DETERMINATION OF PESTICIDES IN WATER SAMPLES USING DISPERSIVE LIQUID - LIQUID MICROEXTRACTION (DLLME) AND GAS CHROMATOGRAPHY- MICRO ELECTRON CAPTURE DETECTOR (GC-μECD)

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RESEARCH REPORT SUBMITTED IN FULFILLMNT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE (ANALYTICAL CHEMISTRY AND INSTRUMENTAL ANALYSIS)

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ABSTRACT

The surface modification of magnetic nanoparticles was carried out in order to change the polarities. The coated particles with octyl group on the surface to ensure the attachment of the functional group and hence improved the extraction process in two step of Dispersive Liquid Liquid Microextraction, DLLME method.

Combination of two steps of DLLME method and Gas Chromatography Electron Captured Detector, GC-ECD were used for the extraction and determination of pesticides extracted from water samples (treated waste water, tap water from laboratory and housing area). In this extraction method, CCl_4 was selected as the extraction solvent since it shows the highest relative recovery, 41.20 to 98.30 % and 1-octanol was selected as dispersal solvent with the relative recovery of 29.02 to 81.39 %.

Under the optimum condition, extraction of pesticides residues in treated waste water, tap water (laboratory and housing area) were investigated. Chlorothalonil in treated waste waters shows the highest content (0.6789 μgL^{-1}) compared tap water in laboratory and hosing area, which lies in the values of 0.4781 and 0.4781 μgL^{-1} respectively. The presence of DDT residues in three different types of water were detected at the level of 0.1762 to 0.7173 μgL^{-1}. The residue of DDE detected in treated waste water was 0.2122 μgL^{-1} compared to tap water in housing area (0.1762 μgL^{-1}). However, there are no residues of DDE was detected in tap water collected in laboratory. Chloropyriphos shows the higher percentage recovery compared to the other pesticides residues in the ranges of 43.21 to 86.79 %.

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TABLE OF CONTENT

Original Literary Work Declaration

Abstract i

Acknowledgment ii

Table of Content iii

List of Table iv

List of Figure vi

List of Abbreviation vii

CHAPTER 1 INTRODUCTION

1.1 Pesticides 1

1.2 Historical Development of Pesticides 1

1.3 Pesticides Toxicity in Aquatic System 3

1.4 Effect of Pesticides 5

1.4.1 Human Health 5

1.4.2 Ecological Effect 6

1.5 Pesticide Monitoring in Water 9

1.6 Sample Preparation 13

1.6.1 Dispersive Liquid-Liquid Microextraction (DLLME) 14

1.6.2 Principle of DLLME 15

1.6.3 Advantage and Disadvantages of DLLME 17

1.6.4 Application of DLLME 17

1.7 Objective of this Work 20

CHAPTER 2 METHODOLOGY

2.1 Introduction 21

2.2 Synthesize and Derivatization of Magnetic Nanoparticles 22

2.2.1 Synthesize of Magnetic Nanoparticles 22

2.2.2 Surface Modification of Magnetic Nanoparticles 22

2.2.3 Characterization Magnetic Nanoparticles 23

2.2.3.1 FT-IR 23

2.2.3.2 CHN Analysis 23

2.3 Real Water Samples 23

2.4 Sample Preparation 24

2.5 DLLME Procedures 24

2.6 Instrumental Analysis 25

CHAPTER 3 RESULTS AND DISCUSSION

3.1 Synthesize and Derivatization of Magnetic Nanoparticles 27

3.1.1 Synthesize of Magnetic Nanoparticles 27

3.1.2 Surface Modification on Magnetic Nanoparticles 28

3.2 Characterization of Magnetic Nanoparticles 28

3.2.1 FT-IR Analysis 28

3.2.2 CHN Analysis 31

3.3 Extraction Optimization 32

3.3.1 Organic Solvent Selection. 32

3.3.2 Selection of Disperser Solvent. 35

3.4 Evaluation of the Performance of DLLME with Real Water Analysis 36

CHAPTER 4 CONCLUSION 40

REFERENCES 42

LIST OF TABLE

Table		Page
1.1	Chronology of Pesticides Development	2
1.2	Criteria of the Ecological Impact of Pesticides in Aquatic System	4
1.3	Proportion of Selected pesticides Found in Association with Suspended Sediment	9
1.4	Application of DLLME Coupled with Different Analytical Instruments	19
3.1	FT-IR Band Absorption in modified and Unmodified Magnetic Nanoparticles	29
3.2	CHN Analysis for Magnetic Nanoparticles	31
3.3	Extraction recoveries of different extraction solvents for analysis of OCPs in water samples using DLLME (mean extraction recovery (%) ± standard deviation, SD).	34
3.4	Extraction recoveries of pesticides from waters samples using DLLME method with different dispersal solvents (mean extraction recovery (%) ± standard deviation, SD).	36
3.5	Relative recoveries (RR, %) of OCPs from spiked real water samples using DLLME method[a]	39

LIST OF FIGURE

Figure		Page
1.1	Occurrence of Atrazine	12
1.2	Dispersive Liquid Liquid Microextraction Procedure	16
2.1	Experimental Procedures of Two-step of DLLME	25
3.1a	Unmodified Magnetic Nanoparticles	30
3.1b	Modified Magnetic Nanoparticles	30
3.2	Chromatogram of Original Treated Waste Water (i) and Spiked Treated Waste Water (ii) at the Concentration Levels of 10µg/L for each Pesticides Standard Compound.	37

LIST OF ABBREVIATION

DDT	Dichlorodiphenyltrichloroethane
DDE	Dichlorodiphenyldichloroethylene
LD_{50}	Lethal Dose
WHO	World Health Organization
ADI	Acceptable daily intake
DNA	Double Nucleic Acid
PAHs	Polyaromatic Hydrocarbons
PCBs	Polychlorinated biphenyls
ND	Not Detectable
SPE	solid-phase extraction
MIT	Molecular Imprinting Technique
SPME	Solid-Phase Micro-extraction
SDME	Single-Drop Micro-extraction
HF-LPME	Hollow Fibre-based Liquid-Phase Micro-extraction
GC	Gas Chromatography
HPLC	High Performance Liquid Chromatography
DLLME	Dispersive Liquid-Liquid Micro-extraction
LLE	liquid-liquid Extraction
K	Distribution coefficient
AAS	Atomic Absorption Spectroscopy
GC-FID	Gas Chromatography - Flame Ionization Detector
GC-MS	Gas Chromatography - Mass Spectroscopy
GC-ECD	Gas Chromatography - electron Capture Detector
mmol	Milimol

OCP	Organochlorine Pesticides
ng	nanogram
C_2Cl_4	Tetrachloro ethylene
CH_3Cl	Chloroform
C_6H_5Cl	Chlorobenzene
ACN	Acetonitrile
µg	microgram
L	Litre
MeOH	Methanol
EtOH	Ethanol