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THE DEVELOPMENT OF HEADSPACE TECHNIQUE FOR ANALYSIS OF
SOME SEMIVOLATILE ORGANIC COMPOUNDS IN WATER

Miss Sujinda Rojanasaksothorn

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for the Degree of Master of Science
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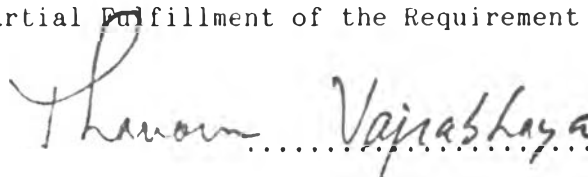
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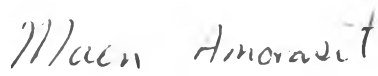
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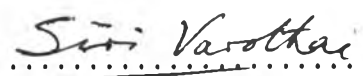
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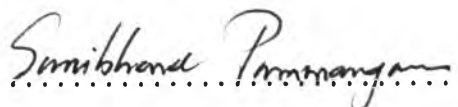
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สุจินดา โจรนศักดิ์โสธร : การพัฒนาเฮดสเปสเทคนิคเพื่อใช้วิเคราะห์สารอินทรีย์กึ่งระเหย
 บางตัวในน้ำ (THE DEVELOPMENT OF HEADSPACE TECHNIQUE FOR ANALYSIS OF
 SOME SEMIVOLATILE ORGANIC COMPOUNDS IN WATER) อ.ที่ปรึกษา : ดร.สิทธิชัย
 ลิขิตพันธ์ไพบูลย์, 128 หน้า.

เฮดสเปสเทคนิคถูกพัฒนาขึ้นมาเพื่อใช้ในการวิเคราะห์สารอินทรีย์กึ่งระเหยในน้ำ เช่น
 เอทิลเบนซีน คลอโรเบนซีน 1,2-ไดคลอโรเบนซีน 1,3-ไดคลอโรเบนซีน และ 1,4-ไดคลอโรเบนซีน
 โดยทำการศึกษาปัจจัยต่าง ๆ ที่มีผลต่อเซนซิวิตี (sensitivity) และประสิทธิภาพของการสกัด
 (percent recovery) ได้แก่ เวลาที่ระบบเข้าสู่สมดุล อุณหภูมิ อัตราส่วนของปริมาตรน้ำต่ออากาศ
 ปริมาตรของเฮดสเปสแก๊สที่ใช้ในการวิเคราะห์ และการเติมเกลือโซเดียมคลอไรด์ และเกลือโซเดียม-
 ซัลเฟต ผลการศึกษาพบว่าการใช้อุณหภูมิ 45.0°C เป็นเวลา 30 นาที ด้วยอัตราส่วนน้ำต่ออากาศ
 25:35 ปริมาตรของเฮดสเปสแก๊ส 2.00 ลูกบาศก์มิลลิเมตร และใช้เกลือโซเดียมซัลเฟต 10.00 กรัม
 เป็นสภาวะที่เหมาะสมที่สุดของการวิเคราะห์โดยเฮดสเปสเทคนิค ซึ่งสามารถที่จะนำมาใช้กับการ
 วิเคราะห์สารอินทรีย์กึ่งระเหยในตัวอย่างน้ำ เทคนิคนี้สามารถตรวจวัดสารประเภทนี้ในตัวอย่างน้ำได้
 ต่ำถึง 1.00 ส่วนในพันล้านส่วน (ppb) โดยมีประสิทธิภาพการสกัดสารอินทรีย์กึ่งระเหยอยู่ในช่วง
 53.30-91.51 % และมีค่าเบี่ยงเบนมาตรฐานสัมพัทธ์ (%RSD) ระหว่าง 0.77-10.62 % นอกจากนี้
 ยังได้ศึกษาความถูกต้องในการวิเคราะห์ด้วยเทคนิคนี้ โดยวิธีเอ็กซ์เทอร์นัลสแตนดาร์ดไทเซชัน
 (external standardization method) และวิธีสแตนดาร์ดแอดดิชัน (standard addition
 method) พบว่าเปอร์เซ็นต์ของความผิดพลาดนั้นน้อยกว่า 11.63 % จากการเก็บตัวอย่างน้ำทั้งจาก
 สระน้ำภายในจุฬาลงกรณ์มหาวิทยาลัย 3 แห่ง มาตรวจวิเคราะห์ด้วยเทคนิคนี้ พบว่าตัวอย่างน้ำทั้งที่เก็บ
 จากสระน้ำหลังตึกเคมี 2 มีปริมาณคลอโรเบนซีนอยู่ 0.06 ส่วนในพันล้านส่วน

ภาควิชาเคมี
 สาขาวิชาเคมีวิเคราะห์
 ปีการศึกษา2531

ลายมือชื่อนิสิตสุจินดา โจรนศักดิ์โสธร
 ลายมือชื่ออาจารย์ที่ปรึกษาสิทธิชัย ลิขิตพันธ์ไพบูลย์

SUJINDA ROJANASAKSOTHORN : THE DEVELOPMENT OF HEADSPACE TECHNIQUE
FOR ANALYSIS OF SOME SEMIVOLATILE ORGANIC COMPOUNDS IN WATER.

THESIS ADVISOR : SITTICHAJ LEEPIPATPIBOON, Ph.D. 128 PP.

A headspace technique has been developed for the determination of semivolatile organic compounds i.e., ethylbenzene, chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene and 1,4-dichlorobenzene in water samples. The various factors having the effect on sensitivity and percent recovery, i.e., equilibration time, temperature, phase ratio, injection volume, and salting out with NaCl and anhydrous Na_2SO_4 were studied and evaluated. The temperature of 45.0°C , equilibration time of 30 min, the liquid to gas phase ratio of 25:35, 2.00 mL of injection volume, and salting out with 10.00 g of anhydrous Na_2SO_4 were chosen as an optimum headspace analysis condition for the analysis of the semivolatile organic compounds in water samples. The detection limit of this technique was less than 1.00 ppb ($\mu\text{g/L}$) for all studied compounds and the percent recoveries of semivolatile organic compounds were in the ranges of 53.30-91.51 % with 0.77-10.62 % %RSD. The accuracy of this technique was also studied by two different methods, i.e., external standardization and standard addition methods and the % errors found were less than 11.63 % at the ppb level of concentration. In addition, the wastewater samples collected from three pools in Chulalongkorn University were analyzed and one of them collected from the pool behind Chemistry Building 2 seemed to have chlorobenzene and its content in the water sample was 0.60 ppb.

ภาควิชาเคมี.....
สาขาวิชาเคมีวิเคราะห์.....
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ลายมือชื่อนิสิตสิริหัตถ์ โสภณศักดิ์/สธ.....
ลายมือชื่ออาจารย์ที่ปรึกษาSujinda Rojanasaksothorn.....

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