

MASTER'S THESIS

Studies of flow injection system for micelle-assisted preconcentration of PAHs coupled with HPLC

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**Studies of Flow Injection System for Micelle-assisted
Preconcentration of PAHs Coupled with HPLC**

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**A thesis submitted in partial fulfillment of the requirements
for the degree of
Master of Philosophy**

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Abstract

A novel preconcentration and analytical method for polycyclic aromatic hydrocarbons (PAHs) in soil using cloud point methodology was studied and established.

The first part of the research aimed to explore the potential of using surfactant solution to extract organic PAHs in solid matrix, assisted with conventional techniques such as ultrasonic and microwave-assisted extractions. The nonionic surfactant Tergitol 15-S-7 was successfully used as the surfactant-mediated extractant in both ultrasonic and microwave-assisted extractions. Over 90% of recoveries for various PAHs in soil were obtained under the optimal experimental conditions. For the second part of study, an on-line coupling system “flow injection-cloud point preconcentration-high-performance liquid chromatography” (FI-CPP-HPLC) was designed and built. The FI-CPP-HPLC system equipped with a fluorescence detector and an excitation/emission wavelength program was used to preconcentrate and analyze PAHs in the extracts that acquired in previous extractions. The preconcentration system and optimal working conditions were established. The limit of detection of the FI-CPE-HPLC system ranges from 0.101 to 0.456 $\mu\text{g/L}$ for the selected PAHs, i.e., phenanthrene, pyrene, chrysene, benzo[*k*]fluoranthene and benzo[*a*]pyrene.

In the third part of the project, the established method was used to analyze some real

soil samples spiked with PAHs and compare the results with some conventional methods such as gas chromatography–mass spectrometry (GC-MS). At the last stage of research, some further improvement and alternative set up that can sharpen the system analytical abilities were explored. In summary, our proposed technique provides a reliable, simple and automatic analytical method for the determination of PAHs in environmental soil samples.

Table of Contents

Declaration	i
Abstracts	ii
Acknowledgements	iv
Table of Contents	v
List of Tables	x
List of Figures	xi
List of Abbreviations	xiii

CHAPTER ONE

OBJECTIVES AND LITERATURE REVIEW	P.1
1.1 Project Objectives and Outline of Studies	P.1
1.2 Overview of Polycyclic Aromatic Hydrocarbons	P.2
1.2.1 Chemical properties of PAHs	P.3
1.2.2 Fluorescence properties of PAHs	P.4
1.2.3 Selection of PAHs	P.5
1.2.4 Complexity of Soil	P.5
1.2.5 Structure and nature of soil	P.6
1.3 Extraction of Solid Matrix	P.6

1.3.1	Traditional and classical extraction technique	P.7
1.3.2	Ultrasonic-assisted extraction	P.8
1.3.3	Microwave-assisted extraction	P.9
1.4	Overview of Surfactant	P.10
1.4.1	Introduction of surfactant	P.10
1.4.2	Solubility and critical micelle concentration of surfactants	P.14
1.4.2.1	Properties of surfactants solution at critical micelle concentration	P.14
1.4.2.2	Shape of micelle	P.15
1.4.3	Theory and application of cloud point extraction	P.15
1.4.3.1	Cloud point phenomenon	P.15
1.4.3.2	Application of cloud point extraction	P.17
1.4.3.3	Role of cloud point extraction in analytical application	P.18
1.4.3.4	On-line cloud point extraction	P.19
1.4.4	Selection of surfactant	P.23

CHAPTER TWO

	EXPERIMENTAL SECTION	P.24
2.1	Reagents and Apparatus	P.24
2.2	Instrumentation	P.24

2.3	Method	P.25
2.3.1	Method development	P.25
2.3.2	Off-line setup of CPE-HPLC	P.26
2.3.3	On-line setup of CPE-HPLC	P.28
2.3.4	Phase diagram	P.30
2.3.5	Sample preparation	P.31
2.3.5.1	Collection of soil	P.31
2.3.5.2	Soil storage and pre-treatments	P.31
2.3.5.3	Blank test of soil	P.32
2.3.5.4	Spiking of soils	P.32
2.3.6	Ultrasonic-assisted extraction procedures	P.33
2.3.7	Microwave-assisted extraction procedures	P.33
2.3.8	Liquid chromatographic analysis	P.34

CHAPTER THREE

	RESULTS AND DISCUSSION	P.35
3.1	Phase Diagram	P.35
3.2	Chromatographic Analysis on PAHs	P.36
3.3	Extraction Efficiency of Micelle Solution	P.38

3.3.1	Ultrasonic extraction	P.38
3.3.2	Microwave-assisted extraction	P.40
3.3.3	Extraction efficiency - conclusion	P.42
3.4	Off-line Flow Injection CPE	P.42
3.5	On-line Flow Injection CPE	P.45
3.5.1	Effectiveness of the preconcentration column	P.45
3.5.2	Selection of materials in preconcentration column	P.47
3.5.2.1	Silica gel granule	P.49
3.5.2.2	Filter paper	P.49
3.5.2.3	Cotton / Gauze	P.50
3.5.2.4	Silica gel powder	P.52
3.5.2.5	Modification of materials - Conclusion	P.53
3.5.3	Varying the mobile phase composition of HPLC	P.54
3.5.4	Effect of flow rate on HPLC	P.57
3.5.4.1	Separation efficiency at different flow rates	P.59
3.5.5	On-line cloud point preconcentration and liquid chromatographic analysis	P.62
3.5.6	Coupling the ultrasonic and microwave-assisted extractions with on-line FI-CPP-HPLC	P.65

3.5.7	Analytical performance	P.67
3.6	Analysis of Soil Sample	P.69
3.7	Further Improvements on the FI-CPP-HPLC System	P.70
3.7.1	Introduction of “Pressure relieve period”	P.70

CHAPTER FOUR

	CONCLUSION	P.79
4.1	Surfactant	P.79
4.2	Cloud Point Extraction	P.80
4.3	HPLC Analysis	P.83
4.4	Coupling UE and MAE with FI-CPP-HPLC	P.84
4.5	Future Prospect	P.85
	References	P.88
	Publications	P.96
	Poster Presentation	P.96
	Curriculum Vitae	P.97