

การวิเคราะห์พหุเลขเอสเทอร์บางชนิดในน้ำรัดยการสกัดด้วยวัฏภาคของแข็ง

นางสาว สุภาณี หิรัญธนกิจจากุล



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

ภาควิชาเคมี

บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย

พ.ศ. 2537

ISBN 974-583-709-1

ลิขสิทธิ์ของบัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย

ANALYSIS OF SOME PHTHALATE ESTERS IN WATER BY
SOLID PHASE EXTRACTION

Miss Supanee Hiruntanakitjakul.

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science

Department of Chemistry

Graduate School

Chulalongkorn University

1994

ISBN 974-583-709-1

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Thesis Title Analysis of Some Phthalate Esters in Water by
 Solid Phase Extraction
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พิมพ์ต้นฉบับบทคัดย่อวิทยานิพนธ์ภายในกรอบสี่เหลี่ยมเพียงแผ่นเดียว

สุภาณี หิรัญธนกิจจากุล : การวิเคราะห์พทาเลทเอสเทอร์บางชนิดในน้ำโดยการสกัดด้วยวัฏภาคของแข็ง (ANALYSIS OF SOME PHTHALATE ESTERS IN WATER BY SOLID PHASE EXTRACTION) อาจารย์ที่ปรึกษา :

ดร. วราภรณ์ ลิพิพัฒน์ไพบูลย์, 186 หน้า. ISBN 974-583-709-1

การสกัดด้วยวัฏภาคของแข็งเป็นเทคนิคการเตรียมตัวอย่างซึ่งนำมาใช้ในการพัฒนาการวิเคราะห์พทาเลทเอสเทอร์บางชนิดในน้ำได้แก่ โดเมทิลพทาเลท ไดเอทิลพทาเลท ไดนอร์มัลบิวทิลพทาเลท บิวทิลเบนซิลพทาเลท ไดบูเอทิลเฮกซิลพทาเลทและไดนอร์มัลออกทิลพทาเลท โดยทำการสกัดสารละลายตัวอย่างในน้ำด้วยออกตะเตซิลที่เกิดพันธะกับซิลิกา (octadecyl bonded silica) แล้วนำสิ่งที่ได้จากการสกัดปริมาณน้อยนี้ไปวิเคราะห์หาปริมาณด้วยเครื่องแก๊สโครมาโทกราฟีที่ใช้เครื่องตรวจวัดชนิดเฟลมไอออไนเซชัน งานวิจัยนี้ได้ทำการศึกษาและประเมินค่าปัจจัยต่างๆที่มีผลต่อประสิทธิภาพการสกัด ได้แก่ สภาพความเป็นกรด-เบสของสารละลายที่นำมาสกัด ปริมาณวัฏภาคของแข็ง ชนิดและปริมาณของตัวชะ ผลการศึกษาพบว่าสภาวะการสกัดด้วยวัฏภาคของแข็งที่เหมาะสมสำหรับการวิเคราะห์สารเหล่านี้ในตัวอย่างน้ำคือ ควบคุมสภาพความเป็นกรด-เบสของสารละลายที่ค่า 2.0 ปริมาณวัฏภาคของแข็ง 500 มิลลิกรัม และโทลูอินเป็นตัวชะปริมาตร 3.0 มิลลิลิตร เทคนิคนี้สามารถตรวจวัดสารประเภทนี้ในตัวอย่างน้ำได้ที่ระดับต่ำที่สุดในช่วง 0.51 ถึง 1.26 ส่วนในพันล้านส่วน (ppb) โดยมีประสิทธิภาพการสกัดอยู่ในช่วงร้อยละ 88.01 ถึง 105.24 และมีค่าความเบี่ยงเบนมาตรฐานสัมพัทธ์ (% RSD) อยู่ในช่วงร้อยละ 1.37 ถึง 2.66 ความถูกต้องของการวิเคราะห์โดยเทคนิคนี้ พบว่ามีความผิดพลาดอยู่ร้อยละ 0.03 ถึง 2.00 และเมื่อใช้เอทิลอะซิเตตซึ่งมีความเป็นพิษน้อยกว่าโทลูอินเป็นตัวชะจะให้ประสิทธิภาพการสกัดอยู่ในช่วงร้อยละ 87.42 ถึง 95.75 และมีค่าความเบี่ยงเบนมาตรฐานสัมพัทธ์ระหว่างร้อยละ 1.59 ถึง 2.81 นอกจากนี้ได้นำเทคนิคนี้มาประยุกต์หาปริมาณพทาเลทเอสเทอร์เหล่านี้ในตัวอย่างน้ำจากสิ่งแวดล้อมด้วย

ภาควิชาเคมี.....
สาขาวิชาเคมีวิเคราะห์.....
ปีการศึกษา2536.....

ลายมือชื่อนิสิตสุภาณี หิรัญธนกิจจากุล.....
ลายมือชื่ออาจารย์ที่ปรึกษาวราภรณ์ ลิพิพัฒน์ไพบูลย์.....
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม

##C325203 : MAJOR CHEMISTRY

KEY WORD: PHTHALATE ESTER / SOLID PHASE EXTRACTION / WATER POLLUTION

SUPANEE HIRUNTANAKITJAKUL : ANALYSIS OF SOME PHTHALATE ESTERS IN WATER BY SOLID PHASE EXTRACTION. THESIS ADVISOR :

Dr.VARAPORN LEEPIPATPIBOON, Dh.C. 186 pp. ISBN 974-583-709-1

Solid Phase extraction (SPE) is the sample preparation technique that has been developed for the determination of some phthalate esters, i.e., dimethylphthalate, diethylphthalate, dibutylphthalate, butylbenzylphthalate, di(2-ethylhexyl)phthalate and di-n-octylphthalate. This technique involves extraction of aqueous solutions by using C₁₈ SPE cartridge and the small volume of extract. is analyzed by a gas chromatograph equipped with flame ionization detector. Various factors having effect on the percent recovery, i.e., the pH of solution, the sorbent mass, the eluting solvents and the elution volume are studied and evaluated. The pH value of solution at 2.0, 500 mg of sorbent mass, toluene as eluting solvent and 3.0 mL of toluene are chosen as optimal conditions of solid phase extraction for the analysis of phthalate esters in water samples. The method detection limit of this technique is in the range of 0.51 - 1.26 ppb for all studied compounds. The percent recoveries of the phthalate esters are in the range of 105.24- 88.01 % with \pm 1.37- 2.66 % RSD. The accuracy of this technique is also studied and the percent errors are in the range of 0.03- 2.00 % at the ppb level of concentration. Ethyl acetate which is less toxic than toluene is an alternative for eluting solvent giving the percent recoveries of phthalate esters in the range of 87.42-95.75 % with \pm 1.59- 2.81 % RSD. Moreover, the developed technique is also applied to analyze these phthalate esters in real water samples.

ภาควิชา.....เคมี.....

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ACKNOWLEDGEMENTS



The author wishes to express her deepest gratitude to her advisor, Dr. Varaporn Leepipatpiboon, for her kindness, guidance and assistance. She is also deeply grateful to Dr. Sittichai Leepipatpiboon for his assistance and valuable suggestions. In addition, she wishes to thank the thesis committee for their comments.

She wishes to appreciate Miss Virarat Kammaung, the Director of Toxicology Division, Department of Medical Sciences, Ministry of Public Health for her encouragement.

She is also grateful to the Graduate School, Chulalongkorn University for the financial support.

Finally, she wishes to record her greatest indebtedness to her parents and the family members for their encouragement and understanding throughout the entire course of study.

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