenda de la d	an tanan kana kana kana kana kana kana k		10	4.41
hadar na Frai Talain (na Frai Insis) na maistean tai na Sina an Anna Anna Anna Anna Anna Anna Ann	traan orgi najaroon naainaa kienia sia hisein for kienni mii hisi nisaa hali a	740 Martin 1996 1995 1995 1997 1997 1997 1997 1997 1997	n de la presentación de la presenta I	20	4.41
9469477179889-97931494-75-97-97-97-97-97-97-97-97-97-97-97-97-97-	n en M (1999) Aldust- 2: 27: 23: 33: 72: 11: 22: 12: 27: 72: 29: 22: 27: 72: 29: 20: 27: 72: 29: 20: 20: 27: 72	C. / Mananalarintationalisti Operato Mello ana ungrum ang rumangan Mananalarintationalisti Operato Mello ana ungrum ang rumangan ang sa		20	4.41
ĸĸĸĸŦŢĸŦĊĸĊĸĊĸĊĸĊĊĊŦŦŦĊĸĸĸĸŦĸĸŦĸĸŦĸĸŦĸĸŦĸĸŦĸĸŎĸĊĊĊŎŀĸĊġŎĊġŀĸġĿŎĬĬ	n Beylanis e vinit far un via d'anatoli fan dia franda franda frank di dri p	eneralistika energia energia en anti-		30	4.41
LL COM LECTION OF MICHAELEN ALEMAN ALEMAN ALEMAN ALEMAN ALEMAN ALEMAN	nyy ny y nazi ana sina kao ana 100 maini 1444 piai tanàna dia mani	· · · · · · · · · · · · · · · · · · ·	a a way a sa a sa a sa a sa a sa a sa a	30	4.41
an na marana an		**************************************	and a monthly find a superior of the second s	40	4.41
ni na ninakarang dari na milangka kalang na milangka kana kana kana kana kana kana kana	- 1999 (1999) (1999 (1999 (1999 (1999 (1999 (1999 (1999 (1999 (1999 (1999 (1999 (1999 (1999 (1999	รองวิวิริราช (การครามสาวอย่าง เมือง การคราม การครามสาวาน (การคราม การครามสาวาน) 		40	4.41
	875000 (87508) (8750) (8750) (8750) (8750) (8750) (8750) (8750) (8750)	arte nan eftersonetist augenspeattet view yrterlegtis er at Artak Makador (dansk dar (dansk sad 1960))	an a na an	50	4,41

Table 11. Dihyroxy-theophylline Migration in C-18 Capillary (-25 kV)

7.06 1 7.06 1 7.06 1 7.06 2 7.06 2 7.06 2		(mAU)		<u>(min)</u>	
7.06 1 7.06 1 7.06 1 7.06 2 7.06 2 7.06 2			an	9.5.19.19.20.4.19.20.4.19.20.19.20.20.20.20.20.20.20.20.20.20.20.20.20.	สมารถุงสมารถ การกำรงการการการการการการการการการการการการการก
7.06 1 7.06 1 7.06 2 7.06 2 7.06 2)		₽₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩		PRATEROVERUM GAR ORDONUSTRICKIC CALIFORNAL, CLONAR COM NAMERICA CALIFORNIA (SA ORDONUSTRICKIC CALIFORNAL), CLONAR COM NAMERICA (SA ORDONUSTRICKIC CALIFORNIA), CLONAR COM NAMERICA (SA ORDONUSTRICKIC), CLONAR COM NAMERICA (SA ORDONUSTRICK
7.06 1 7.06 2 7.06 2)		89584 •••4947948*482547756977867879877634-8••498847464 ••4968 8554•4566•4576978256433845877626+4268447955+(72)17-8-754-64		NOVEMBELT STORED AND STORE AND STOLEN TO STORE AND
7.06 2 7.06 2)	ana managana mana managana da kata kata kata kata kata kata kata	n a a an a	1	
7.06	111111000 CONTRACTOR CONT	PROFESSION CONTRACTOR AND			
			ĸĠĿŔŴĸŔĸĸŔĸĔĊſŎĿĿĊŎŎĿĊŎŎĿĊŎŎĿĊŢĊĊŎŎĸŎŢŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎ		
		100-110-11-11-12/2010-1-11-11-1-1-1-1-1-1-1-1-1-1-1-1-1-1			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
7.06 3	and an approximation of the second statement of		MARTIN STANDART AND AND AN AN AN AND AN AND AND AND AND		
7.06	And the Automation of the Automation of the	n - marine and a state of a state of the state	81.0.500 (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997)		i na Manhara na Manifa na na matana ang kanana na na na na na na na matana ina ina na matana ina ina matana ina ina
7.06	and the second		RUMURT IN THE REPORT OF A DESCRIPTION OF A		
7.06	A CONTRACTOR OF A CONTRACT OF A CONTRACT OF	*****	The alternation and the state of the state o		
7.06 5	ineravar costs a removario-desendrivity-more	anananan ananana ang ang ang ang ang ang			havan an a
	d na po na		an a		25655675567567567567666766976 -7777575767777777
Methanc	I Peak	Height	Migration	Width	Area
pH (%		(mAU)	Time (min)	(min)	(mAU.sec)
Service results in a state of the service of the se)		na na manana ang kang kang kang kang kang kang		
	j l		ana ina ana ana ana ana ana ana ana ana	**************************************	
	and a second second second	1799 August - 1999 August -			7/11/2012/01/2012/01/2012/01/2012/01/2012/01/2012/01/2012/01/2012/02/2012/02/2012/02/2012/2012/2012/2012/2012/
	Survey and the second sec			- Baller & TBallegary, Ballergard (2000)	9779-779-9770-7877-98-98-98-98-98-98-98-98-98-98-98-98-98-
	more contraction of a contraction of the contractio	-Original Contraction of Association - Supposition			
				er(1984)-9268950007617689994-929693668995-9369969696969696969	aagaanaa ah ka ah ka
	contractive and an approximation to the province of the	2.2	8.65	0.15	28.17
			2009-2019 - 2019-2019-2019-2019-2019-2019-2019-2019-	Construction of the	anaanaan ahayaan ahaan ahaa A
	and the second		900-10		
	CONTRACTOR CONTRACTOR OF THE OWNER OWNER OWNER	Ale a la construction de la constru	an an ann an Alain an Alain an Alainneacha an Alainne an Alainne an Alainne an Alainne an Alainne an Alainne a		
	and the second s	2.44	2.37	0.086	15.61
			in a second second territory and the literate a second second second second second second second second second	0.075	10.96
8.14 5	- f				######################################
$\begin{array}{c cccccc} 6.14 \\ \hline 8.14 \\ \hline 1 \\ \hline 8.14 \\ \hline 2 \\ 8.14 \\ \hline 2 \\ 8.14 \\ \hline 2 \\ 8.14 \\ \hline 3 \\ 8.14 \\ \hline 3 \\ 8.14 \\ \hline 4 \\ 8.14 \\ \hline 8.14 \\ \hline 5 \\ \end{array}$	D D D D D D D D D D D D D D D D D D D	2.2 2.44 2.01	8.65 2.37 2.25	0.15 0.086 0.075	28.17 15.61 10.96

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Dihydroxy-Theophylline migration in C-18 etch modified capillary: L = 50 cm; I = 41.5 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 270 nm.

Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	рН
(11170.200)			an waa waa waa waa waa waa waa waa waa w	0	2.14
1941 1947 19 19 19 19 19 19 19 19 19 19 19 19 19	allin fei eigelik an ei eine an aile an the statement of the sa		*****	สมระทรงการสมและการการการการการการการการการการการการการก	
an Manuaranan di manandari da garan da karan da karan da manan		BB in construction is a lightly official of the second state of the se		0	2.14
1. 1874 27 20 - 9 20 20 4 7 20 12 20 20 20 20 20 20 20 20 20 20 20 20 20				10	2.14
		an a		10	2.14
999 - Contra Martina - Martina 1999 - Contra Martina - Martina	a	มนากการของแขนประเทศเหตุการของ และ (มสมาคร.จายายายาศ สครอาทีเมืองโดกคากกัดการการการการการ	20	2.14
			an de la contraction de la contraction La contraction de la c	20	2.14
na na mana ang kana a		and the second secon	a na ana ana ana ana ana ana ana ana an	30	2.14
Naroliaetherneter allefariethicker filder filden filden eine state				30	2.14
ware and the synthesis of the Sold TD Middle of Sources				40	2.14
		เพราะของสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถสามารถส		40	2.14
ארייייטער מערער אין אינער אין	ngelite en	ana ana ang ang ang ang ang ang ang ang	ากเกิดสารกระการระบาติเกิดเป็นหนึ่งจะกระกัดกัดสารกระบาติสารกร	50	2.14
	and an agreement of order a constant of a strengt garder gard over point over the point of the p	11 04/2010 - 1.17 10 10 10 10 10 10 10 10 10 10 10 10 10	สามารถหน่าน เราะ อาสาสอากระหว่ามหน่าม เอาอาราจร่า	50	2.14
Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	рН
2711	0.67	12.46	46.73	0	3
781	0.35	12.51	26.19	Ō	3
**************************************				10	3
	- 11-17-114 - 11-11-11-1-1-1-1-1-1-1-1-1-1-1-1-	051 0 14910 00-0910 14 14919 14 14 14 14 14 14 14 14 14 14 14 14 14	1999-1997-1999-1999-1999-1999-1999-1999	10	3
2006-00-00-00-00-00-00-00-00-00-00-00-00-		1998 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -		20	3
			******	20	3
				30	3
149991111 8479811179811999999999999999999999999999			1984 (1986) (1997) (199	30	3
	27 Maret 1977 - Frank Saward 19	- 6 -19-19 - 19-19-19-19-19-19-19-19-19-19-19-19-19-1	1289-14-129-14-14-12-12-12-12-12-12-12-12-12-12-12-12-12-	40	3
		etter er sendet meller blin kender tod av menne i Nie dar i viser av et våer annar uppar i vers er vers kom ste		40	3
				50	3
		-3 M () M (50	3
		, na is filmen - malen - state			
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mAU)	(%)	рН
			· · · · · · · · · · · · · · · · · · ·	0	4.41
				0	4.41
				10	4.41
	1			10	4.41
······································	99999 - 1099 (* 1997), 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999			20	4.41
4/1//101148/1099-01449-01/1014-01/1014-01/009-0144-0148-014-0148-014-0148-014-0148-014-0148-014-0148-014-0148-		1999 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 1999 - 201		20	4.41
	**************************************			30	4.41
Epicepito autoplatela - aporte transmito france a languate		1944 Marine Brits Barren and Barren Brits and Annual Strain and Barren and Barren and Barren and Barren and Ba	12-12-12-12-12-12-12-12-12-12-12-12-12-1	30	4.41
				40	4.41
4884644488844448884448884448884448444444	***************************************		******	40	4,41
and any other the state of the	nija je na poslovanje pri na na pri na poslovana na poslovana poslovana poslovana poslovana poslovana poslovana			50	4,41
		i	1	- DC 1	64 64 1

Table 12. Dihyroxy-theophylline Migration in Cyano Pentoxy Capillary (+25 kV)

anneally from the first of all the second spin of the second s	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mAU)	Time (min)	(min)	(mAU.sec)
7.06	0	57.46	1.17	0.3	1495
7.06	0	196	0.78	0.16	2684
7.06	10	anna an Anna ann a contain gr-an-anna an Anna a			
7.06	10	n er en	1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -		
7.06	20	24.22	3.25	0.12	221
7.06	20	21,09	3.34	0.11	170
7.06	30		4.32		
7.06	30	37.15	4.76	0.18	551
7.06	40	54.16	4.89	0.18	772
7.06	40	34.83	5.39	0.11	287
7.06	50	52.96	6.99	0.19	681
7.06	50	17.16	8.63	0.17	226
	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mÃU)	Time (min)	(min)	(mAU.sec)
8.14	0	7.3	1.86	0.18	112
8.14	0	na in a para pangana ng mga	89-1-14-19-29-1-1-1-1-1971-1971-1971-1971-1971-	ar a dire "Alla" a sa filia da	4 199959 - 14 9 14 19 19 19 19 19 19 19 19 19 19 19 19 19
8.14	10	-Justice and real sub-set of the providence of the providence of	Sengles (1974) - da spaninkali in allina in filmale salar di standiti en recebbarati in		δο ματιπολογια της παραγοριατικής στο το τ
8.14	10		rannan an baile an si an an inn an a	99 88 - Frank Strade 1990 Frank Strade - Frank Strade Frank Strade - Frank Strade - St	den in felder Schnenzens de Alex norden de Alex Andread de Standard Alexandra de Perde
8.14	20	369	15.42	0.18	5706
8.14	20	369	15.46	0.11	3461
8.14	30	an a	n bernege en en en de en		
	00	ĸġġġĸ ĸŒĸŒŢĊŨĿĸ ĔĸĸġĸĊŎŎĬĬĬĬŢĬŎĔĹĬĸŒġĸŔĸŊĬŎĔĬĬŎĸĸĬĬĬŎĸŎĬĬĬŎĸ			anda da canda da antanggi a da arta antan mantana da arta da a
8.14	30	· · · · · · · · · · · · · · · · · · ·			
8.14	<u> </u>			an , an	
		168	37.01	0.18	2391
8.14 8.14	40	168	37.01	0.18	2391
8.14	40 40	168 	37.01	0.18	2391

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- Experimental conditions for Dihyroxy-Theophylline migration in Cyano Pentoxy etch modified capillary: L = 33.4 cm; I = 24.9 cm; injection 3 sec at 50 mbar; i.d. = 50 μm; detection wavelength = 270 nm.

рН	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
2.14	<u> </u>	169	7.19	0.14	1603
2.14	0	11.96	7.36	0.11	86.15
CARGE STREET, S	and a second	11.90	9.74	0.24	1711
2.14	10	and a second	10.47	0.24	1828
2.14	10	112	18.69	0.20	3349
2.14	20	84.34	The second se	0.47	3811
2.14	20	76.36	20.9	0.56	18.52
2.14	30	35.16	27.81	0.01	
2.14	30	1999 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -		Pitrajanaa Soojerija masemaare	
2.14	40				
2.14	40				
2.14	50	18.58	38.12	0.25	69.84
2.14	50	5.7	39.1	0.8	10.26
рН	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
3	0	102.97	11.16	0.25	2038
3	0	102.37	10.19	0.20	2025
	10	114	3.58	0.09	660
3	The second s	1 1 64	3.76	0.08	
3	10	100	contraction of the state of the	0.18	1372
3	20	108	7.63	a name in the second	1372
3	20	107	8.45	0.19	CORP. OF COMPLETE AND ADDRESS STORE AND ADDRESS
3	30	85.5	7.94	0.18	1063
3	30	105	7.82	0.17	1267
3	40	88.66	14.39	0.33	2526
3	40	86.11	15.3	0.38	2686
3	50				
3	50				na panyine in ter palan sa sa palan sa
рН	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
4.41	0	111	3.24	0.12	875
4.41	Ō	107	3.95	0.14	1015
4.41	10		an a		1991 - Martin Martin, Martin State - Sta
4,41	10	anaron paramar marya na makana dari dahida ni kan 1920 (1939) (1930) (1930) (1930) (1930) (1930) (1930) (1930)			
4,41	20			1,79 1788 B 49 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
4.41	20	anna Ba ar a an a			
	30	1.12.10.10.10.10.10.10.10.10.10.10.10.10.10.		***************************************	20.001 IV.201 AND INC. BEING IN AND INC. INC. IN AND IN AND IN AND INC.
4.41		2017 - La - La - La Transmont de la companya de la 2017 - La - L	all' and provide the second		
4.41	30	A ^ C	4.3	0.12	820
4.41	40	106		0.12	925
4.41	40	105	4.07		
4.41	50	106	18.84	0.27	2082
4.41	50	100	16.97	0.24	1756

Table 13. Dihyroxy-theophylline Migration in Cyano Pentoxy Capillary (-25 kV)

n	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mAU)	Time (min)	(min)	(mAU.sec)
7.06	0	283	0.19	0.23	5484
7.06	0	124	0.58	0.04	428
7.06	10	5.39	0.059	0.02	6.11
7.06	10				
7.06	20				
7.06	20				
7.06	30				
7.06	30				
7.06	40				
7.06	40				
7.06	50				
7.06	50		Areida parapatan ing manana ang m Ang manana ang manana a Ang manana ang manana a	nije de Brand Miller (de literature de literature de literature de literature de literature de literature de li	
1911-1913-1913-1914-1914-1914-1914-1915-1915-1915-1914-1914	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mĂU)	Time (min)	(min)	(mAU.sec)
8.14	0	an tigging ng pingkang pangang ang kanang ang pingkang ang pingkang ang pingkang pingkang pingkang pingkang pin Ing pingkang			
8.14	0				
8.14	10				
8.14	10				
8.14	20				ALLOW PRODUCTION OF THE OWNER OWNE
	The rest of the second se	and the second			
8.14	20				
	20 30	alaria fanazarika a na na na manana mananana manana sa	างการสารแข่งสมมาณสารเขาแห่งการสารแขน เป็นการสารสารสารสารสารสารสารทางสารการสารการสารการสารการสารการสารการสารการ	الله محمطة مردمان فرسية عندينية الاسترابي والاربياني (#1.15 55
8.14 8.14 8.14	and a state of the		יורים בינים בינים בינים משפע אונים אונים אונים אונים אינים בינים בינים אינים אינים בינים בינים בינים בינים ביני יישר או אונים בינים בי		An Landa - The An Land Land Land Tar (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (19
8.14	30		1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.		
8.14 8.14	30 30				
8.14 8.14 8.14	30 30 40				
8.14 8.14 8.14 8.14	30 30 40 40				
8.14 8.14 8.14 8.14 8.14 8.14	30 30 40 40 50				

1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).

2. Experimental conditions for Dihyroxy-Theophylline migration in Cyano Pentoxy etch modified capillary: L = 33.4 cm; I = 24.9 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 270 nm.

Methanol	Peak Height	Migration	Width	Area
Malifed B Collection Contract Contract Streets Printing And Printing Systems	(mAU)	Time (min)	(min) [.	(mAU.sec)
second and the second	erin emergerus förstalla versamlar som gan föra eller en etter som	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
any any approximation of the book of the second state of the secon	י. איז איז איז איז איז איז איז איז איז איז			
na ang kana na mang katalan dina kata Mang kana dina kata Bana dina kata kata kata kata kata wata wata kata k			1,000 mg - 2004 and 1,15 Mar 10 and 100 mm 100 and 100	
an a second day of the complete second of the second second second second second second second second second se		27 (19) (14) (14) (14) (14) (14) (14) (14) (14	Pertilitation of a different contraction of the state of	
and a second a second			Abiteliiteliinteelii jähtele alitelua ohmonistiiselaageomon, oma	
a construction of a second				alan dalam antifikadi persolah serika atau masaranga ana sesi
in the second				niti murati de la cierte a super a contrari de serve e
emperation and the superior and the second		en named an		
40	warman company management and the second terrorized in the second states and a	والمراجع والمراجع والمراجع والمعادية والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع	In the second	1.25
40	289	36.98	the state of the balance is a state of the	1.07
50	567	44.95	0.41	1.98
50	565	45	0.42	1.98
Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
				574
and the second				635
entre constante entre		6m I . V		and the second secon
In the state of the				2019 M 49 10 10 10 10 10 10 10 10 10 10 10 10 10
In the second				an hy 1999 (Mala ang a baasan ya na baasan ka darar a manada maa ni ka aa
Constrained and a state of the second state of the second state of the second state of the second state of the		ana manina katana ina manana manan		ne hannskippelsen et ander Skrivet falljaanske fallet fallet.
an a far a star for a star and a star and a star and a star a				adynautyskaan of ar belefyster fader weren er offisjeren fin
a second state on a side of the side of an advantage of the side				

and a second				*****
and the second state of th	117	22.4	0.28	2213
and a state of the			and a state of the second s	2483
	124 	51.57	0.20	249.
Methanol	Peak Height	Migration	Width	Area
(%)	(mAU)	Time (min)	(min)	(mAU.sec)
0	162.65	9.43	0.12	1197
0	162.65	9.43	0.12	1197
10	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			4.499.499.699.899.999.999.999.699.699.699.699.6
	a an			19. al. en valandet vet a roo borgana de seu à sa forpeter a sa
CONTRACTOR DE LA CONTRACTOR DE CONTRACTOR DE LA CONTRACTÓRIA DE CONTRACTOR DE CONTRACT	31.22		0.17	391
				358
				789
				611
a maj jule e parte e constructione de la construction de la co				2301
and a second and the state of the state of the second second second second second second second second second s	ALTERNATION AND A CONTRACTOR OF A CONTRACTOR OF A CONTRACTOR AND AND A CONTRACTOR AND A CON			2128
50	••••••••••••••••••••••••••••••••••••••			1 44 4
	(%6) 0 0 10 10 20 20 20 30 30 40 40 40 50 50 50 Methanol (%6) 0 0 0 0 10 10 20 20 30 30 40 40 40 40 50 50 50 50 50 50 50 50 50 5	(%) (mAU) 0 0 10 10 10 10 20 20 30 312 40 289 50 565 Methanol Peak Height (%) (mAU) 0 50.05 0 51.62 10 0 20 30 30 30 0 51.62 10 10 20 30 30 30 40 20 20 30 30 30 30 112 50 112 50 124 Methanol Peak Height (mAU) 0 162.65 0 162.65 10 10 10 30 30 39.54 30 37.71 40 89.9	(%) (mAU) Time (min) 0 10 10 10 20 10 20 20 10 30 30 10 30 30 10 30 30 10 30 30 10 30 30 10 30 30 10 40 289 36.98 50 565 45 50 565 45 0 51.62 21.3 0 51.62 21.3 10 20 20 20 20 20 20 20 20 30 30 30 30 30 30 40 40 31.57 Methanol Peak Height (Migration time (min)) 0 162.65 9.43 0 162.65 9.43 0 162.65 9.43	(%) (mAU) Time (min) (min) 0 0 0 0 0 10 10 0 0 0 0 10 10 10 0 0 0 0 20 10 10 10 0 0 0 0 20 20 10

Table 14. Aminophylline Migration in Bare Silica Capillary (+25 kV)

Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
203	0.06	9.5	50.83		7.06
247	0.06	9.51	60.09	0	7.06
210	0.07	11.04	42.14	10	7.06
230	0.07	11	46.28	10	7.06
333	0.07	11.96	67.74	20	7.06
327	0.07	11.87	67.87	20	7.06
				30	7.06
		an interior in the second s		30	7.06
802	0.16	15.43	69.27	40	7.06
787	0.15	15.34	69.08	40	7.06
2267	0.38	20.43	79.6	50	7.06
1907	0.29	20.25	76.25	50	7.06
Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
1186	0.18	8.44	84.61	0	8,14
606	0.16	7.93	48.88	0	8.14
1024	0.3	13.86	42.3	10	8.14
778	0.18	9.91	54.05	10	8.14
1405	0.29	10.8	58.82	20	8.14
1349	0.28	10.59	59.99	20	8.14
	**************************************	2.22.52.52.11.52.52.22.22.5.72.52.52.52.52.52.52.52.52.52.52.52.52.52	in Mali di kana karaka kara jara kara kara kara kara k	30	8.14
an garan jaran dari darin 1 dili merinta dal yang dari dari dari dari dari dari dari dari		2 (* 1997) 1997) 1998) 1997 - 1997 - 1997) 1997 (* 1997) 1997) 1997 - 1997) 1997 - 1997) 1997 - 1997) 1997) 19	9. No. 1999. I No. 1999. I No. 1999. I No.	30	8.14
99-948 (1994) (1997) (1994) (1997) (1997) (1997) (1997)		2992 Mar 1998 Awr 19 486 - Old 1993 Awr 4wr 4wr 4 o fa Alexandron - Color Alexandron - Color Alexandron - Color	na na miliona ang kana na kana kana kana kana kana	40	8.14
			ann dir e fan manne en janne en jan føret an en en fan e kan samet en fan de sen en sen en sen en sen en sen s -	40	8.14
	1				
				50	8.14

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Aminophylline migration in Bare Silica capillary: L = 58.2 cm; I = 48.6 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 270 nm.

Area	Width	Migration	Peak Height	Methanol	
(mAU.sec	(min)	Time (min)	(mAU)	(%)	pH
4842	0.35	35.5	189	0	2.14
4883	0.35	37.08	182	0	2.14
-		**** * *******************************		10	2.14
	an a		******	10	2.14
		210-0-10-10-10-10-10-10-10-10-10-10-10-10		20	2.14
			n an se de anno an anno an se an	20	2.14
				30	2.14
		:		30	2.14
				40	2.14
and this is a state of the second			an in a suite an ann an an Ann an	40	2.14
**********		••• ••••••• **************************	an an a	50	2.14
1997 - 1997 -	n ogna ann ofna again	Ŧŧĸġĸġġġġġġġġġġġġġġġġġġġġġġġġġġġġġġġġġġ	ֈֈֈ֎ՠ֎ֈ֎ՠ֎ՠֈ֎ՠ֎ֈ֎ՠ֎ֈֈֈ֎ՠ֎ՠ֎ֈ֎ՠ֎֎ՠ֎ֈ֎ՠ֎ֈ	50	2.14
Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
		nyanangangan nangangan sina tan tan tan sa		0	3
				<u> </u>	3
n na kati na mananin ta dan an an miningin katina tikaké na kita na hada si		kaning (japangapan sang nang nang nang nang nang nang na		10	3
tin ternen mer tekiseten meleken steler senen hele sitentije de soorteje of soorteje of soorteje of soorteje s		สมหาร์สาราชรัฐบารประกอบการสาราชสาราชสาราช		10	3 .
		an daga sa	***************************************	20	3
				20	3
1997-1997 (J. 1997), M. B. B. B. P. P. P. P. B. P. P. B. P. P. B. P. P. B. P.		an the section of the sector of the		20	3
*****				30	3
An			1999	40	3
ngaya ng kina kana kana dan Mila ka per dinakan Mila Mela Mela Kana di K			a An an	40	3
Mantana Manada Indi Katala ana amin'ny kaodim-paositra dia mampiasa minina dia mampiasa dia mampiasa dia mampia			/~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	40 50	3
		ar en angeler an		CALL AND AND AN AND AN AND A ALL MAN AND AND AN AND AND AND AND AND AND AN	3
	******			50	3
Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
		กลางและการการการการการการการการการการการการการก		0	4.41
	70 - 17 an (- 17 - 17 - 17 - 17 - 17 - 17 - 17 - 	475889,347097,67,47664,58939788-5597978438769-657747	******	Õ	4.41
namanan yang menandrasya (mgi in jadar lawar tikar ini ana am-dinasy i				10	4.41
an 124 an is const and fold to the state of	arrahonderson mar and an an and dela so and dela so and the second source and t	an a		10	4,41
	an da mana tanàna mang dia mang mang mang mang mang mana mana man	1400-2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2	₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩	20	4.41
	-2*******	ŊġġŦŦţĸŦĸŢŦŦŊġŎĸŦŢŦŢĬġŦŦŦŦĬĹĸĸĹŊĬŧĊĬŎĬŎĬŎĬŎĿŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎŎ	00000000000000000000000000000000000000	20	4.41
		na n		30	4.41
Andread and a state of the second state of the		insandurgen Barbelada inis Barbi ada abarbarbarba	an a suite a suite ann an	30	4.41
	1946-99-149-19-19-19-19-19-19-19-19-19-19-19-19-19		es e per per per se	<u> </u>	4.41
an - 400 - 60 - 50 - 50 - 50 - 50 - 50 - 50 -			?\$~?}?\$??\$??????????	40 40	4.41
		2222-10-10-2212-10-10-10-10-12-12-12-10-10-10-10-10-10-10-10-10-10-10-10-10-	1) (n 101 101 101 101 101 101 101 101 101 10	40 50	4.41
nin de anterio el la mandarica de la compañía de la	1997 - The Television of State State of State		านกราวการการการการการการการการการการการการการก		CONTRACTOR INTERVECTIONS IN AND INCOMENTATION STREET, INCOMENTATION OF
	***************************************	an a	ann air fa fa ann an ann an ann ann ann ann ann	50	4.41

Table 15. Aminophylline Migration in Bare Silica Capillary (-25 kV)

Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mAU)	(%)	pH
		1997 (B. 1997)		0	7.06
LANGER CONTRACTOR OF CONTRACTOR CONTRACTOR CONTRACTOR				0	7.06
	ALC - BACEBLO - AND AN EXPLOY - CELEVICE - CALLER	in you we do to you share a sin an		10	7.06
				10	7.06
				20	7.06
				20	7.06
1.100 - Cryme (2001) - Crist Crist (2007) - Crist (2007)		raggen finn forst narstand för i först för först och för stran bendans och find för att som som som som som so		30	7.06
			99 h, 109 h, 109 h, 10 h, 1	30	7.06
29 Mar 1988 - Marine Bardin, 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010			9 80 10 10 10 10 10 10 10 10 10 10 10 10 10	40	7.06
and a submitted as a substrate while the control of the substrate second base of the state			92. Maria and an	40	7.06
		and the second	***************************************	50	7.06
		erg anore a constante de la constante de		50	7.06
			11.1.1.077.01.201.01.11.11.11.11.11.11.11.11.11.11.11.1		
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mAU)	(%)	pH
77.72	0.18	16.37	5.06	0	8.14
	annous annous annous annous annous annous a	8-1	2.44		ทะพระการแก่งสาวๆ เสียงในสาวที่สาวที่สาวที่สาวที่สาวที่สาวที่สาวที่สาวที่สาวที่สาวที่สาวที่สาวที่สาวที่สาวที่สาว
20.6	0.1	12.6	2.44	0	8.14
ALL AND ALMERICAN ALCOMERCY ALCOMORY AND ADDRESS AND ADDRESS AND ADDRESS ADDRES	U.1	12.6	۵.444	0 10	8.14
ALL AND ALMERICAN ALCOMERCY ALCOMORY AND ADDRESS AND ADDRESS AND ADDRESS ADDRES	U.1 มหายมหาราสารางการเป็นระการเรียงสารางการเรียงการเร	12.6	6.444	and shares an annual structure and a structure structure of the	
ALL AND ALMERICAN ALCOMERCY ALCOMORY AND ADDRESS AND ADDRESS AND ADDRESS ADDRES			<u> </u>	10	8.14
ALL AND ALMERICAN ALCOMERCY ALCOMORY AND ADDRESS AND ADDRESS AND ADDRESS ADDRES		12.6 	2.44	10 10	<u>8.14</u> 8.14
ALL AND ALMERICAN ALCOMERCY ALCOMORY AND ADDRESS AND ADDRESS AND ADDRESS ADDRES	0.1	<u>12.6</u> 8.14	3.6	10 10 20	8.14 8.14 8.14
20.6	1814 4.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1			10 10 20 20	8.14 8.14 8.14 8.14 8.14
20.6 54.48	0.18	8.14	3.6	10 10 20 20 30	8.14 8.14 8.14 8.14 8.14 8.14
20.6 54.48	0.18	8.14	3.6	10 10 20 20 30 30	8.14 8.14 8.14 8.14 8.14 8.14 8.14
20.6 54.48	0.18	8.14	3.6	10 10 20 20 30 30 40	8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14
20.6 54.48	0.18	8.14	3.6	10 10 20 20 30 30 40 40	8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14
20.6 54.48	0.18	8.14	3.6	10 10 20 20 30 30 40 40 50	8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Aminophylline migration in Bare Silica capillary: L = 58.2 cm; I = 48.6 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 270 nm.

Area	Width	Migration	Peak Height	Methanol	
(mAU.sec	(min)	Time (min)	(mAU)	(%)	pH
and the second				0	2.14
				0	2.14
				10	2.14
			a de la companya de l	10	2.14
			n Henricki, and a station of the second s	20	2.14
			an la canada de la canada da ser en de la canada de la can	20	2.14
1999 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997)	ann fan 1999 yn 1997 yn	\$	- The second	30	2.14
an a	220 - 201 - 201 - 202 - 202 - 202 - 202 - 202 - 202 - 202 - 202 - 202 - 202 - 202 - 202 - 202 - 202 - 202 - 202 		H DATH BERTHINSER GALLER FRANKLING OF GRANNING AND	30	2.14
		annan en fan skriften fan de fan de fan fan skriften fan fan de fan fan de fan de fan de fan de fan de fan de f	allindill louis and a litelitie of a days of the second second second second second second second second second	40	2.14
	and an and the second	ner an	andaranian manananan ing ang maring maring mananan ing ang mananan ing mananan ing mananan ing mananan ing mana	40	2.14
gangeleyyysia a togol deleyddologyyn a bolloddolau		and a second and the second and a second a se	n ann a gun a na anns a fais i na bha a tha an tha an tha ann an th	50	2.14
ala di Martin a Martin ana ana ana ana ana ana ana ana ana a		ĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨĨ	1997 (La Fandrach) (La Fand 	50	2.14
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec	<u>(min)</u>	Time (min)	(mAU)	(%)	рН
1003	0.33	39.73	35.44	0	3
		2000-00-000-000-000-000-000-00-00-00-00-	errest aus dramaticanisticanis a statemente bela de la place d'anna de la basis de la comparisone de la compari	0	3
proje od komen da kodi je kodi ka Primili ka kodi ka kodi na kodi ka kodi ka kodi ka kodi ka kodi ka kodi ka ko			warungenderikawanan dinina karana karali kidafi nakwarwa kwala karana 1970 1970 1970 1970	10	3
		1. Sector of the state	***********	10	3
	**************************************	2012/2012/01/10/01/2012/01/2012/2012/20		20	3
אין איראי איז אין	-			20	3
na an an an an an an an Anna a				30	3
14.11 (14.11) (14.11) (14.11) (14.11) (14.11) (14.11) (14.11) (14.11) (14.11)		19 19 19 19 19 19 19 19 19 19 19 19 19 1		30	3
				40	3
				40	3
			er i Agos dogis	50	3
	NY 10 10 10 10 10 10 10 10 10 10 10 10 10			50	3
Area (mAU.sec	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
				0	4.41
				0	4.41
				10	4.41
		annen an Kanagina an Frankina an Frankina an Frankina an Anna a		10	4.41
	an generating na bear ann ann ann ann ann ann an ann a' saidh a' dùrac th	Panage and an		20	4.41
an a				20	4.41
22.03	0.09	8.97	2.99	30	4.41
20.48	0.09	9.02	2.73	30	4.41
	**************************************			40	4.41
	1999 1999 1999 1999 1999 1999 1999 199	<mark>องกังสมมัยของสามสาขาวของสาขางของสาของ</mark> ของสามออกสามออกสาของ 		40	4.41
\\\\@W\\\&@AAAAAAAAAAAAAAAAAAAAAAAAAAAAA	ad disable for the former of the	band broadening		50	4.41
ARTINTERA OFFICIAL AND	****	6.4 1 767 568 767 768 7 1 8 11 1 2 84 19 10 10 10 10 10 10 10 10 10 10 10 10 10	na latutinu ata bata ontiberne dan nor-quar monto ata da	50	4.41
5638134835888614854664788541656197488		**************************************	สารัทสมัยสร้างการแนนสาราชมาติ เสอราการสรรณภา รายาวันกรุ (c.ศ. (((())))		

Table 16. Aminophylline Migration in C-18 Capillary (+25 kV)

	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mĂU)	Time (min)	(min)	(mAU.sec)
7.06		114	7.91	0.13	1129
7.06	0	118	7.97	0.13	1187
7.06	10	132	9.09	0.19	1932
7.06	10	120	8.81	0.26	2498
7.06	20	145	11.28	0.2	2189
7.06	20	78.71	11.63	0.2	1179
7.06	30	.315	13.07	0.4	9062
7.06	30	322	13.84	0.42	9810
7.06	40	3,18	16.48	0.14	38.12
7.06	40		16.72	*******	
7.06	50	6.09.986/09/00896/00896/00897/009977777797621-028777522-3-7755 ⁻¹⁶ 655/-0255-16	far húðing var anna skil fræðsinning sinn histori sinn sin sin sam sem sem sem sem sem sem sem sem sem se		алтан калан ка
7.06	50		۵٬۰۰۰٬۰۰۰ همانه میرانها به این از ۲۰۱۰ (۲۰۱۰ میران ۲۰۱۰) ۲۰۱۰ (۲۰۱۰ میران ۲۰۱۰ میران ۲۰۱۰ میران ۲۰۱۰ میران ۲۰	an a	4 4 4 4 5 4 5 4 6 6 6 6 7 7 9 7 7 7 7 7 7 7 7 7 7 7 7 7
**************************************			anto pinga aparta - ny farakana panto - ny mandra sa kanana kanana kanana kanana kanana kanana kanana kanana k a	an in a finn an a	ander er von - en der er erkent op von der erkent den erkentenden der
999999-9999-9999-9999-9999-9999-9999-9999	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mAU)	Time (min)	(min)	(mAU.sec)
8.14		31.96	6.99	0.15	388
8.14	0	39.17	6.48	0.13	420
8.14	< <u>10</u>	22.24	11.39	0.27	490
8.14	10	18.82	17.36	0.52	835
8.14	20	32.15	10.56	0.27	736
8.14	20	32.49	10.44	0.26	717
8.14	30	40.16	11.46	0.39	1316
8.14	30	41.68	11,42	0.39	1365
Q. 1-7			Source of the supervision of the supervised of t	A AA	3488
8.14	40	64.39	12.76	0.64	0400
	and the second descent of the second s	64.39 72.13	12.76	0.64	3403
8.14	40	te de service a service to tot d'acteur en anter a trader e service de la service de la service de la service d		er an the second s	and we have a second state of the state of the second state of the state of the state of the state of the state

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Aminophylline migration in C-18 etch modified capillary: L = 50 cm; I = 41.5 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 270 nm.

Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
an a				0	2.14
		an an Thursdan an Annaichte an Annaichte an Annaichte an Annaichte an Annaichte an Annaichte ann Thair 1987 1977 🦉 A	1996) 1499 1997 - 1997 - 1997 1997 1997 1997 199		2.14
	alalalar alayar dalar nga kana nga nga nga nga nga nga nga nga nga			10	2.14
1	9009090-0-0-0			10	2.14
	1999 Server and a state of the server of the server of the server server server server server server server ser	and a second		20	2.14
	194994497944			20	2.14
nije na na staniju na na staniju na stanog na stanog na stanovno stanovno stanovno stanovno stanovno stanovno s	281.282.282.0 (1999) 10.282.000 (1999) 10.292.000 (1998) 10.292.000 (1998) 	***************************************	, nyanya ngi mga ana angi nga ngangang ngang ngang nga nga nga ng	30	2.14
99 993 996 996 997 998 998 998 998 998 998 998 998 998	an she and a star and a star and a star a The star a st			30	2.14
**********	19. Fe all an are a lay and a fair water water and a south are all and a so			40	2.14
in the stand of the second	i manunionerani mermira de ante de a			40	2.14
(1), (1), (1), (1), (1), (1), (1), (1),				50	2.14
fragtagt och för det för at han att att att att att att att att att a	ani antar di materi dala nombre da anti di setta da anti di setta da anti da anti da anti da anti da anti da an	and a factor of the second		50	2.14
	an a				Sau -
Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
				0	3
	an 1879 an an 1979 an 1		กระบบครามสายสายสายสายสายสายสายสายสายสายสายสายสายส	Ŭ	3
044 ***********************************		an ya mana ana ang mana ang ma Ng	۵۰۰۰۰۰۵۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰	10	
2019/17/9 1999/17/2019/17/2019/17/99/2019/10/2019/2019/2019/2019/2019/201		tangangan ang katalang kanangang katalang katalang katalan di Katalang katalan di Katalang katalang katalang ka		10	<u>3</u> 3
an a	1984/1001-1986/2016/2016-2016/2017/2016/2017-2016/2017/2016/2017/2016/2017/2016/2017/2016/2017/2016/2017/2016/	1. y y y ar o a bong a a roman an a		20	Š Š
******		Terry My is a make i i skirning a suin ary to nor to normalismai ponti i sui :		20	ž
		ressense va como va responsa no algoridado en va vienciado e solo. Bila valitadar da P		30	3
******	1999 - Constantino de la constante de la const -	es de verse constituer de la constituer en la linea de constituer de la constituer de la constituer de la const	๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	30	3
			ġŗĦŶŧŢĸĿĿĸĿŔŶŎŶĨĸĸĿĔŎĿĬĬĊĬſĸĸŔĸĬĿŎĬĸĸĬĬĿĿĿĠĸŒĹĸĸĸŢĸĸĸĸŒĔŔĸĸĸĦŎ	40	3
analytic provide the state of the flow the second second state of the state of the second second second second		****	na na mana na m	40	3
	60/170-700-1966	1. A 1. 1. 2. A 1. 2. A 1. 2. A 1. A 1.		. <u>.</u> 50	3
Professiona and a star of the star of th			андарады так жана так так тар казай жана ай айта так так так так так так так так так т	50	3
					<u> </u>
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mAU)	(%)	pH
				0	4.41
				0	4.41
				10	4.41
	ading () yan 10 - 11 - 11 - 11 - 11 - 11 - 11 - 11	****		10	4.41
	Repletor Rev Stands and State could state to the other			20	4.41
	1417/14/14/14/14/14/14/14/14/14/14/14/14/14/			20	4.41
				30	4.41
				30	4.41
2.12	0.013	13.88	2.43	40	4.41
1.57	0.007	14.36	3.35	40	4.41
ner en	9 11 11 12 12 13 13 13 13 13 13 13 13 13 13 13 13 13	anna ann an ann an ann ann ann ann ann	a an an an an an tha ann an a	50	4.41
	a ka ka na	ni na manini na poloni na minina na minina na minina na minina ma		50	4,41

Table 17. Aminophylline Migration in C-18 Capillary (-25 kV)

Area	Width	ration	Peak Height	Methanol	8.2010 - 0.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2
(mAU.sec)	(min)	(min)	(mAU)	(%)	pH
		and a state of the	ne entre en la companya de la compa	0	7.06
				0	7.06
			a national sector of a minimum sector of an and the sector of the sector	10	7.06
			no alterna for o toro i di si forma di azo antida ava a dalla di si dalla di si dalla di si dalla di si dalla d	10	7.06
			na na manana kao ana kao an	20	7.06
a nan sa kanaga sa kana sa kana sa kana sa kana sa kana sa		alingali dhanishi kushi kamalini ka	ana matanakana kata matana kata kata kata kata kata kata kata	20	7.06
1,500,62,679,500,000,000,000,000,000,000,000,000,00		i delanettarina di contra di co	niele die volk date die ofgenaalte van die werden keide die bieden is ja vereplieten staard voor hij die	30	7.06
		in the set of the set o	an a	30	7.06
ngan ang panalan kata na kata n	18-3 434-454-454-454-474-186-186-186-186-186-186-186-186-186-186	aare ee gelaanske skon offen dit Orientikanse ondels da hakadik i	Sanayya guriya ngani iliya kilon nga guran nashir ya munata nga	40	7.06
\$1,000,000,000,000,000,000,000,000,000,0		sidas pagain kananga kang kang bahar ba	alte er - 4 er i nator flatten som itt sinser og fan annen som i sektor for	40	7.06
hereng bet yn ferste fan de fan ferste ferste fan de fan ferste fan fan fan fan ferste fan ferste fan ferste fa	anianananananananananananana	96035646766467464599949	nterinari e de tre nontanta e en artikantan in artika	50	7.06
an an t-an an a			75 A 78 A 79	50	7.06
	**************************************	alaan ahaa ahaa ahaa ahaa ahaa ahaa ahaa			
Area	Width	ration	Peak Height	Methanol	
(mAU.sec)	(min)	(min)	(mĂU)	(%)	pH
		4.45		0	8.14
		4.13	ĸ. 1944 - 1946 (* 1977) 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 197 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 - 1979 -	Ō	8.14
49 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 - 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 1 - 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 19 1				10	8.14
				10	8.14
- 1.2. V 1.27. COST - C. I. C. TRINO CON				20	8.14
	91799 WHAT TO BE THE REAL PROPERTY AND THE P	- los and the second	,	20	8.14
	18 - 29 - 20 - 20 - 20 - 20 - 20 - 20 - 20	1.00-100-101-101-101-10-10-10-10-10-10-10-		30	8.14
ransan inter tany ny manakaranjin'ny sola ina dia manakara ina dia manakara na	22,2200-0		อาณาสมมาณ การการการการการการการการการการการการการก	30	8.14
		anijanda ang san sa	2011/10/11/11/2011/11/2011/11/2011/11/2011/11/2011/2011/2011/2011/2011/2011/2011/2011/2011/2011/2011/2011/2011	40	8.14
n, nga mangan dipan dipan dan nan ngan gan diminipakan dan kari bar kari bar kari bar kari bar kari bar kari b			700 ar an Sainte A'n 196 aile Stadt Stadt State (1975 - 1975) Albert 1975 - Manier Annae State State State Stat	40	8.14
ĸ₩ĸĸ₽₽₩₩₽₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩		2.48		50	8.14
₩₩₽₽₩₽₽₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩		2.49		50	8.14
		~			₩ , I 7

- 3. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 4. Experimental conditions for Aminophylline migration in C-18 etch modified capillary: L = 50 cm; I = 41.5 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 270 nm.

Area (mAU.sec	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
(IIIAO.sec			และแกนสาวการการการการสาวสาวสาวสาวการการสาวการสาวการสาว	ana deventere la substance de l	
			S	0	2.14
++++++++++++++++++++++++++++++++++++++		an a dha canada a na farfa fa fa fa fa fa an	a 19 alter film and all film for an all film a state of the	0	2.14
			n 1949) aan daaraa ku daaraa ku daaraa daa ku da	10	2.14
	1.55 (21 5 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		and a subsection of the second sector of the second sector of the second sector of the second sector of the second s	10	2.14
and the second			Salanan orfan de Blananan gerenovele (orfan disker)	20	2.14
eleveningen andere den men valer verde average av	84-46-93-06-93-08-986-684-69-08-4-75885-487-98-98	a 1774 (a. 1877) - 1976 (a. 1977) - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977	สมารณาและเหตุการณาสารณาและเหตุการณาสาร	20	2.14
nder Gallyn refferinge oanderstel eine ferreitigen.	an management			30	2.14
0 tellisheddrafara dhife en feli e anna sior I. Anna an an an 1	*************) te n di juta mengang mengang mengangkan periodak periodak periodak periodak periodak periodak periodak period		30	2.14
bookashasaana maraana karaa karaa karaa				40	2.14
				40	2.14
18.1	0.044	3.42	4.97	50	2.14
11.94	0.036	3.78	4.5	50	2.14
Area (mAU.sec	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pН
1.06	0.81	14.46	153	0	3
1.42	1.23	17.73	135	0	3
	distriction of the second s		1-11-00-11-01-01-01-01-01-01-01-01-01-01	10	3
*****				10	3
		n dige fan de fenne were en en de sene aan de ferste kere en de ferste kere en de ferste kere en de ferste kere E		20	3
		~?>>\$\$	***************************************	20	3
		**************************************	299 - 2010	30	3
aanaan - aa aan in ar raddiina - si dharad in ar saar				30	3
401-13-137-14-1 14-1 Bartshold			······	40	3
alle distant de mais de fan de service de la service de la fan de service de la fan de service de la fan de se		***************		40	3
160	0.13	33.02	15.84	50	3
113	0.13	18.64	9.59	50	3
1 1 C	U. 14	10.04	3.09	50	<u> </u>
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec	(min)	Time (min)	(mÁU)	(%)	pH
2103	0.14	3.98	226	0	4.41
1972	0.15	4.03	205	0	4.41
			an dan mana bart da sakat kanan Paginadib or provinsioni Bolika Sakat (1999) dan Barda	10	4.41
			ana ka a filin da na ana na ana na ana na ana na ana na	10	4.41
			17379-1883, of 1779 of 1799 of 1799 of 1799 of 1899 of 1899 of 1899 of 1999 of 1999 of 1999 of 1999 of 1999 of	20	4.41
	SPARATE STATES CONTRACTOR AND A STATES AND A S		man a an a-rainn an saise r'a bhliain a s-rainn aidh a saidh a saidh an shu in 1700 a bhail an ann an ann an a	20	4.41
iyan basar bari kari dan sali ni birsil kini ka faalisi ta tiraki siya tiraki si ta biri ta tiraki si tiraki s		999 (2019) 999 (2019) - Anna Anna Anna Anna Anna Anna Anna An		30	4.41
en til sen stil var ville och som still det spännade setter att som som som för stande störer var til det	1999 1999 1999 1999 1999 1999 1999 199	2012	-05-6-5-1976-6-656	30	4.41
na funda kaka katala hasilar ila da bahar katala sa Katala na Katala na Katala katala sa Katala (Katala Katala	n versamenten versionen er versioner hier sich har versionen er versioner hier sich har version er sich sich si	******		40	4.41
anunun yuru terrini alata karala karala da arala	1997 - 1997 -			40	4.41
יי אבר גברי בדרו לבידה אלאוני בריבורי בניסי ידי דעד בדער בביבור די אלא אלא איני א			1919-191 Marine I		
	1	1	1	50	4.41

Table 18. Aminophylline Migration in Cyano Pentoxy Capillary (+25 kV)

Methanol	Peak Height	Migration	Width	Area
(%)	(mĂU)	Time (min)	(min)	(mAU.sec)
0	a la alla anna an ann ann ann ann ann an	ar na har a far an	and a state personal second	anna ann an Paraine ann ann an tar ann an saoinn a' seachadh an saoinn an saoinn ann ann ann ann ann ann ann an
0	######################################	1	2*************************************	S A MARINA MALITIN IN MISSING AN INSTALLEY (UP IN 1697)
10	32.08	3.39	0.08	179
10	46.02	3.28	0.09	332
20	21.2	3.59	0.07	115
20	45.81	3.65	0.05	182
30	44.6	4.3	0.14	473
30	45.21	4.55	0.16	597
40	98.82	6.61	0.17	1314
40	83.02	5,48	0.15	1044
50	85.83	8.83	0.12	755
50	799 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 2019 - 175 - 277 - 278 - 278 - 279 - 279 - 279 - 279 - 279 - 279 - 279 - 279 - 279 - 279 - 279 - 279 - 279 - 279 - 279		and in which of the state of the state of a state of the	
Methanol	Peak Height	Migration	Width	Area
				(mAU.sec)
Personany was not the state of the property of the	maanmaanmaanmaannadaannaanmaanmaan	MARGON STATUTE ARD THE CONTRACT OF STATUTE OF STATUTE AND A STATUTE AND A STATUTE AND A STATUTE AND A STATUTE A	an na sanna mar Promaniana da nadeo	237
and the second s	สารกับแรงเหตุสารสารการสารการการการการการสารสาร			***************************************
	839	6.29	0.04	2930
anna a constant ann an		TO A REAL PROPERTY AND A	and the second state and shade the state of the second state of th	85.04
rented and the second s	1977 II. II. II. II. II. II. II. II. II. I	สมารณะเวลากระ เสาะเสาะแขางแขน จะบุราคา โรงนี้แข่งในสมัตรแขนไขงสม		eren in seren an der an der eine einen der einen de
20				
20 30	ARANJAna mpi umunu unu ana mi umu mutan unu ang mpi mangan Arang mangang m Arang mangang ma	99 (1991) (1991) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1 1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1997) (1		
30		الا من الأمانية العالمية المن المن المن المن المن المن المن المن		
30 30		الا الا بين عالم الإ الله من عن الله الله الله الله الله الله الله الل	219 200020 1020-1-20000 2000200 102000 20000000000	2000 - 100 -
30 30 40				
30 30				
	(%) 0 0 10 10 20 20 20 30 30 40 40 50	(%) (mÂU) 0 0 0 0 10 32.08 10 46.02 20 21.2 20 45.81 30 44.6 30 45.21 40 98.82 40 83.02 50 85.83 50 0 Methanol Peak Height (%) (mAU) 0 30.15 0 10 839 10	(%) (mAU) Time (min) 0 0 0 0 32.08 3.39 10 32.08 3.39 10 46.02 3.28 20 21.2 3.59 20 45.81 3.65 30 44.6 4.3 30 45.21 4.55 40 98.82 6.61 40 83.02 5.48 50 85.83 8.83 50 7.48 8.83 50 85.83 8.83 50 85.83 8.83 50 0 0.08 0 30.15 0.08 0 10 839 6.29 10 5.61 7.44	(%) (mAU) Time (min) (min) 0

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- Experimental conditions for Aminophylline migration in C yano P entoxy etch modified capillary: L = 33.4 cm; I = 24.9 cm; injection 3 sec at 50 mbar; i.d. = 50 μm; detection wavelength = 270 nm.

Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
1374	0.17	8.22	128	0	2.14
1323	0.17	8.15	121	0	2.14
1457	0.21	11.5	90.1	10	2.14
1469	0.21	11.42	89.52	10	2.14
1299	0.21	17.95	59	20	2.14
2228	0.41	17.94	64	20	2.14
36	0.41	34.91	2.06	30	2.14
number and transformation to many and the state of the st		J4,51	2.00	30	2.14
				A REAL OF THE REAL PROPERTY OF THE PARTY OF	And a second
มรูปแก งป ระเทศเหมือนว่าสาวจากกระบาทสามารถการการแสดง 605 ป				40	2.14
anna an an ann an thaoir ann an thaoir an an thaoir an				40	2.14
aundermeinisse officiert, by relien von eithe (rem., in auflichten)	enteren en inner te en en en inner op analte same			50	2.14
allen Hainalen allen kontralen die seinen Haumen Hausen die seine seinen kann die seine seinen die seine seine				50	2.14
Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	рН
5897	0.25	7.66	362	0	3
6255	0.27	8.93	345	0	3
2753	0.1	3.78	437	10	3
2804	0.1	3.85	445	10	3
5380	0.18	5.93	455	20	3
5145	0.17	5.57	451	20	3
***************************************				30	3
				30	3
	· · · · · · · · · · · · · · · · · · ·	*****		40	3
		*****		40	3
		ar a george ageorge an		50	3
**************************************		99 - Yan Alexandro Yan Alex 		50	3
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mĂU)	(%)	pH
4.09	0.03	2.72	1.99	0	4.41
1.64	0.01	2.99	1.9	Ō	4,41
- 19 45-19 1 WERE IN CONTRACT CONTRACTOR OF STREET	*210 424* 424* 3* 44 * 4 * * * * * * * * * * * * * *	1988 - 28 - 19 - 19 - 19 - 19 - 19 - 19 - 19 - 1		10	4,41
anda filon Arfordade Gradentierana Motandati konst		& #1944 #1988 #1994 #1994 #1994 #1997 #1997 #1998 #1998 #1998 #1998 #1998 #1998 #1998 #1998 #1998 #1998 #1998 #	*******	10	4.41
19-72/2010/01/01/01/01/01/2010/01/01/01/01/01/02/02/01/01/01/01/01/01/01/01/01/01/01/01/01/		*******		20	4.41
naan ah	5-18	***************************************		20	4.41
nen yn de sen werden en anwere an ar ar de sen an ar				30	4.41
6.46	0.02	5.85	3.19	30	4.41
2955	0.02	4.17	366	40	4.41
4082	0.12	4.14	417	40	4.41
4089	0.31	27.09	179	50	4.41
400s 34093	0.31	29.05	89	50	4.41
34093	12.23	GU. 63	A CONTRACTOR CONTRACTOR CONTRACTOR		4,41

Table 19. Aminophylline Migration in Cyano Pentoxy Capillary (-25 kV)

pH	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
7.06	0	148	0.52	0.16	1969
7.06	0	184	0.6	0.13	2058
7.06	10	4.55	0.09	0.03	11.7
7.06	10	4.8	0.092	0.03	11.2
7.06	20	utrainte autoritarian anti-animana antina para ana antina dalara dalara dalara dalar	ungleunerigennistissens einen manning einen dem einen		- A PRAMERA VIEW AND A A LEAD AND A PROBABILITY AND A DECEMBER OF A DECEMBER OF A DECEMBER OF A DECEMBER OF A D
7.06	20	ng hi ng pinin ni ni ng ni ni ng minin ng minin ng kalang kalang kalang kalang kalang kalang kalang kalang kala	9999 - Alain Barry Barr Barrado (Barrado - San Sharrado - San Sharrado - San Sharrado - San Sharrado - San Sh	4199-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	na doctar anna an ann ann ann ann ann ann ann a
7.06	30	andri (1999 - Sanis Ale March Indon - Labola) (1994 - 200 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201 - 201			ninge of the antis sector of the
7.06	30	n na 1999 na harth a stad an 1999 na har an			
7.06	40	ala Garanta (pakanta karanta karanta) kanala pana da karanta da karanta da karanta da karanta da karanta karant			
7.06	40	n de ferende general de la service de la			
7.06	50				
7.06	50	a mandalar ara mananana mananana ana ana ana ana ana	an a		
**************************************	99999999999999999999999999999999999999	inna (1999) (Para dan Sunda), Paala da Sunda Carda (Barana da Sunda da Sunda da Sunda da Sunda da Sunda da Sund			
pH	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
8.14	0				
8.14	0				anumati dani cundu (i Pani kajudu) pajudu pari o copul Pani Pani Pani pa
8.14	Non-The Company of the Company of th	an a		***************************************	ententiolismi in otto male solutione etalin do 1940
U. 144	10	11 I I I I I I I I I I I I I I I I I I	물건 물건물건 물건 물건 물건	1	
	10 10			- Fand Land M. B. 1998 (Film - Salis) - Ball (Film - Salis) - Ball (Film - Salis) - Film (Film - Salis) - Film	nogadon galantatak eedan tarootan kundaedi konsi insi igan oo yaan tarabaa
8.14	10				n gan gar anna an gu an an gu an an gu an
8.14 8.14	10 20				ağı anın arğançığı kura tar. Safata sırda yardı yardı sırda sırda yardı yardı yardı yardı yardı yardı yardı ya Andre Baranda yardı ya Mağı yardı yard
8.14 8.14 8.14	10				
8.14 8.14 8.14 8.14	10 20 20				
8.14 8.14 8.14 8.14 8.14 8.14	10 20 20 30				
8.14 8.14 8.14 8.14 8.14 8.14 8.14	10 20 20 30 30				
8.14 8.14 8.14 8.14 8.14 8.14	10 20 20 30 30 40				

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- Experimental conditions for A minophylline migration in C yano P entoxy etch modified capillary: L = 33.4 cm; I = 24.9 cm; injection 3 sec at 50 mbar; i.d. = 50 μm; detection wavelength = 270 nm.

	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mÃU)	Time (min)	(min)	(mAU.sec)
2.14	0	30.52	13.02	0.24	622
2.14	0	28.45	13.14	0.23	554
2.14	10	32.44	11.28	0.21	580
2.14	10	28.62	11.25	0.18	450
2.14	20	21.27	10.4	0.12	211
2.14	20	21.72	10.43	0.11	211
2.14	30	26.99	9.48	0.15	321
2.14	30	27.99	9.41	0.14	318
2.14	40				
2.14	40	***************************************	1446484449499949449444444444444444444444	a anton din un contra d'a cilla di ci la continue d'interne di f	1995-1976a o Bran Albanet (Selection Belleville) (Selection Science)
2.14	50	******	allio alfatio de avalitado encluira de productiva de alta alta de artes de alta de artes de artes antes de arte		
2.14	50	7727-97-67-4739-0	al o l'Ano antivente cardi le la carda carda construcción de construcción de construcción de construcción de co		ar an an ann ann an ann an ann ann ann a
fan i 1 "T			9 (1.) (1.) (1.) (1.) (1.) (1.) (1.) (1.)		₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩
99933-0095-00-00-00-0000-0007-00724	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mAU)	Time (min)	(min)	(mAU.sec)
3	0	21.91	6.91	0.07	141
3	0	23.44	6.8	0,07	165
3	10	20.44	11.37	0.14	209
3	10 10	19.32	10.96	0.12	196
3	20	15.74	11.49	0.12	223
3	20 20	15.74	11.36	0.16	215
3	NAMES OF A DESCRIPTION OF A	18.8	10.57	0.15	213
3	30	18.8	10.57	0.15	251
3	30 40	22.2	10.67	0.10	348
3	40	22.16	10.52	0.18	329
3	40 50	22.10	10.52	0.16	482
3	50	22.76	10.73	0.20	486
	00	22.10		0.20	007
	Methanol	Peak Height	Migration	Width	Area
			Time (min)		(mAU.sec)
pH	(%)	(mAU)	and the second	(min)	
4.41	Q	4.98	4.79	0.02	12.9
4.41	0	5.07	4.88	0.03	12.94
4.41	10	24.97	5.72	0.03	47.01
4.41	10	25.5	5.62	0.02	46.31
4.41	20	25.93	7.8	0.04	76.86
4.41	20	27.15	7.76	0.04	76.8
4.41	30	30.33	8.54	0.05	
4.41	30	30.42	8.47	0.06	108
4.41	40	38.71	9.36	0.07	175
4.41	40	38.48	9.38	0.07	170
4.41	50	43.03	10.95	0.09	343
4.41	50	44.02	10.97	0.1	366

Table 20. Nortriptylline Migration in Bare Silica Capillary (+25 kV)

Area	Width	Migration	Peak Height	Methanol	9.4889-00-0940-0940-09-0-0-0-0-0-0-0-0-0-0-0-
(mAU.sec)	(min)	Time (min)	(mÃU)	(%)	pH
		andority of 2019 (1997) 1997 (1999) (1997) (1997) (1998) (1998)	ann an	0	7.06
an a an Thirth Connection an Analysis (Contesting of a		an da da manana di manana da ma		0	7.06
			and considering a first order of a growth of the second of a growth of the second of a growth of the second of	10	7.06
				10	7.06
				20	7.06
				20	7.06
				30	7.06
			- 22 mei - 22 mei - 20 mei - 20 mei - 24	30	7.06
				40	7.06
				40	7.06
				50	7.06
		retalio tatalo dati esse. Ola Destati dereta este serie serie serie de marce de marce este este este este este Desta de la serie de la ser		50	7.06
Area	Width	Migration	Peak Height	Methanol	1995 au 1997 (1996 au 1916 - 1996 (1997 - 1977 - 1977 (1996 - 1977 - 1977 (1997 - 1977 - 1977 (1996 - 1977 - 19
(mAU.sec)	(min)	Time (min)	(mAU)	(%)	pH
94	0.17	4.13	6.4	0	8.14
84	0.17	4.15	6.2	0	8.14
117	0.21	4.83	6.5	10	8.14
91.51	0.2	5.85	5.6	10	8.14
170	0.34	5.13	5.7	20	8.14
118	0.33	5.16	5.7	20	8.14
			na mana ang ang ang ang ang ang ang ang ang	30	8,14
				30	8.14
				40	8.14
	and the second			40	8.14
	<u> </u>			40	0.14
	dan han 1947 in di war with of y with the black in water that the man of the barray war and	••••••••••••••••••••••••••••••••••••••		50	8.14

- **3.** The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 4. Experimental conditions for Nortriptylline migration in Bare Silica capillary: L = 58.2 cm; I = 48.6 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 254 nm.

Width	Migration	Peak Height	Methanol	
(min)	Time (min)	(mAU)	(%)	pH
	an d'Ann an an Anna an	an fail an ann an fhair a' fhail an an ann ann ann ann ann an ann an ann an a	0	2.14
111111-11111-1111-1111-1111-1111-1111-1111		4 (85)-14-16-64-4-4-14-66-4	0	2.14
	an Malain Balan a maran katan Balan Ba		10	2.14
	a l'han din data de reconstruit d'anna a de reconstruit de la serie de la serie de la serie de la serie de reco		10	2.14
	and and an and the second s	19 (19 (19 (19 (19 (19 (19 (19 (19 (19 (20	2.14
	nin Perinten dari menterangkan seterangkan dari perinta dari dari dari perinta dari dari dari dari dari dari da		20	2.14
1992 (1992) - 1986 - 1987 (1992) (1994) - 1997 (1994) (1994) (1994)	gan an a		30	2.14
	99-99-69-99-99-99-99-99-99-99-99-99-99-9	in a growth of the set	30	2.14
in the sub-density (species of shifting times of the set of the shifting times of the set of the set of the set	Taar Barbard Connection of Annal and Annal An	ygenya da an da	40	2.14
, a gran a pastal pastal a garma da marca a da	a na la na mana na man	***************************************	40	2.14
an ann de marte ann ann ann ann ann ann ann ann ann an	in distribution for the officer of the statement of the statement of the statement of the	an gara para karan karan karan karan karan dalam dalam karan karan karan karan karan karan karan karan karan ka	50	2.14
na mangan kanan di kana kan bar	je njeve je na jezer je za jezer na za jezer na na Na na na jezer na jezer na na jezer jeze Na na na jezer na jezer jezer jezer jez	***************************************	50	2.14
Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
and a second	fallik lakun kun surrugan surr		0	3
**************************************	an a	1997 - Jan Sandar, ang Sandar, ang Sandar, Sandar, Sandar, Sandar, Sandar, Sandar, Sandar, Sandar, Sandar, Sand	TO ATTAC AND A DATE OF A DATE	3
and The of The state of the sta	1999 / D. Chen X. Market States of America States and American States and American States of American St American States of American States of		Construction of the second state of the second state of the second state of the second s	3
O and a filler and an	an di sering ang ang ang ang ang ang ang ang ang a	999	CONTRACTOR OF CONT	3
- and the block of the state of	***************************************	۵ - ۲۳۷۹ (۲۰۰۹) - ۲۰۰۹ (۲۰۰۹) - ۲۰۰۹ - ۲۰۰۹ (۲۰۰۹) - ۲۰۰۹ (۲۰۰۹) - ۲۰۰۹ (۲۰۰۹) - ۲۰۰۹ (۲۰۰۹)		3
ara jal dala dana dala dalam da gintanda nagona da arawa yang baran da arawa yana da arawa baran	**************************************			3
1997 - Contrado - Hanna Contrado Hando A. C Borthal Marine Contrado	999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1997 - 199	999-1949 (n. 1849-1949) - Maria Quellandia (n. 1849) - Maria (n. 1979) - Maria		3
	1994 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -			3
	4 2 4 5 5 6 5 6 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7			3
	aa aan aa kana daga kata daga kata kata kata kata kata kata kata k	a, na na alian na mila	en en en sen anter en	3
	ar agus ana airtean ann an Airtean ann an Airtean ann ann an Airtean ann an Airtean ann an Airtean ann an Airte		International International Contraction of the Antiperson of the	3
9999-984-99-989-99-98-98-98-98-98-98-98-98-98-98	an a		50	3
Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	рН
Sili				4,41
	enishirennegerine enississione enississione			4.41
			and the second	4.41
	n an	<mark>and an and an </mark>	And the second state of th	4.41
*****				4.41
ann an 1997 an	an a	there we have been a set of the s		4.41
an a	11971 agos / 1			4.41
		**************************************		4.41
1979 C. 1997 C				4.41
2007 (1979 APR) - 1977 - 197	energen her en de server en	and parton and canada and a second second second	n - name a mainteachar staine shi fin ta tha ta tha tha tha tha tha tha tha t	4.41
gy von syn y samp v v v v v i pi v v v sampasi rame t v k sie 2 m/ v siedinistie i v si		สามรถเหตุ เกิดจากที่ได้กับเหตุ การการการการการการการการการการการการการก		4.41
		101m-0-01m-0-100-000-000-000-000-000-000	50	4.41
	Width (min)	Time (min) (min) Migration Width Time (min) (min) Migration Width Time (min) (min) Migration Width (min) (min) Migration Width (min) (min) Migration Width (min) (min)	(mAU) Time (min) (min) Peak Height (mAU) Migration Time (min) Width (min) Peak Height (mAU) Migration Time (min) Width (min) Peak Height (mAU) Migration (min) Width (min) Time (min) Migration (min) Width (min) Migration (mAU) Migration (min) Width (min) Migration (mAU) Migration (min) Width (min)	(%) (mAU) Time (min) (min) 0

Table 21. Nortriptylline Migration in Bare Silica Capillary (-25 kV)

Area	Width	Migration	Peak Height	Methanol	gaymperint constant with a constant of the second
(mAU.sec)	(min)	Time (min)	(mAU)	(%)	pH
			9189 (911) / FULLER ALL BELLER (1998) - 1919	0	7.06
				0	7.06
				10	7.06
				10	7.06
				20	7.06
nad Dillowed on the Walder for with a particulation of the Castrolling, Distance of				20	7.06
				30	7.06
				30	7.06
				40	7.06
				40	7.06
				50	7.06
EDBRIGHTINGS OF STREET,		1992 - 1994 - 1994 - 1994 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1995 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 -	1950/J. 1960 For The State of Line of Day 105 (1970) 1970 (1970) 1970 (1970) 1970 (1970) 1970 (1970) 1970 (1970	50	7.06
Area	Width	Migration	Peak Height	Methanol	293 29 51-195256-2822 - 2844 - 1960 - 1960 - 1970 - 19
(mAU.sec	(min)	Time (min)	(mAU)	(%)	pH
32.88	0.12	13.54	3.29	0	8.14
19.49	0.05	13.82	4.45	0	8.14
24.92	0.03	13.79	1,87	10	8.14
29.47	0.1	11.76	3.38	10	8.14
				20	8.14
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		an - ann an	29 ,001 2 2. 179,000 ,000,000,000,000,000,000,000,000,0	20	8.14
46.59	0.16	7.74	3.43	30	8.14
35.67	0.12	7.59	3.57	30	8.14
				40	8.14
				40	8.14
			and a second	***************************************	and the second sec
				50	8.14

- 5. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 6. Experimental conditions for Nortriptylline migration in Bare Silica capillary: L = 58.2 cm; I = 48.6 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 254 nm.

Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	<u>(min)</u>	Time (min)	(mAU)	(%)	pH
2011-22 Service 2012 To 2011-2 Calls of the "Solar Calls Calls of the Solar Calls Calls Calls Calls Calls Calls	สารแนนสาวารแกรงการแก่งการสาวาร	efenitettines entri mettisette di entros di encondictore		0	2.14
gf is passed gas i front in the in this is the state of the first in the		and a hard the second	**************************************	0	2.14
nga yan gina pina minini dalam kana kana dala minini dalam kana dalam kana dalam kana dalam kana dalam kana da	2022/2011 Berthalout Cabler 11 a Carlor Disagon (1 a Carlor Marcon		······	10	2.14
				10	2.14
en gygeneg ei yw y dwegen yw af fernen Merker Mau Jag yw blan Jourfaan al Merken Malfan			1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000	20	2.14
urt se ver verhaarte hij naamt i han haar bester ver 14 met in die staat de staat de staat in die staat de staa				20	2.14
				30	2.14
n an an a sha a				30	2.14
10100-111010-001-00-00-000-110-00-000-0				40	2.14
				40	2.14
-				50	2.14
a filozofi na se				50	2.14
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mAU)	(%)	pH
56.24	0.13	6.36	5.09	0	3
77.61	0.18	6.47	5.2	Ō	3
83.92	0.21	11.38	4.82	10	3
130	0.26	11,46	4.5	10	3
106	0.19	9.85	6.85	20	3
109	0.18	9.86	7.12	20	3
139	0.22	10.83	7.5	30	3
129	0.21	10.85	7.44	30	3
**************************************				40	3
				40	3
210	0.18	12.52	13.77	50	3
220	0.19	12.51	14.06	50	3
9,9,9 9,000,00,9,9,9,9,9,00,00,00,00,00,00,00,					
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mAU)	(%)	pH
94.58	0.28	6.97	3.92	0	4.41
96.45	0.28	6.99	3.96	0	4.41
77.81	0.15	9.66	6.28	10	4.41
92.45	0.15	9.55	7.61	10	4.41
32.03	0.13	10.97	2.58	A DESCRIPTION OF THE PROPERTY	THE REAL PROPERTY OF THE PARTY
135	0.14	10.89	10.05	20	4.41
193				20	4.41
190	0.17	11.65	14.98	30	4.41
242		11.61	15.55	30	4.41
	0.16	14.11	17.79	40	4.41
227	0.16	14.03	17.0-8	40	4.41
454	0.17	14.27	32.06	50	4.41
43.25	0.1	13.07	5.59	50	4.41

Table 22. Nortriptylline Migration in C-18 Capillary (+25 kV)

5,17 ° 2,2435-4,822-9,27 ° 2 ° 7 ° 20° 22 ° 22 ° 22 ° 22 ° 22	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mAU)	Time (min)	(min)	(mAU.sec)
7.06	0	193	8.02	0.14	1867
7.06	0	291	7.95	0.16	3385
7.06	10			ander wer ander ander ander an einer state of the second second second second second second second second secon	anna amagana o apamonana dila di di konto di Sistem
7.06	10				
7.06	20		199-100_024_0-0.000-0.0000		
7.06	20				
7.06	30	2.87	13.88	0.33	82.87
7.06	30				na a fan a fan fan de fan d
7.06	40	a ga ga a sa a a a a a a a a a a a a a a			
7.06	40				
7.06	50	7.27	30.54	0.55	342
7.06	50	5.01	29.53	0.32	138
577-07-0-99-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0	Methanol	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
pH	(%)	luwo		<u>(((()))</u>	(IIMD.Sev)
8.14	0				
8.14	0				All and the second and the second of the
8.14	10		an management of the state of the State of the state of		and the cost of the constraint of the local difference in the formation of the
8.14	10		6.99		1994
8.14	20	3.94	7.06	0.035	11.37
8.14	20	and an	and a second	0.035	4.95
8.14	30	2.74	10.03	and the second s	NAMES AND ADDRESS OF A DESCRIPTION OF A
8.14	30	1.71		0.06	8.24
8.14	40	22.09	10.79	0.46	832
8.14	40	2.2	14.57	0.13	24
8.14	50				
8.14	50				1- 5-1-1-1-11-11-1-1-1-11-1-11-1-11-1 -1
	ji aja	⁹⁸⁷ 8			

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Nortriptylline migration in C-18 etch modified capillary: L = 50 cm; I = 41.5 cm; injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 254 nm.

Area	Width	Migration	Peak Height	Methanol	
(mAU.sec	<u>(min)</u>	Time (min)	(mAU)	(%)	pH
				0	2.14
		-		0	2.14
		117 VI 00:00		10	2.14
an a hin company as lands only of the order of the second		100 M 101 101 101 101 101 101 101 101 10	19 19 - 1951 - 1940 - 1951 - 1951 - 1951 - 1951 - 1951 - 1951 - 1951 - 1951 - 1951 - 1951 - 1951 - 1951 - 1951	10	2.14
1997-1998-1998-1998-1998-1998-1998-1998-	-		NIDEVELO JULIE CALL TO A DATA DATA DATA DE CALL	20	2.14
	-			20	2.14
				30	2.14
	5			30	2.14
				40	2.14
·				40	2.14
				50	2.14
977) 997 - 998 - 997 - 978 - 987 - 987 - 987 - 987 - 978 - 978 - 978 - 978 - 978 - 978 - 978 - 978 - 978 - 978				50	2.14
Area (mAU.sec	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
	and a second and a second second			0	3
~&¥38941448431831439~8909744874497497489489489			17 De - 19 30 - 19 19 19 19 19 19 19 19 19 19 19 19 19	0	3
	****	11117 10 (112114) - 14.01 - 14.01 - 14.01 - 14.01 - 14.01 - 14.01 - 14.01 - 14.01 - 14.01 - 14.01 - 14.01	1994 - A. R. Bartan Walter, Barth and a 1997 Action of the South State	10	3
	91 - 92 - 72 - 72 - 72 - 72 - 72 - 72 - 72	มะระการกำระโดยของการให้ได้มีกำระสอรรกักการสร้างรวมกระกอบกระการร่วมสาวกระกัง	ug instrumint taan is nig nig inis isaal manga dalam nigerasa nagi ilada talah inis ang ang ang ang ang ang ang	10	3
a tradi de nanado estado e se relativa tradición de la STR natural de la Characteria de la Characteria de la Ch		·		20	<u> </u>
nen algen stil gen van fan Fandelse van Haan Kland Openbag van		******		20	3
1999 (1999) - Sandara Marcoval (* 1995) - Staniko andrže Marcovalovske († 1996)	*****			30	3
				30	3
				40	3
**************************************		****************		40	3
n Billiu Anna Mai Anna Màr Bailteann a Praisseadh an				50	3
		. 1999 Marao Marao Manaka Manaka 1999		50	3
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	<u>(min)</u>	Time (min)	(mAU)	(%)	pH
11 - 5500 TALE (2007 W THE 10 TO MAY - WAL IT WAS NOT THE TALE IN AND THE		9998/201-1011/201-211228/201-211228/201-2112229/201-21122-201-201-201-201-201-201-201-20		0	4.41
@~\$&\$\$\${\@~\#~#\$\\$\$*\$\$P~\$\$~~\$\$\\#&##\$\$</td><td></td><td>·</td><td></td><td>0</td><td>4.41</td></tr><tr><td></td><td>· · · · · · · · · · · · · · · · · · ·</td><td>a) meninana ili antras</td><td></td><td>10</td><td>4.41</td></tr><tr><td>9975</td><td></td><td></td><td></td><td>10</td><td>4.41</td></tr><tr><td>rasi ili mala mala mala mala mala mala mala</td><td></td><td></td><td>z li se de juge par la compacta de la compacta de</td><td>20</td><td>4.41</td></tr><tr><td>94-17-18-142 (17-1949) (17-11-144) Profiling Tradits (17-144) (17-144)</td><td>-1244-0-10270-044-0-1027-0-1107-0-1103100-00</td><td></td><td></td><td>20</td><td>4.41</td></tr><tr><td>a day way any product of the second state of the</td><td></td><td>10-50-11-10-50-50-50-50-50-50-50-50-50-50-50-50-50</td><td>1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 -</td><td>30</td><td>4.41</td></tr><tr><td>אור איז איז איז איז איז איז איז איז איז איז</td><td></td><td>1</td><td></td><td>30</td><td>4.41</td></tr><tr><td></td><td></td><td></td><td></td><td>40</td><td>4.41</td></tr><tr><td></td><td></td><td></td><td></td><td>40</td><td>4.41</td></tr><tr><td></td><td>Contraction of the second s</td><td>and a second second</td><td></td><td>50</td><td>4.41</td></tr><tr><td></td><td></td><td></td><td></td><td>50</td><td>4.41</td></tr></tbody></table>					

Table 23. Nortriptylline Migration in C-18 Capillary (-25 kV)

Methanol	Peak Height	Migration	Width	Area
(%)	(mAU)	Time (min)	(min)	(mAU.sec)
0				
0				
10				
10				
20				
20				
30				
30				
40				
40				
50	i entre entre la superiori de la constitui de la superiori de la superiori de la superiori de la superiori de l	an	an en presidente de relación de la Blanco de Carlos	
50	a segala standarda a segara a su sito a su si su	o The regulation of the states about the states and states with the state of the states and the states at the stat	NGC PREATURE LANGE AND A CALIFORD AND AND A CALIFORD AN	**************************************
Methanol	Peak Height	Migration	Width	Area
(%)			(min)	(mAU.sec)
0	an a		มาขางมาขุมสุขสามารถเขางานใหญ่ หรือส่วย ได้ไปได้ได้ได้ได้ได้ได้ได้ได้ได้ได้ได้ได้ได้ไ	รพระสารรู้ดางการสารราชการสารงางการสารรูกก
0	nya ya ala a kana kana a kana a kana a kana kan	45.007.001.001.001.000.000.0000.0000.0000	gaggy an ar an	nangada nalitima yitu na nana na n
10	,,	\$275\$109-548\$6664866998999968789999999999999999999999	the many intervention of the base of the day distribution of the second distribution of the distribution of the	a Manada da mangkan dan kana dan kana da mana kana da kana da ma
10 1	1		•	
CONTRACTOR CONTRA		Provide and a second	ng on ny gy gynafo ang gynar lâne 'n din fer dir 9 fer ei din begyfrefer ar ei	ት ሽስት ለመጀመርት ላይ በተቀበረር ውስጥ በመሆኑ መሆኑ በመሆኑ መሆኑ ላይ የሚያስ መሆኑ በመካከት የመሆኑ
10	2.58	9.32	0.09	19.81
CONTRACTOR CONTRA	2.58 2.56	9.32 10.34	0.09 0.085	19.81 17.22
10 20 20	2.56	10.34	Construction and County of County and Construction and County and	
10 20	and the second	the diversity of the second	0.085	17.22
10 20 20 30	2.56	10.34 25.67	0.085	17.22
10 20 20 30 30	2.56	10.34 25.67	0.085	17.22
10 20 20 30 30 40 40	2.56	10.34 25.67	0.085	17.22
10 20 20 30 30 40	2.56	10.34 25.67	0.085	17.22
	(%) 0 0 10 10 20 20 30 30 30 30 40 40 40 50 50 50 50 50 0 0	(%) (mAU) 0 0 0 0 0 0 10 10 10 20 20 20 20 30 30 30 40 50 50 50 Methanol Peak Height (%) (mAU) 0 0	(%) (mAU) Time (min) 0 0 0 0 0 0 10 10 0 10 10 0 20 0 0 30 30 0 40 0 0 50 50 0 Methanol (%) Peak Height (mAU) Migration Time (min) 0 0 0	(%) (mAU) Time (min) (min) 0

24 - A.

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- 2. Experimental conditions for Nortriptylline migration in C-18 etch modified capillary: L = 50 cm; I = 41.5 cm; Injection 3 sec at 50 mbar; i.d. = 50 μ m; detection wavelength = 254 nm.

Table 24.	Nortriptylline	Migration	in Cyano	Pentoxy	Capillary	(+25 kV)

Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	<u>(min)</u>	Time (min)	<u>(mAU)</u>	(%)	pH
11.93	0.05	3.11	3.08	0	2.14
5.86	0.04	2.94	2.06	0	2.14
214	0.08	3.62	32.05	10	2.14
213	0.08	3.48	33.82	10	2.14
15.06	0.05	4.03	3.95	20	2.14
13.61	0.015	3.92	3.61	20	2.14
65.84	0.11	5.74	7.63	30	2.14
an a	2			30	2.14
16.22	0.092	5.01	2.28	40	2.14
-				40	2.14
235	0.24	7.08	11,85	50	2.14
				50	2.14
Area (mAU.sec)	Width (min)	Migration Time (min)	Peak Height (mAU)	Methanol (%)	pH
370	0.08	1.65	59.9	Ô Ì	3
355	0.08	1.67	57.02	0	3
920	0.38	5.23	29.7	10	3
858	0.37	5.18	29.24	10	3
362	0.15	4.47	29.88	20	
585	0.25	4.63	28.81	20	3
169	0.1	3.8	22.68	30	3
410	0.2	3.77	25.26	30	3
490	0.09	3.97	65.21	40	3
ראשי אינער 1997 אינער איז				40	3
21.61	0.06	9.49	5.06	50	3
				50	3
Area	Width	Migration	Peak Height	Methanol	
(mAU.sec)	(min)	Time (min)	(mAU)	(%)	pH
268	0.046	1.45	87.67	0	4.41
	0.040		<u> </u>	0	4.41
231	0.08	2.87	41.58	10	4.41
455	0.00	2.9	61.97	10	4.41
225	0.09	3.1	29.47	20	4.41
314	0.08	2.85	47.07	20	4.41
2222	0.62	4	41.31	30	4.41
408	0.02	4.02	44.05	30	4.41
400	0.3	14.42	1.88	30 40	4.41
\$27.5867000000000000000000000000000000000000		The second se	enversion the second sector of the second	and a second	1000 A 1000 A 100 YEAR
67 00 07	0.3	13.98	3.98	40 E0	4.41
88.07	0.06	4.23	17.61	50	4.41
116	0.04	4.22	35.42	50	4.41

pH	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
7.06	0	169	0.76	0.1	1442
7.06	0	12.9	0.13	0.071	705
7.06	10	3.44	2.52	0.074	20.09
7.06	10	2.76	2.61	0.08	18.31
7.06	20	8.791-80-102-102-81-991-891-81-00-91-91-90-92-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0		· · · · · · · · · · · · · · · · · · ·	Φ. (ΤΟ ΔΕ ΠΤΑ
7.06	20				
7.06	30	#184: #1:180: 1997 #1997 #1997 #1997 #1997 #1997 #1997 #1997 #1997 #1997 #1997 #1997 #1997 #1997 #1997 #1997 #1	English (1999) (1994) (1994) (1994) (1994) (1994) (1994) (1994) (1994) (1994) (1994) (1994) (1994) (1994) (1994		
7.06	30		enterna menes senti sen de colore- do se concerna de esta de la senti de la senti de la senti de la senti de d El		an y de direction de la construction de la construction de la construction de la construction de la construction A construction de la construction de
7.06	40	******	analaili in an an in an		a mar an a thair an
7.06	40		an a	an an an Albertan an Albert	2016-2020, Carlo altra Sala Sala Sala Sala Sala Sala Sala Sa
7.06	50		n na gan na n		
7.06	50	an a	ngengenden van dit an ip stil die die aan in toeren. Die rij toe treffen in die die die die die die die die die		***************
**************************************		un and an	anta o farin (managedi da senan di senan di senan di senan da senan di senan di senan di senan di senan di sen		
pH	Methanol (%)	Peak Height (mAU)	Migration Time (min)	Width (min)	Area (mAU.sec)
				and the second	
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	549	3.67	0.056	2434
8.14	0	**************************************	3.67	0.056	2434
8.14 8.14	0 0	549	3.67	0.056	2,434
8.14 8.14 8.14	0 0 10	549 	3.67	0.056	2434
8.14 8.14 8.14 8.14	0 0 10 10	549.	3.67	0.056	2434
8.14 8.14 8.14 8.14 8.14 8.14	0 0 10 10 20	549 	3.67	0.056	2434
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 0 10 10	549 10.68	3.67 10.57	0.056	2434
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 0 10 10 20 20 30				
8,14 8,14 8,14 8,14 8,14 8,14 8,14 8,14	0 0 10 10 20 20				
8,14 8,14 8,14 8,14 8,14 8,14 8,14 8,14	0 0 10 10 20 20 30 30				
8.14 8.14 8.14 8.14 8.14 8.14 8.14 8.14	0 0 10 20 20 30 30 40				

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- Experimental conditions for Nortriptylline migration in Cyano Pentoxy etch modified capillary: L = 33.4 cm; I = 24.9 cm; injection 3 sec at 50 mbar; i.d. = 50 μm; detection wavelength = 254 nm.

	Migration	Peak Height	Methanol	
) (min) (mAU.se	Time (min)	(mAU)	(%)	pH
			0	2.14
			0	2.14
8 0.28 1	12.78	4.46	10	2.14
1 0.18 39	14.21	2.53	10	2.14
2012/10/19/2019/2019/2019/2019/2019/2019			20	2.14
######################################			20	2.14
**************************************		9 (8)+ 0-1148048 (9)+++ 41- 91-91-91-91-91-91-91-91-91-91-91-91-91-9	30	2.14
		fer s gefold og froger sjør og ander ligeboer hatte og date er fore, til er e forerige en første forere af stat	30	2.14
######################################	ann de a féireann an thairteachte ann an thairteachteachte	999 y 1889 Y 1989 Y 2017 KAN KANGGO (BI GA GA GA YANG KAN	40	2.14
1999-999 <mark>9</mark> 99-999-999-999-999-999-999-999	1916 - Daniel Marine, 1917 - Daniel Marine, 1917 - Daniel Marine, 1917 - Daniel Marine, 1917 - Daniel Marine, 1 1917 - Daniel Marine, 1917 - Daniel Marine, 1917 - Daniel Marine, 1917 - Daniel Marine, 1917 - Daniel Marine, 19	na mpalitan da dikan dan panjakan da manangin mpanan panjanda na da population da	40	2.14
5 0.17 25	22.5	1.83	50	2.14
	an tean and a trace damage of the tean of		50	2.14
>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>		- 1999 (1999) 1999 (1996) 1999 (1996) 1999 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997 (1997) 1997	A THE PARTY AND A DESCRIPTION OF A CALCULATION OF A CALCU	
n Width Ar	Migration	Peak Height	Methanol	
	Time (min)	(mAU)	(%)	pH
have a second a second s			0	3
๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛		กลุ่มเหม่า เหมาะสามารถ เหมาะสามารถ เป็นสามารถ เป็นสามารถ เป็นสามารถ เป็นสามารถ เป็นสามารถ เป็นสามารถ เป็นสามาร	Ŏ	3
1 0.1 45	4.11	5.56	10	3
e vezer palar bener e vezer e repair gaban dava e entre dat en else var dat e ar persone dat e entre e ser e s	4,14	5.52	10	3
AND AND ADDRESS OF A DECEMBER OF	5.19	6.84	20	3
	5.21	6.94	20	3
	9.25	6.57	30	3
	8.7	8.61	30	3
	18.43	6.4	40	3
	17.72	9.53	40	3
	16.04	3.00	50	3
	and the second		50	3
		****		~ ~
n Width Ar	Migration	Peak Height	Methanol	
) (min) (mAU.se	Time (min)	(mAU)		-
		138	(%)	pH
2000 martine a construction a construction a construction a construction a construction a construction a constr 2000 martine a construction a construction a construction a construction a construction a construction a constru	23.03	130	0	4.41
			0	4.41
tajibban da tilitaan talaan shaka sa salaa sa salaa sa s			10	4.41
		5 + 10 - 7 + 10 + 10 + 10 + 10 + 10 + 10 + 10 +	10	4.41
	ร <b>ให้เล่าสาขานที่สายเหลายุงสา</b> ยคลายสายรู้สายสาย	1978 q. 4 Million and American States and a states of the	20	4.41
	1 1 1 1 1 1 1 1	a production and the contraction of the structure of the	20	4.41
	n den kan ander som den staden staden staden staden som den staden som den staden som den staden som den som de	สาวสารแกรมเหลาสารกระบบการ และสารประกังสาวสารกระบบการสารกระบบการ	30	4.41
			30	4.41
	1918/8011911/111111111111111111111111111	1999-1999-1999-1999-1999-1999-1999-199	40	4.41
ר איז			40	4.41
	39	7.23	50	4.41
3	38.23	8.33	50	4.41

Table 25. Nortriptylline Migration in Cyano Pentoxy Capillary (-25 kV)

	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mAU)	Time (min)	(min)	(mAU.sec)
7.06	0	20.55	1.093	0.3	530
7.06	0	al la forma agai ang kana kana kana kana kana kana kana	e razh azikezh zaneko azikete z 2010 ezek zek zek zek zek zek zek zek zek ze		
7.06	10		4916 - 1999 - 1999 - 1999 - 1999 - 1999 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 -	······································	
7.06	10	la de dels ante de la constante dell'Adrian de Roma de mais de la colle d'actione la de la college	©<0.4.52.4.534.444.444.444.444.444.444.444.444.4		φήτων από τη φάλη δια μα το του του του το του τητορογία της του τητορογίας του του του του του του του του το
7.06	20	สมข่างการการการการสมของสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวส	ֈֈՠՠֈՠֈՠֈ֎ՠֈՠֈՠՠֈՠՠֈՠՠֈՠֈՠֈ֎ֈՠֈֈֈՠ֎ՠՠֈՠ֎ՠ֎ՠ֎ՠ֎ ֈֈՠՠֈՠֈՠ֎ՠֈՠֈՠՠֈՠֈՠՠֈՠՠ֎ՠ֎ՠ֎ՠ֎		an a
7.06	20	480,85375481,084,05394,05394,042,724,042,234,042,442,444,054,024,044,0424,044,0424,044,044,044,044,	ar an rain an ann ann ann ann ann ann ann ann a	9499-97-9839-97-98-98-97-97-97-97-97-97-97-97-97-97-97-97-97-	
7.06	30	48 0421119 493 141 191 192 193 193 193 193 193 193 193 193 193 193	ου τη πολο στο της τη βατοβρητητό - Μαγρητικο Αληθού το Αβάνου Αληθού το Αγγου.		<b></b>
7.06	30		ани на вода на кола и одна и дона и дон се одна се на селото на фолу на 1910 <b>на 1910 на 1910 на 1910 на</b> 1910 на	anternanian ang ng dan pada - faktor a dalah a pilanan ang dalah 1994 ka	na a de la généra de la constante de la constan
7.06	40		**************************************	- 28 LOUGH	a NAMES AND AND A STREET AND A ST
7.06	40	1977 - 1978 - 1999 - 1999 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	**************************************		********
7.06	50	*****	3.89	**************************************	- 
7.06	50	75 miles in 1875 - 1877 miles in Antonio (1976 - 1976) and an annual an annual anna an anna ann an anna ann an	815774677, "Adie-Tai-Seland State of The US Second The US Second		949 - New York,
	Methanol	Peak Height	Migration	Width	Area
pH	(%)	(mAU)	Time (min)	(min)	(mAU.sec)
8.14	0	19.4	6.89	0.03	52.03
8.14	0	392	38.61	0.06	19.47
8.14	10	1.76	1.86	0.06	9.66
8.14	10	9 (224 (211) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (2 (10) (10) (2 (10) (2 (10) (10) (2 (10) (2 (10) (10) (2 (10) (10) (10) (10) (10) (10) (10) (10)			
					and the second se
8.14	20	9-0-0-045-0410-0-0311120-0-0311-0-0311-0-0311-04510-04510-04510-04510-04510-04510-04510-04510-04510-04510-04510	alitadio anti dia manana pana dana dia manana dia manana dia dala dala dala dala dala dala dala	na mainte en angéneriques d'antes a paiste alaitean de mainte de la faire de la faire de la faire de la faire Internet de la faire de la f	
8.14 8.14	A REPORT OF A PARTY OF A	งารสาร วิธารรับสามาร์เป็นสามาร์ เรื่องสาร เรื่องสามาร์เกาะสามาร์ สามาร์ สามาร์ สามาร์ สามาร์ สามาร์ สามาร์ สามา อาการสรารสามาร์ สามาร์ สามาร	ดเสริมสำนักของการสาขางสาขางสาขางสาขางสาขางสาขสมาย เขาสาขางสาขางสาขางสาขางสาขางสาขางสาขางสา	nno - ganzan o manimali jamu ( 1400 - ya galaki kili makimali kula da	
	20	วตั้งเสม ตะหลังที่เป็นประเทศได้ เป็นหรือ เป็นหรือ เตาะให้ ครั้ง สุด ตั้งต่อง การการการให้เป็นที่ การการการการการการการการการการการการการก	ปองปราชาตินนๆ เคราะเห็นได้ เป็นสาราชาตามีสาราชาติน จะต่างจากไม่เลย คายน้ำเก	ill in numinin medi destant filos andalakti daga segi daga pan mula nu daga kasarta Asuri ita generakan an matama analakti ita daga segi daga segi daga segi daga segi daga	รับที่ที่มาสัตว์สมัยหน่าวเป็นสุดชาติมา(จะเชิงจัวไตว์ประกวัตร จ. กลักษณ์สุดที่สุดที่สุดที่มีสายการเขาสาทางสัตว์สุดชิติมาได้เรื่อง
8.14	20 20			اس الا محمد المحمد ا المحمد المحمد المحمد المحمد المحمد	18-rad Pilly John Tichumm dish Talaha dalakan mulai partiti ma tikanan John afa kanan ta manalata kanana dala nama arma mulai dalakan muna muna kanakan dala
8.14 8.14	20 20 30				
8.14 8.14 8.14	20 20 30 30				
8.14 8.14 8.14 8.14 8.14	20 20 30 30 40				
8.14 8.14 8.14 8.14 8.14 8.14	20 20 30 30 40 40				

- 1. The blank table positions without any data represent CEC measurements without any observable migration peaks (all of those conditions had stable and finite electrical current flows).
- Experimental conditions for Nortriptylline migration in Cyano Pentoxy etch modified capillary: L = 33.4 cm; I = 24.9 cm; injection 3 sec at 50 mbar; i.d. = 50 μm; detection wavelength = 254 nm.

Table 26. Summary descriptions of the effects and ranges of the experim	nental
parameters in this study.	

Parameters	Description	This Study
Applied Voltage	10-30 kV; higher V's → higher EOF and better resolution, but more Joule heating	±25 kV
Capillary Temperature	Typically room T; higher T's → Joule heating & band broadening	Controlled Room T (20°C)
	Larger i.d. → higher detection sensitivity, but higher Joule heating & band broadening	i.d. = 50 μm L = 33.4 – 58.2 cm
Buffer pH	Lower pH → decreased EOF Higher pH → increased EOF	pH = 2.14 – 8.14
Organic Modifier		Methanol 0% to 50% v/v

Table 27. The primary experimental variables and their values.

Parameter	Attributes / Values
Capillary Type	Bare Silica, C-18 Modified, Cyano-Pentoxy Modified
Applied Voltage	+25 kV and -25 kV
Methanol Modifier	0%, 10%, 20%, 30%, 40%, 50%
Buffer pH	2.14, 3.00, 4.41, 7.06, 8.14

Table 28. The overall preferred experimental conditions for various compounds evaluated in this study (the pH values for obtaining the greatest numbers of successful measurements are shown).

Capillaries 🔺	Bare Silica	C-18	Cyano Pentoxy
Compounds <b>▼</b>			
Theophylline	pH = <u>4.41</u> , 7.06, 8.14,	pH = <u>7,06</u> , 8,14,	pH = <u>7.06</u> , V=+25 KV;
(greatest # of	V=+25 kV; superior	V=+25 kV; peak w >	peak w < C-18; belter
peaks for pH=7.06)	peak w <c-18 &="" cyano<="" td=""><td>cyano; some tailing</td><td>electromigration</td></c-18>	cyano; some tailing	electromigration
Dyphylline	pH= <u>4.41</u> , 7.06, 8.14,	pH = 7.06, 8.14,	pH= <u>7.06</u> , V⇒25 kV;
(greatest # of	V=+25 KV, superior	V=+25 kV, peak w >	peak w < C-18, belter
peaks for pH=7.06)	peak w <c-18 &="" cyano<="" td=""><td>cyanx, some tailing</td><td>electromigration</td></c-18>	cyanx, some tailing	electromigration
Aminophylline	pH = 4.41, <u>7.06</u> ,	pH = <u>7,06</u> , 8,14,	pH = <u>7.06</u> , V⇒25 kV;
(greatest # of	V=+25 kV; superior	V=+25 kV; peak w >	peak w < C-18; beller
peaks for pH=7.06)	peak w <c-18 &="" cyano<="" td=""><td>cyano, some tailing</td><td>electromigration</td></c-18>	cyano, some tailing	electromigration
Nortriptylline	pH= 2.14, 3.00, 4.41,	pH = 3.00, <b>4.41</b> ,	pH = 2.14, 3.00, <u>4.41,</u>
(greatest#of	V⇒+25 KV; superior	V=+25 kV; peak w >	V=+25 kV; better peak
peaks for pH=4.41)	peak w <c-18 &="" cyano<="" td=""><td>cyano; some tailing</td><td>w &amp; electromigration</td></c-18>	cyano; some tailing	w & electromigration

Table 29. The optimal capillary type, applied voltage polarity, pH value, and Me volume ratio for various compounds evaluated in this study (for obtaining the greatest number of successful measurements and good capillary efficiency).

Compound	Optimal Conditions (greatest # of successful measurements; capillary efficiency)
Theophylline	Cyano Pentoxy; +25 kV; pH = 7.06; 10-50% Me
Dyphylline	Cyano Pentoxy; +25 kV; pH = 7.06; 20-50% Me
Aminophylline	Cyano Pentoxy; +25 kV; pH = 7.06; 10-50% Me
Nortriptylline	Cyano Pentoxy; +25 KV; pH = 4.41; 0-20% & 50% Me